Hypnotic Mindcontrol Workshop

Elements in Strategy

Presented

by

Mr. Augusto C. Mel

This world is a **world** of *worlds*.
Our imagination dreams of itself . . .
as we find ourselves *here* and **now**.

Foreward

And ye shall know the truth, and the truth shall make ye free. - John 8: 32
Inscription found in lobby of C.I.A. Headquarters - Langley, VA.

In the summer of 1985, an article from the Journal of Professional & Ethical Hypnosis tried to warn us about the dangers of **becoming hypnotized without our awareness.** It suggested that without a working knowledge of hypnosis, we might not be able to consciously detect any trance behavior taking place anywhere around us **right NOW, at this very moment.** And while it's possible to find ourselves suddenly pondering what might seem mysterious and unknown, the hypnotic technique of using certain words in a specific structure might easily guide anyone listening into **becoming deeply and totally entranced…**

> *Sure, I suppose I'd be curious about the power of words too. Iif they could help me to understand what it's like to find myself noticing these words asking me to notice finding myself noticing. Trance is such an amazing thing, especially when we're asked to notice it.*
> *Charles A. Sherwood*

Life is a mixture of experience with the strategies **you** use, those used on **you** and those around **you**. While organizations use hypnotic persuasion to get you to be something, new behavior is molded and outcomes are shaped in ways that parallel brainwashing. To gain back conscious control, educate yourself with powerful ideas and strategies. There's good news, you **can** and could teach yourself. What you believe in, can **change** you.

What you are reading right now possesses powerful hypnotic qualities. While most real information is kept out of public view, it's also been right in front of us all along. Hypnosis does exist and Subconscious talk is real.

Understanding the importance of *building a better working knowledge of hypnosis* becomes urgently clear again in the speech "The Battle for your Mind: persuasion & brainwashing techniques being used on the public today". It was delivered to the World Congress of Professional Hypnotists in 1995 and the title clearly said it all: These techniques are **already** being used on us all the time, everyday. It's now not even a question of how, but why.

Many of the subjects covered in this workshop come from copyrighted patents, scientific research, and unclassified-top secret material. These ideas belong to all of us, since they can help us help ourselves in defining the possible limits of our own unconscious freedom. Our minds are naturally free. As science and technology improve with time, so do the strategies their research reveals. One such strategy was to utilize a fully functional understanding of hypnosis. It reveals the way a human mind can be structured, disassembled, shaped and re-organized. It's the strategy of understanding and utilizing *Hypnotic Mindcontrol*. It's all about life, all about you.

When reading **Hypnotic Mindcontrol Workshop®,** discover for yourself that the mind functions more effectively when operating with a practical understanding of hypnosis. Decipher a lesson based on learning what control of an idea like "Hypnosis" can mean. Understand its power can have amazing effects. *Perhaps even now it's as if some of you may have already realized there's something going on under the surface of all communication.* If you did, *you're right!!* It's always up to you to make sense of it all anyhow. This workshop is structured **for exploring** different realities at your own pace using hypnotic ideas, language and behavior that shape **our world**.

Enjoy.

Mr. Augusto C. Mel

Table of Contents

Table of Contents

Sub-Natural Strategy

- **Sub-Natural Strategy:** *patents, research and technology leading us into the next century*

  - **History of Experiments:** *the science of Mindcontrol Technology®*

Indirect and Subliminal Communication: *Weber, Miller and other cornerstones of research into the unconscious mind*
CIA Study: THE OPERATIONAL POTENTIAL OF SUBLIMINAL PERCEPTION by Richard Gafford -1958
Subliminal Telecasts, the FCC and denials from 1958
CONSCIOUSNESS- C.O. Evans & J. Fudjack -Addendum A - The Concept of Generalized Reality-Orientation
Pavlov, Russian Woodpeckers, Chinese-North Korean Brainwashing and the American Neurophone
The History of Mind Control: *Lecture by Dr. Alan Scheflin*
Mk-Ultra & Intelligent Interrogation ®
KUBARK COUNTERINTELLIGENCE INTERROGATION - July 1963
CIA Human Resource Exploitation Training Manual - 1983
Diary - "School of the Americas," *Fort Benning, Georgia*
CIA Study: HYPNOSIS IN INTERROGATION by Edward F. Deshere-1960
WHITE PAPER- Effects of GHz Radiation on the Human Nervous System *by Harian E. Girard, Philadelphia- January 1991*

  - **Psychotronic Devices**

Radio-Frequency Brain Wave Technology: ***Psychological Operations Groups (PSYOP-S)***
Subliminal Messages and Commercial Uses-Information Warfare
Carrier Waves
Psychotronic Weapons
Radio Frequency Weapons
US5973999 Acoustic Cannon
E.M.D.R.
The Telephone "*Works*"
US6358201 Method and apparatus for facilitating physiological coherence and autonomic balance
Brainwashing - by John Mark Ockerbloom
US6506148 Nervous System Manipulation by EM Fields from Monitors (TV and Computer) (Heartbeat)
US Patent Application # 20020188164 - NERVOUS SYSTEM MANIPULATION BY ELECTROMAGNETIC FIELDS FROM MONITORS

EKG's, emotional signature clustering, patented technology and beyond:
US4335710 Device for the induction of specific brain wave patterns - white noise
US4395600 Auditory subliminal message system and method - Anti-shoplifting device
US4717343 Method of changing a person's behavior
US4777529 Auditory subliminal programming system
US4834701 Apparatus for inducing frequency reduction in brain wave
US5151080 Method and Apparatus for inducing and establishing a changed state of consciousness
US5159703 Silent subliminal presentation system
US6024700 System and Method for Detecting a thought and generating a control instruction in response thereto
US6219657 Device and Method for Creation of Emotions
US6258022 Behavior Modification
US6358201 Method and apparatus for facilitating physiological coherence and autonomic balance

Terminology & Related Research Topics:
½ Hz Autonomic Sensory Resonance Frequency
2.5 Hz Cortical Sensory Resonance Frequency
*Positive "S"(+S) emotional signature cluster modification strategiesAmbient Radio (a*R *) and Ambient TV (aTV)*
United States Patent Application # 20020173823 - Sense organs synthesizer
Micro Burst and Down Burst Systems Technology - Project H.A.A.R.P.
US NAVY CONTRACT FOR ULTRASONIC ACOUSTIC HETERODYNING TECHNOLOGY
HAARP - by Dr. Nick Begich & Jeane Manning
US4686605 Method and apparatus for altering a region in the earth's atmosphere, ionosphere, and/or magnetosphere
US4712155 Method and apparatus for creating an artificial electron cyclotron heating region of plasma
US5777476 Ground global tomography(CGT)using modulation of ionospheric electrojets
FACTS & FIGURES -APPLICATIONS IN SCIENCE

  - **Trance-forming the history of mankind**

The mathematical languages of Artificial Intelligence**:** *Patents, the future and the strategy of being you*

US5507291 *Methods and Apparatus for Remotely Determining Information as to a persons Emotional State*
US5539705 *Ultra-Sonic Speech Translator and Communication System*
US6011991 *Communications System and Method Inducing Brain Wave Analysis and/or use of brain activity*
US6017302 *Subliminal acoustic manipulation of nervous systems*
US6135944 *Method of Inducing Harmonious States of Being*
CIA Study: A BIBLE LESSON ON SPYING by John M. Cardwell, 1978
FORENSIC APPLICATION OF HYPNOSIS by Inspector Marx Howell

Conclusion -Appendix

US2304095 Method and apparatus for inducing and sustaining sleep
US3060795 Apparatus for producing visual stimulation
US3278676 Apparatus for producing visual and auditory stimulation
US3393279 Nervous System Excitation Device
US3398810 Ultrasonic Sound Beam
US3568347 Psycho-Acoustic Projector
US3576185 Sleep inducing method and arrangement using modulated sound and light
US3612211 Method of producing locally occurring infrasound
US3613069 Sonar System
US3629521 Hearing Systems
US3647970 Method and system for simplifying speech wave forms-Neurophone
US3712292 Method and apparatus for producing swept FM Audio signal patterns for inducing sleep
US3773049 Apparatus for treatment of neuropsychic & somatic diseases with heat light sound & VHF electromagnetic radiation
US3782006 Means & methods to assist people in building up aversion to undesirable habits
US3884218 Method of inducing and maintaining various stages of sleep in the human being
US3951134 Apparatus and method for remotely monitoring and altering brain waves
US3967616 Multi channel system for & multi factorial method of controlling the nervous system of a living organism
US4006291 Three dimensional television system
US4141344 Sound Recording System
US4227516 Apparatus for Electro-Physiological Stimulation
US4315501 Learning Relaxation Device
US4315502 Frequency Stimulation Device
US4335710 Device for the induction of specific brain wave patterns
US4349898 Sonic Weapon System
US4388918 Mental Harmonization Process
US4395600 Auditory subliminal message system and method
US4572449 Method for Stimulating the falling asleep and/or relaxing behavior in a person
US4616261 Method and apparatus for generating subliminal visual messages
US4686605 Method and apparatus for altering a region in the earth's atmosphere, ionosphere, and/or magnetosphere
US4692118 Video Subconscious Display Attachment
US4699153 System for accessing verbal psycho-biological conditions of a subject
US4712155 Method and apparatus for creating an artificial electron cyclotron heating region of plasma
US4717343 Method of changing a person's behavior
US4734037 Message Screen (Subliminal)
US4777529 Auditory subliminal programming system
US4821326 Non-Audible Speech Generation Method & Apparatus
US4834701 Apparatus for inducing frequency reduction in brain wave
US4858612 Electromagnetic Interaction with biological system-ground wave emergency network 800mhz
US4877027 Hearing System (Microwave)
US4883067 Method and Apparatus for Translating EEG into Music
US4889526 Noninvasive Method and Apparatus for Modulating Brain Signals
US4940058 Cryogenic Remote Sensing Physiograph
US5017143 Method and apparatus for producing subliminal images
US5036858 Method and Apparatus for changing Brain Wave Frequency
US5123899 Method and system for altering consciousness
US5134484 Superimposing Method and Apparatus Useful for Subliminal Messages
US5135468 Method and Apparatus for varying the brain state of a person by means of an audio signal
US5151080 Method and apparatus for inducing and establishing a changed state of consciousness
US5159703 Silent subliminal presentation system
US5170381 Method for mixing audio subliminal recording
US5213562 Method of inducing mental, emotional and physical states of consciousness, including specific mental activity in human beings
US5218374 Power Beaming System with printer circuit radiating elements having resonating cavities

US5221962 Subliminal device having manual adjustment of perception level of subliminal correlates
US5224864 Method of recording and reproducing subliminal signals that are 180" out of phase
US5270800 Subliminal message generator
US3278676 Method and apparatus for cyclic scanning of images
US5289438 Method and System for Altering Consciousness
US5330414 Brain Wave Inducing Apparatus
US5352181 Method and recording for producing sounds and messages to achieve alpha and Theta brainwave states and positive emotional states in humans
US5356368 Method and Apparatus for Inducing Desired States of Consciousness
US5425699 Method of modifying human behavior using signal triggered post-hypnotic suggestion
US5450859 Protection of living systems from adverse effects of electric, magnetic and electromagnetic fields
US5507291 Method and Apparatus for Remotely Determining Information as to a Person's Emotional State
US5539705 Ultra Sonic Speech Translator and Communication System (DE-AC05-840R21400-Martin Marietta Energy Systems, Inc.
US5544665 Protection of living systems from adverse effects of electric, magnetic and electromagnetic fields
US5551879 Dream State Teaching Machine
US5557199 Magnetic Resonance Monitor
US5562597 Method and Apparatus for Reducing Physiological Stress
US5577041 Method of Controlling a Personal Communication System
US5586967 Method and Recording for Producing Sounds & Messages to achieve Alpha and Beta Wave States
US5644363 Apparatus for superimposing visual subliminal instructional materials on a video signal
US5675103 Non-Lethal Tetanizing Weapon
US5729694 Speech Coding, Reconstruction and Recognition using Acoustics and Electromagnetic Waves
US5777476 Ground global tomography(CGT)using modulation of ionospheric electrojets
US5784124 Supraliminal Method of Education with particular application behavior modification
US5800481 Thermal excitation of sensory resonance's
US5823932 Apparatus and method for modifying human behavior by triggering positive and aversive post-hypnotic suggestions
US5830064 Apparatus and method for distinguishing events which collectively exceed chance expectations and thereby controlling an output
US5864517 Pulsed Combustion Acoustic Wave Generator
US5889870 Acoustic Heterodyne device and method
US5919679 Method and Apparatus for altering Ionic interactions with magnetic fields
US5935054 Magnetic Excitation of Sensory Resonances
US5954629 Brain wave inducing system
US5973999 Acoustic Cannon
US5997464 Magnetic coil for pulsed electromagnetic Field
US6011991 Communication System and Method Inducing Brain Wave Analysis and/or use of Brain Wave Activity
US6017302 Subliminal Acoustic Manipulation of Nervous Systems
US6024700 System and Method for Detecting Thought and Generating Control Instruction in Response Thereto
US6052336 Apparatus and method of broadcasting audible sound using ultrasonic sound as a carrier
US6067468 Apparatus for monitoring a person's psycho-physiological condition
US6081774 Electric Fringe Filed Generator for Manipulating Nervous Systems
US6091994 Pulsative Manipulation of Nervous Systems
US6135944 Method of Inducing Harmonious States of Being
US6167304 Pulse Variability in Electric Field Manipulation of Nervous Systems
US6203486 Earth-Magnetic Field Augmenters
US6219657 Device and Method for Creation of Emotions
US6258022 Behavior Modification-using Hypnosis
US6358201 Method and apparatus for facilitating physiological coherence and autonomic balance
US6506148 Nervous System Manipulation by EM Fields from Monitors (TV and Computer) (Heartbeat)
DE19713947a1 Unknown
JP11042282a2 Hypnosis accelerating apparatus
WO09802200a Behavior modification
N Chomsky- Syntactic Structures: Mouton, The Hague. 1957 / Language and the Mind: New York. HBJ, Inc. 1968
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Introduction

Rest assured, things are not always as they seem. For example, this workshop is put together in such a way that hypnosis is explained to the reader overtly and used covertly to help learners help themselves. Hypnosis in and of itself can merely be a word that is spoken, written down or something thought of in abstract ways. It can be used functionally or not used at all. The end user can only manifest it's forces by having the skills necessary. Although all of us manifest unconscious processes, very few understand how they work. Some already believe that its power is hidden in each of us and conclude that we make what we will out of that power. The point of this effort for me is to deliver a message to you, right here: **NOW.**

We live each day going in and out of different mental and physical states, dipping in and out of consciousness. It's all naturally occurring. So by recalling something as simple as a daydream we can reconnect with all the necessary ingredients found in hypnotic behavior. Hypnosis is real, whether we know it or not - everyone is still affected. Research not only vindicates **Hypnosis as real,** but most Mindcontrol research using hypnosis remains classified and out of public reach. Hidden truths exist. This workship will combine elements of scientific reasoning to show you how this world manifests it's illusions. The idea of Elements in Strategy is to give the reader knowledge and information for self awareness. I go about this in many ways. Using hypnotic techniques in my workshops helps accelerate material absorption rates in learners. They get a unique perspective into an invisible world that's the most powerful psychological force in life. Mastering these concepts and ideas will help enhance life experiences.

It's been taught that using hypnosis begins with understanding and utilizing what's already there. Setting the pace of any reality means accepting and utilizing what's already given. To entrance, you can entrain. Securing attention and guiding the direction of focus is part of our daily interaction, it's a naturally occurring action-energy/phenomena found throughout all of my life and yours too. Because of our mixed states of consciousness, we can sometimes **become totally unaware** of our own conscious attention. This happens quite naturally throughout our interactions and environment. We respond to minimal cues, indirect associative and ideodynamic focusing (Hypnotherapy/Rossi-Erickson) mostly without being aware of it consciously. Often referred to as an "Unconscious" response, an indirect suggestion can be used to direct the focus on reading words from a page like this just now. The response is quite natural. Natural spontaneous things happen, it's called Life. We all communicate, some just better than others.

> *"You can dream you're awake even though you're in a trance.....Or you can act as if you're in a trance even while awake. Now, in a moment your eyes will open but you don't need to awaken. Or you can awaken when your eyes open, but without remembering what happened when they were closed. "*
>
> *Double Disassociation Double Bind -"Hypnotherapy-Rossi/Erickson pp46-48*

> *" Another way to nonverbally pace and lead is to synchronize one of your behavioral parameters- You might nod your head subtly every time the subjects blinks his eyes and then begin to nod occasionally when the subject is not blinking. This can be gradually increased to the point that you can illicit eyelid flutters from the subject, a response that can be easily utilized to develop a trance"*
>
> *Cross behavioral pacing and leading – Ericksonian Approaches to Clinical Hypnosis - Gilligan pp91*

> *"Mixed state communication is very, very powerful because rather than putting people into a deep trance and making it difficult to talk to them, why not keep their conscious mind around so that you can consult it from time to time… A basic form of indirect suggestion is to raise a relevant topic without directing it in any obvious manner to the patient."*
>
> *Richard Bandler*

> *"The hypnotist works to secure and hold the subject's attentional processes, thereby making it possible to access unconscious processes to develop hypnotic experiences"*
>
> *Herbert S. Lustig*

Our reality is constantly changing every second of every minute of everyday and at some point we might become *entranced.* In each instance when a person isn't paying attention, something is still going on and sometimes anything can be dropped in. During mixed states of consciousness things that are in our awareness can be modified, focus becomes worked/relinquished and something can be slipped in. It's what a particular song or a familiar moment does to us mentally, hypnotically. We can even become anchored to a state, entranced and "Hypnotized without our awareness". It doesn't even matter whether we believe that it's true or not because hypnosis occurs **anytime, anyplace and anywhere.**

Hypnosis

Hypnosis

Trance and *Hypnotically Induced Altered States of Mind*

Hypnosis is induced. Whether you believe it exists or whether we, are in fact, *having this conversation already:* it's all just a matter of perspective. Trance and Hypnotically induced altered states of mind occur everyday.

Some take advantage of this type of knowledge Advertisers are just one example; they know all too well what they're doing inside our minds and hearts. They know what makes us tick. What they do really works well. *Making us do something we might not ordinarily do or hadn't thought of is what they officially do …remember* **?**

In 1956, a Doctor at MIT named George A. Miller wrote about how much the human mind can process in " The Magic Number 7+/-2 ". Some Agency Groups have been using the psychology of persuasion to increase sales for many years now and if you don't think they have any influence on you or those around you… you're just not being realistic- they've got your name, they've got your number!!! Getting us to buy is what they're usually after but sometimes *something else is happening*: **Reality is shaped and defined by suggestion.** Our realities stack in infinite ways, some know the combination unlocking the unconscious.

> *"Man is not only a biological organism but also a social one. His behavior is modified by and in turn modifies the behavior of others"*
>
> *pp5 Psychology- The Fundamentals of Human Adjustment by Norman L. Munn*

Hypnosis...what trance?? What the heck's this ALL about anyway right? Well, most people think that they're consciously awake most of the time but it's not true. Luckily for you one of the very first ideas to help you in creating a tangible understanding of hypnosis has been reached. You've already been reading about it and the idea is simply this: **Hypnosis exists -** *regardless of our knowledge or acceptance of its powers to shape behavior and manipulate outcomes*. You can start by first examining your own interactions with others.

The very first theory is about you, yes... **You!!** You and the way you look at things, the way they sound, feel, smell and taste. In fact anything that describes experience in relation to you has the ability to affect you by altering your reality and even possibly allowing you (and others) to exhibit hypnotic phenomena.

What you **focus your attention** on is all-important. Although these are simply words on a page they represent ideas with much implication. By paying attention, **you're able read** and use your own logic to create an understanding of these symbols, these letters and words represent for you and the world around you. Maybe by paying any attention at all hypnosis has already happened. It's not always up to you now…

> *"You can induce trance most subtly and easily by simply letting a person focus on what is of most interest to them Trance is initiated when they become absorbed in something they are really interested in. This is the basis of all indirect induction of trance ".*
>
> *Pp368-Hypnotherapy-Erickson-Rossi*

For most people, reality is what we **pay attention** to and what we **focus** on. It's what we **think** we **know**. How we communicate is often overlooked. Verbal and non-verbal aspects of communication have often been a misunderstood process in our reality. They play a big role in our self-expression and interpretations of reality. By studying them we have gained new strategies for inducing and eliciting responses that are at times, "Hypnotic in nature". We can learn to teach ourselves "Multi-level communication and indirect suggestion" both of which "Occur naturally, spontaneously and usually without much conscious knowledge" (J. Zieg). We can also research the strategy of building response potential to minimal cues. We can utilize concepts like pacing and leading to do more with hypnosis.

This brings us now to the unfortunate fact that many are interested in manipulation. Governments and Religions wash the brain well. People hurt each other on even the most basic levels. The world has suffered enough. Love has always been the answer. With that being said let us continue to **learn more about hypnosis**. The next passage is from "Building Resistance" by R. Eichlow and I've found it particularly helpful in understanding why hypnosis is so important for everyday people and everyday life.

"One's fund of general information (e.g. philosophy, comparative religion and history) can be vital in resisting manipulation. Perhaps more important, however, is an awareness of the limits of one's knowledge base, and a willingness to add knowledge when one is unsure of the validity of what is being said."

- *It is possible to be hypnotized without being aware of the induction process. Most hypnotic phenomena, including carrying out posthypnotic suggestions, have been produced in subjects who were not aware of being in hypnosis (Erickson, Rossi, & Rossi, 1976).*

- *Hypnosis begins with a shift in attention (Hilgard, 1968). Attention is normally motile. That is, it is dynamic and is relatively freely focused on a variety of events within a large perceptual field; it moves back and forth between the external (e.g. actions and events "outside" the self) and the internal (e.g. thoughts and feelings). Trance is a state that involves relatively focused, fixed or immotile attention. Corollary: anyone or anything that results in decreased motility of attention is highly likely to induce an altered state of consciousness ("trance") whether or not it is labeled "hypnosis."*

- *The language of hypnosis is marked by vagueness, overgeneralizations, metaphors and abstractions. Classical inductions are not the only way to "talk hypnosis" (although they can be found in many "meditation" techniques not overtly labeled as hypnosis). Nonclassical inductions use "normal" conversation and storytelling, often directed at more than one representational system (e.g. sight, sound and touch) to shift attention, in part by activating the subject's tendency to search within him- or herself in order to find ways of relating what is being said now to experiences in the past (Bandler & Grinder, 1975). Corollary: words that sound "deep" or meaningful but feel confusing (and/or strangely calming) can induce trance outside the subject's awareness.*

- *In trance, memories, fantasies, feelings and thoughts are often experienced more vividly and intensely than they are in the normal "waking" state (Hilgard, 1981). If a person is unaware of being in trance, or is unfamiliar or unconvinced of the phenomenon of hypnotic enhancement of perception, fantasy and suggestibility, then that person is likely to attribute the vividness and intensity of the trance experience to some special characteristic of the message and/or communicator. That is, the person links his/her feelings of intensity with what has been said or who has said it, not with how (i.e. hypnotically) it was said. The message is therefore experienced as "more real" or "more true" than other messages, and the communicator of the message is endowed with extraordinary (or even supernatural) characteristics or skills.*

- *Hypnosis involves powerful transference. The induction process involves establishing and utilizing rapport, and hypnosis is perhaps first and foremost an interpersonal process (Fromm, 1979). Most subjects, after being hypnotized, feel closer, more trusting, and more positively about their operator than before. It is always more difficult to objectively assess someone (or what that someone says) after a powerful transference relationship has developed.*

- *Hypnosis involves the suspension of "normal" logic. Trance logic is characterized by, among other things, lack of criticalness and the ability to hold two contradictory beliefs as true without one canceling out the other (Orne, 1959). Thus, in trance one can have the sensation of cold and still be aware of being seated in a warm, heated room. Corollary: in trance, people can accept notions or ideas that they would otherwise reject because they contradict other beliefs known to be based in reality. For example, the members of one Hindu-based cult believe that the space program is a hoax and yet may listen to and accept weather reports based on satellite pictures.*

Ordinary people unknowingly create contexts in suggestion using ideas like double binds, the building of 'Yes-sets' and reverse psychology. Most of us do it unconsciously as we talk away with each much like we do already everyday, we're having conversations like usual and after a while trance would occur and what not might happen and B O O M !!! What just happened right? The point is that living exposes you to this.

So it all comes into play naturally as we SHARE EXPERIENCE TOGETHER, we interact and focus shifts from one thing to another. People do this with each other automatically, it's our way of communicating although few can acknowledge this consciously the way I have for you just now. We process many things unconsciously as we are entranced. It's fun to be enchanted and carried away, ...right?

Some of us experiment with using different names, creating new personalities and becoming a different person. This allowed us an opportunity to experiment on ourselves, to learn and grow with life. We can use these changes to make powerful rapport with life. We can take it all to another level by tweaking our personalities. This happens to be the way we naturally develop maturity and a solid character anyway. So as we create our own adjustments in approach, we can better calibrate ourselves with life using the degrees of control brought on by a fully functional understanding of hypnosis.

After a while I won't have to repeat myself anymore. You'll **begin to understand** why I emphasize self-research. I've come to the understanding that hypnosis has been studied thoroughly and its knowledge has been well documented. It's part of everyday life so if you study hypnosis, you'll soon discover that it's the motivation behind everything. Your unconscious mind listens and obeys within certain contexts. Those who don't know the rules on how it works are at the mercy of senselessness.

Today we can gain new insight with these words which have been arranged to help readers understand one possible way of sizing up our situation. Throughout our day we go about our business thinking that our actions and re-actions are all random events but they are not. There's a defined structure to human behavior and its secrets are known. The idea of altered states of consciousness and the mechanics of hypnotic induction are said to have structures that can be consciously utilized to interjunct reality.

Have you ever had a "Jingle" stuck in your head? It's because you have anchors that trigger responses in you. It's an intelligence based on the Hypnotic Utilization of Reality: **Hypnosis is real**. The whole point in this section is to keep things simple, hypnosis exists and you have a choice: learn it and use it or don't and be in the dark. Trance and Hypnotically induced altered states of mind are easy to construct if you know what you're doing and what to search for in situations that make it so. **Anchoring is real.**

You may have realized by now that Hypnotic inductions are everywhere. A simple little fan, it's blades can change your state with the right vibrations, fish in an aquarium, strobe lighting, practically anything that has the ability to capture your imagination can hypnotize you. Actually, it's you that allows and enables yourself naturally to shift states of consciousness. Where you wind up is another state, maybe a hypnotic trance state. Trance states can occur naturally or they can be conjured up. Hypnosis is the understanding of induction structure - the things that can make us change our state of consciousness. Practically any state can be induced. So remember, **Inductions into hypnosis are everywhere**.

Natural Strategy

Natural Strategy

Understanding ourselves and the way we communicate

Understanding ourselves and the way we communicate, it's a simple strategy to have. In life, experience revolves all around you. Your strategies determine your understanding of any reality you might have or that could be shared. Natural Strategy is all **you**, it's what you make life itself out to be.

Your state of mind is affected by a lot. Our emotions can be easily triggered, creating an altered state of mind. They are easy to induce, they usually occur all by themselves. An altered state happens quite naturally while driving down the road and getting sleepy or zoning out while reading these words.

The point is this: In an attempt to understand ourselves everyday, we should examine our ways of thinking, our version of reality. Here we can discover the filters of our self-imposed limitations using our knowledge of hypnosis to unleash the powerful focus of attention in our lives and be here now.

We communicate our reality both consciously and unconsciously. The processing of all information happens on many levels and those that understand multi-level communication can manipulate reality with much more effectiveness and grace than someone without this way of using their imagination. Still, these manipulations can happen "Naturally "and *they are all Natural Strategies*. It's when we resort to manipulating environmental factors that we start to experience the sub-natural. That's later…

After spending a couple of years thinking about a way to make all of this material easier to understand, I condensed it all into two distinct ways or strategies of inducing hypnotic behavior/waking suggestion in a person or group of people. Still, much research remains classified.

Natural Strategies *are methods which induce hypnotic behavior and induce waking suggestion "Naturally"- as it would* naturally *occur in regular, everyday experience.* Natural Strategies are also the strategies we use to live our life, the ideas we have in our mental toolbox and which we use to make now a fine time. We can utilize knowledge of naturally occurring hypnotic states to hypnotize ourselves and each other. Natural Strategies are "Machine free" ways of induction. Natural Strategies induce hypnosis through natural means using either verbal and/or nonverbal contexts in communication. Consciously learning these methods require gaining a functional understanding of what governs hypnotic behavior to consciously induce hypnotic modification and test these Ideas. Typically people communicate unconsciously and may employ these strategies "Naturally" without knowing it. Examples are powerful preachers and politicians. **The utilization of naturally occurring mixed states of consciousness make it easy for anyone to develop mastery of hypnotic controls.** We can choose to create our own customized uptime strategy, avoiding downtime/Tranderivational search within ourselves. Utilizing communication at the content level instead of the process level (where analog messages are being marked out by the unconscious) allows us to act beneficially, easily keeping us focused. The whole point is self empowerment, we can do it!

Sub-Natural Strategies *are those methods which induce hypnotic behavior and waking suggestion "Sub-naturally".* These types of strategies use machines and advanced scientific technology to hypnotize a subject. Sub-natural Strategies induce hypnosis by applying the laws of hypnosis, subliminal communication and para-psychophysical manipulation of the human nervous system. All together they form a purposeful " Invisible and Silent " way of modifying behavior and contexts. This type of strategy is usually kept top secret. Some argue that it's best if people were made to believe these strategies don't exist. It's research is old. As far back as the mid 1800's, E.H. Weber measured sensory experience and experimental findings bore a formula with his name. **The subliminal age was born soon after Fechner published Elements of Psychophysics in 1860**

We will discuss innovative research and concepts in the field of hypnotic communication. We will examine Hypnotic Rapport, Representational Systems, Mixed State Communication, Anchoring, Unconscious Behavior, Resistance, Uptime Strategy and more. We'll discover some ideas by Bill O'Connell and Stephen Lankton. We'll examine the Boundaries of Suggestion. Words lead the way.

Hypnotic Rapport: *Matching, Mirroring, Pacing and Leading*

Rapport is just a word and hypnotic rapport makes two. To some, these words might describe a possible conscious/unconscious connection things may exhibit. It's typically an unconscious relationship that occurs when people establish a mutual point in reality that may or may not possess hypnotic characteristics. Some say it's an invisible bond in between people; a few even call it rapport.

Some people like **you**, for instance, could build rapport with others in many ways. By simply agreeing with them, by talking at the same speed, with the same tone and tempo you can begin to become more alike and develop strong rapport. Through mirroring and matching behavior we can begin a biofeedback loop that connects us " HYPNOTICALLY" and induces by pacing with words and actions to represent the ongoing experience of the person you are maintaining rapport with. Gaining rapport helps us to lead hypnotically. You might even **choose** to be in rapport with someone or not at all. This is where an understanding of pacing and leading becomes practical. Pacing and Leading a person's focus of attention can take us along to anywhere at anytime in anyplace. Rapport can be very powerful and understanding it's key elements can help make sense of hypnosis. Rapport can be very hypnotic. You can create it and you can destroy it, it's "Hypnotic Rapport ".

To better understand the basics of Hypnotic Rapport, we can review some material from the experts.

"Notice what people respond to naturally…… So if you begin matching someone else's behavior, either verbally or nonverbally, it puts you in the position of being able to vary what you do and to have them follow"

Pp13-15 Transformations, Bandler & Grinder

" In clinical settings, Milton used his voice and his body similarly. By deliberately and systematically modulating his voice tone and tempo, and altering his body's position and movement, he was able to "Train" his patients to receive subliminal messages the he was transmitting to them. It was not uncommon for patients to receive two messages simultaneously, sometimes even within the same sentence. The first message was sent with one particular vocal or tempo (Body position and movement) and the second message was communicated with a different tone or tempo (body position and movement). This complex technique was just an elaboration of the methods that farmers had used to train animals back in Wisconsin when Milton was a boy."

Pp460 Hypnotherapy - 1979 Rossi and Erickson

"In addition to matching peoples experience with your statements to get rapport, you'll need to be able to do something with the rapport you'll have. The key to this is being able to make transitions. You'll need to have a graceful way of guiding someone from his present state into a trance state - going from describing his present state to describing the state you want him to go. Using transitional words allows you to do this smoothly"

Pp16 Tranceformations - 1983 Bandler & Grinder

"Beginning with sensory based information allows you to make transitions and elicit responses that induce altered states. The sensory base for transitions needs to be something that the person whom you are working can find. It doesn't need to be something he already has in his awareness but something that he can find."

Pp17 Tranceformations - 1983 Bandler & Grinder

"Hypnosis itself, as far as I'm concerned, is simply using yourself as a biofeedback mechanism. You were doing that when you matched the other persons breathing rate with your voice tempo. Your behavior became and ongoing feedback mechanism for his behavior. Whether you're going to use altered states for inducing personal change, for some medical purpose, for the purpose of relaxing , or as a form of meditation, the things that allow you to be able to respond to another human being by going into an altered state are not genetically predetermined. They're simply the mechanisms of communication"

P12 Tranceformations - 1983 Bandler & Grinder

Hypnotic rapport can **be** had between two people or a group. Usually people are in rapport unconsciously but a practical knowledge of hypnosis can change that. One thing you'll have to pay attention to are your senses. Later on you'll read about what happens when you start working with representational systems. The main point now is that unconsciously, we all communicate with each other. It's happening all the time. We "Pace "each other to communicate. Sometimes we even lead.

In order to understand and assess the current situation, time is spent communicating verbally and non-verbally. The fact of the matter is that we **already do** experience rapport in our reality but much happens on an unconscious level. We either do it rather well or we don't know what we're doing (and it's hit or miss). It's all part of our inherited nature to have a focus and a limited consciousness. The science of hypnosis is an amazing thing because it allows us to begin to understand what we are all doing unconsciously, consciously. It's how we are and why we are each connected by experience.

You can understand rapport as many things, a new set of ideas, perhaps a new way of working with things that makes more sense. You might even find it here in these pages trying to understand you. You could begin to think somehow that matching, mirroring, pacing and leading are ALL strategies that we already live with. In that sense, it is true. While salesmen, politicians and the clergy use it, we all are affected by what's on our mind, our current state and our process in thinking. We all display the characteristics of self-hypnosis, imposed by limitations set forth upon our unconscious. Hypnotic structuring of unconscious biofeedback loops enable us to communicate our thoughts to ourselves and each other. That could be something I might call rapport, it may now begin to mean something to you.

Matching, Mirroring, Pacing and Leading

> *Pacing and Leading is a pattern that is evident in almost everything we do. If done gracefully and smoothly it will work with anyone, including catatonics.*
>
> *Pp80 Frogs into Princes NLP*

As I mentioned earlier, the big challenge in writing this book came with trying to interpret hypnosis in such a manner that even the most unskilled reader could easily understand it. We could have begun by discussing Generalized Reality Orientation (Shor-1959) but where would that possibly have gotten us? Hopefully you're beginning to see my point. Instead of going right into some raw data, digging up clues to where we've been, let's now instead discuss Matching, Mirroring, Pacing and Leading. These are the basic elements that you can use to better understand the concept of *Hypnotic Rapport* and how *Hypnosis occurs*. You can utilize these strategies to induce highly suggestive states.

Matching: Matching Modes, Representational Systems and whatever is going on ...on all input and output channels available.

Mirroring: To copy, mimic and or otherwise imitate movements, gestures, patterns and anything else that one can mirror.

1) Direct Mirroring-nonverbal pacing technique whereby you mirror the exact channel
2) Cross Over Mirroring- nonverbal pacing technique whereby you substitute one nonverbal channel for another or "Switch channels"'being mirrored.

Pacing: Pacing the ongoing experience, done both verbally and non-verbally. You can match and mirror to pace.

Leading: Leading the ongoing experience with the intent of moving someone into varying degrees of hypnotic states

Establishing Hypnotic Rapport is very easy using strategies in Matching, Mirroring, Pacing and Leading. All you have to do is know that they exist and start paying more attention to what you are already doing. The concept of building Hypnotic Rapport explains pacing as an exercise in matching and mirroring. When you pace somebody, you get into their world and can match and mirror consciously and/or unconsciously. It's all so natural when we try to understand each other that we try to see/hear/feel from the others point of view using our own point. It is something that is naturally occurring yet mostly an unconscious process. So when we are building rapport, we are attempting to pace someone and this can be done verbally and/or non-verbally. When pacing, we can lead. I highly recommend the 5-4-3-2-1 pacing and leading exercise from the book "Trance-formations ".

Pp 16 - "To build Rapport, we work on building response attentiveness" Hypnotherapy/Rossi Erickson

The idea of building Hypnotic Rapport using Matching, Mirroring, Pacing and Leading.... is that it can get you to start thinking in new ways. You can make finer distinctions in your experience and that of others. That's when we start separating and categorizing different channels of experience. They can be the channels of Kinesthetic, Olfactory, Visual and Auditory experience. There's input and output, and there's internal and external. This will allow us to categorize experience into smaller "Chunks" which we can all thank George A. Miller for (The magic Number 7 plus or minus 2). His paper helps us realize there's only so much we average humans can hold in conscious thought before we start becoming overloaded. We will discuss that further on in the workshop. We should also thank Erickson, Bandler, Grinder and many others too. Repetition is the key to Mastery. Read their books, I highly recommend them to anyone interested in learning more about NLP, Hypnosis and Mindcontrol.

Altered states of consciousness and the mechanisms of induction are said to have structures that can be consciously utilized to interjunct reality. Something as simple as a metronome or dangling tree limb can alter states "Hypnotically ". This is where building Hypnotic Rapport plays its part. Let's take a moment to examine Dr. Charles Tart who defined "d-Soc" or discrete state of consciousness for a given individual as:

> *"A Unique configuration or system of psychological structures or subsystems, a configuration that maintains it's integrity or identity as a recognizable system in spite of various (small) changes in the subsystems. The system, the d-Soc, maintains it's identity because various stabilization process modify subsystem variations so that they do not destroy the integrity of the system. "*
>
> *Pp11* CONSCIOUSNESS© *C.O. Evans & J. Fudjack Addendum A - The Concept of Generalized Reality-Orientation*

To better understand hypnotic rapport, we must begin to dissect communication and find out what's in the core. We communicate through five sensory modes: Kinesthetic, Olfactory, Auditory, Gustatory and Visually. These five Representational Systems can help us to understand hypnotic states as modal shifts in trance. Understanding Transderivational search and transformational grammar can help us to understand hypnotic patter as the structured use of forms. It's gets deeper, so hang on…

> *Telemarketers pace and lead the attention. Like Hollywood, in order to maximize a suggestions powerful effect, lines are written out which they also call a "Script ". The effect of embedded patter can be quite jaunty.*
>
> *Charles A. Sherwood*

Representational Systems: *4 tuples, overlap combinations in unconscious processing and hypnotic induction*

We ALL use representational systems. We all access ALL experience. We do so consciously and unconsciously with each of our five senses, called modes. We experience reality as best we can in whatever way we can. With the right use of these systems, the right combination can lead anyone into an experience of hypnosis. Therapists use it to heal, salesmen use it to sell, and clergy use it to save souls. Here we will use them to examine experience itself. Are you paying attention?

"If people were to recognize what was really happening… what would they do?"
Charles A. Sherwood

For now, rest assured that the "Hypnotic Experience" has been investigated by many. Mainstream research includes the works of Milton Erickson, Gregory Bateson, Richard Bandler and John Grinder. Some research has gone as far as making equations out of human experience and have created an elaborate " Hypnotic Calculus " out of these modes, out of consciousness thereby defining the unconscious and its channels using mathematical language and computers. Today's research uses formulas based on "Emotional Signature Clusters". Even more highly classified experiments exist, all in an effort to control the parameters of reality and experience. Most are developed secretly of course.

A 4-tuple is just an easy of way of categorizing human experience and interaction using a specific time-state based on internally and externally generated sensory points. It's a way of describing the things that are going on and what goes right past us. It's a good way of defining the limits of our conscious and unconscious minds. This formula can help us understand hypnosis as an experience-state in space and time. So, as each of us weaves in and out of different states of consciousness we can use all sorts of different combinations of 4-tuple, interpreting experience and living life with whatever potential we give it.

> *"Once you understand the limitations of consciousness you can begin to understand both the necessity and usefulness of unconscious programming behavior."*
> *Pp73- patterns of the hypnotic techniques of Milton H. Erickson MD II*

To learn about communication models, surface and deep structures, examine the concepts found in transformational grammar. Chomsky, Bateson and heck, even George A. Miller can all be thanked for helping us with our investigation of the wonderful ideas based on Transderivational Search and Representational Systems. Why should we? Well because there's alot of detail found in communication and reality. Hypnosis exists in this twilight of meanings and action. To learn more about these theories, I recommend reading "The Structure of Magic & Patterns I&II series " by Bandler and Grinder. Essentially, 4-tuples are used to define structure and quantify overlap combinations in unconscious processing and induction. Like confusion, The Milton model, pacing and leading…..these are *all* strategies leading to **Hypnotic Mindcontrol®**.

4 tuples

"The 4- tuple is a visual representation of experience which looks like < V, K, Aŧ O > i

Where:
V = visual mode
K = kinesthetic mode
Aŧ = auditory tonal mode
O = olfactory mode
i = the referential index of the experiencer

The 4 - tuple is a way of visually representing a persons experience at any point in time. The 4 - tuple claims that for the purposes of a model of effective hypnotic communication, a person's primary experience at a moment in time can be represented adequately by a description of their visual, kinesthetic, auditory tonal and olfactory experience."
Pp. 11 Patterns of the hypnotic techniques of Milton H. Erickson MD II-Bandler, Grinder, Deloizer

And there you have it, 4 tuple is just a name for an equation that is used to represent ongoing experiences. Why is it important? Well, because it can help explain hypnosis as variations in experience either internally or externally generated. Transformational grammar explains communication as an exchange or combination of deep and surface structures. It can also be a mathematical language used to understand human behavior, modify ourselves and induce hypnosis.

Calibration is found in the book "Trance-formations"- Bandler/Grinder - it describes calibration as an exercise in calibrating ourselves with another person's representational system, their map of the world.

Overlap combinations in unconscious processing

" Once an effective pace is established within the clients own representational system, the hypnotist may begin to lead the client to an altered state of consciousness by finding the point of overlap between some experience in that representational system and that same experience in one of the associated representational systems not normally a part of the clients ongoing experience

Pp 31-32 patterns II of the hypnotic techniques of Milton H. Erickson MD

When you begin to understand representational systems, you'll notice odd things happen when certain modes are overlapped onto each other, cycling together and mixing into experience over time. Unconscious processing of information becomes more fluid in its structure when you understand that we have different operators functioning (*L, C and R operators*) creating 5 tuples. It can then become a matter of studying and applying structure to this hypnotic learning about hypnosis for you to understand that Overlap Combinations in Unconscious Processing can be unavoidably hypnotic and skillfully applied. Do you hear what I'm saying, see what I'm talking about or feel what I'm doing?? Yeah, OK - I don't believe you. It took me years to learn this stuff; I suggest you do some reading up.

"Listening to the client's use of predicates for identifying the clients most highly valued representational system will allow the hypnotist to decide whether a visualization (or whichever) accessing induction will be effective."

Pp187- patterns of the hypnotic techniques of Milton H. Erickson MD I

Bringing people from one state of consciousness to another can be done easily. One effective way is by overlapping representational systems. When we communicate conversationally it happens and altering focus is part of the process. Predicates can be found and utilized. You can calibrate yourself to a person in hypnotic ways. People have a main representational system they use to interpret reality, a sensory mode that leads the others in conscious awareness. This will usually free up other modes and channels making them unconscious in their awareness. Shifting modally in-between sensory experiences, internally and externally can access unconscious processing. Overlap combinations are just one way to unlock the door of hypnotic phenomena. Deep Trance is one possible outcome of overlapping representational systems. Different combinations can create different states. Experiment!!

Hypnotic induction

There are many ways of inducing trance. Hypnotic interaction can help provide a simple bio-feedback loop using verbal and nonverbal communication components. A person can be paced and lead and it can be called an "Induction". Induction is also a word that could represent the process of going from any state to one of increased suggestibility and relaxation. In an altered state some people might exhibit hypnotic phenomena quickly. There could also be an unlimited amount of inductions for an unlimited amount of people. In other words there are many ways and plenty of techniques, it's all a relative function of an individuals programming. Anyone can be hypnotized, even you.

Excerpts from Ericksonian Approaches to Clinical Hypnosis by Stephen Gilligan pp92
"The Main Strategies or principles that an Ericksonian Hypnotist uses to induce trance are

1. *Secure and maintain the subject's attentional absorption;*
2. *Access and develop unconscious processes (associational strategies ;*
3. *Pace and distract conscious processes (disassociational strategies)*

Mixed State Communication: *The Milton Model, Hypnotic Language patterns and the Interspersal Technique*

"Trance: It is a subjective internal experience whose behavioral manifestations will vary across individuals."
Pp 88-89 Tranceformations- Banldler-Grinder

Communication is very important. Within its structure is the understanding that every definition has **a different reality for everyone.** We communicate with ourselves and each other, on many different levels. Since we all operate within our own mixed states of awareness, we are limited in our communication strategies and respond to things, which can be out of our normal conscious awareness. This split in awareness means people can be communicated with, their states can be changed or mixed without them knowing, without them resisting.

In Patterns II, page 88 it goes on to say " The systematic accessing of 4 tuples by tracking or sequencing, whether overt or covert, with or without anchors, offers a structure for communication of multiple messages in ways that give meaning to the principal of maximal direction

By now you should have noticed hypnosis, trance and mixed state communication occurring naturally and spontaneously in all environments, even your own. Mixed state communication is real. Investigate US Patent # 6,506,148 and discover its madness.

" One response that's very useful to illicit when doing hypnosis is the experience that one's unconscious is wise and can be trusted. What are universal experiences in which people respond appropriately without thinking about it consciously?...You can talk about how you when you run, your body knows just when to make your heart beat faster, and your breathing faster, and when to slow them down again. Consciously, you have no idea just how fast your heart should beat in order to get the appropriate amount of oxygen into your cells, and there's no need to, because your unconscious has a wisdom about how and when such things should occur. "

Pp 136 Tranceformations- Banldler-Grinder

I encourage you to study from the work of Milton H. Erickson MD. There's definitely a lot more to know about theories, techniques and what the big picture looks like. For now, learn the basics…

THE MILTON MODEL: The Milton Model is a MODEL of patterns (verbal-nonverbal) that can be used for the induction of hypnotic work. It's a set of descriptions that help give a structure to process of hypnotic induction. It's based on the ways we generalize, delete, distort our experience and more…

HYPNOTIC LANGUAGE PATTERNS: Language patterns spoken with the intent of producing hypnotic response. Effects are compounded when used with the appropriate nonverbal gestures and analog marking (the marking out some of the words in the communication by tonal shifts, tempo shift, body shifts, small gestures, spatial location, etc…): *Structured patterns can produce hypnotic results.*

"Automatically begin to hear and change the language that has been limiting you and begin to use language to create new possibilities in all areas of your life. Language patterns are one of the most pervasively useful areas of communication, because anytime you are speaking - the words you are saying, and how you say them, makes a tremendous difference...Anytime you are talking with someone, including yourself, it is relevant what words you use. Use language patterns to move yourself and others in a direction that results in a win-win situation."

Advanced Language Patterns Mastery- Larry McLauchlin

THE INTERSPERSAL TECHNIQUE: Dr. Milton H. Erickson interspersed **Direct** and **Indirect** suggestions in various ways. He was shifty, one minute he's talking to you about one thing and next minute he has you doing things, thinking things and whatever else leading up to it all. He could bury meaning and dispense ease. Interspersing Embedded Hypnotic commands was his way, his technique.

"With the advent of modern psychodynamic psychology however, we recognize that the mind is a continual state of growth and change. ...The Interspersal , approach, on the other hand is suitable means of presenting a suggestions in a manner that enables the patients own unconscious to utilize them in its own unique way. The Interspersal approach can operate on many levels. We can within a single sentence intersperse a single word that facilitates the patients associations:

Pp20-The Interspersal approach

Milton Erickson's ideas can never be too **repetitiously impressed upon the mind.** He taught indirect ways to "Manipulate the personality" and **access learning** to promote positive changes within people. Miracles arouse from the changed limitations. He would speak to both a person's conscious and unconscious mind and expected them to be together in the same person. His way was so effective that I'm not really sure why more people don't know about him or his "Hypnotic Technique". The power of thought and communication belong to all of us yet so few know its boundaries.

"Hypnosis is primarily a state in which there's increased responsiveness to ideas of all sorts…and one implores that responsiveness not by trying to force but by trying to illicit an immediate response.."

Milton Erickson- Seminar on Hypnosis- Ocean Monarch, 1957- 4:48

" I think that a good hypnotist understands the value of multi level communication. " Milton was the acknowledged master in transmitting more than one message to a person simultaneously, and in simultaneously transmitting different messages to the members of group confidentially. He accomplishes this by deliberately, systematically and precisely controlling his words, his voice and his body language".

Pp460 Understanding Hypnosis and Ericksonian Techniques - Herbert S. Lustig

To accomplish this "Elicitation of Immediate Response" an operator must have some degree of compliance from the subject-responder. Oftentimes this may be best accomplished in ways that where there's no conscious perception or knowledge of the manipulation occurring. In other words, hypnosis works best when done covertly. The subject is unaware that you may be pacing and leading. This lack of knowledge can be used to elicit responses more readily. A person can be led into unconscious processing or they may just be there already, having arrived there on their own. The experienced operator will pick up on this and simply has better access to the resources that make up the subject's unconscious mind. Understanding the human psyche has been one of mankind's greatest obsessions. Still today, few are even aware that life is affected by the laws of hypnosis yet mankind continues to move forward, bumping into the furniture of a dark room that we have found ourselves in. Wake up!

The basic idea of effective mixed state communication is to guide focus and test suggestibility of whomever hypnosis is to be induced in. Erickson proved he could intersperse suggestions, use verbal and non-verbal communication strategies to elicit powerful responses from his patient's unconscious.

The Double Induction is what makes US Military boot camp so effective. It's an example of the hypnotic trance induction using a simultaneous induction technique on one subject, overwhelming their consciousness and eliciting hypnotic phenomena. Look it up on page 98 of trance formations and also on page 101 of Ericksonian Approaches to Hypnosis and Psychotherapy. There are many different levels of experience and communication. Some levels of access to conscious and/or unconscious processing use models to orient reality and alter focus. We communicate with ourselves and each other on many levels, using our own multi-level communication system. Most of us do this unconsciously but the structure of multi-level communication can be learned and used consciously. For now, we will approach representational systems and Uptime Strategy as the two ways of communicating Experience and Potential Reality Orientation.

So as with Multi level communication Systems, those that can manipulate rapport have an advantage over those who can't. What they do with it can possibly affect all those that are near. What you choose to do or think about while using this material is up to you. I suggest researching the word Karma.

Anchoring: *Digital and Analog Marking - Embedded Commands*

TV commercials often feature an anchoring device. A subconscious trigger than has the ability to recall, influence and unconsciously access state change. One example is a catchy TV jingle which is really nothing more than a powerful anchor. When we hear it and we know what it is.

People anchor things with each unconsciously as well. Anchors can be in any representational system. **We are in a constant mix of changing states** We can be trained to respond through the use of anchors. They are part of our unconscious communication strategy. Our emotions, any activity can be linked to a *trigger* - a switch in our unconscious. Anchors exist and they are everywhere.

We can use analogue and digital pathways to anchor. When we anchor, we save a copy of our experience in our unconscious mind. Trigger it and it brings it back our experience. Here we will discuss the features found in various sources on this interesting subject. The purpose is to show us just how important and necessary this stuff can be to know. If you aren't aware that commands are being imbedded, that your unconscious mind is being communicated with by suggestions having bypassed consciousness and having gone straight to your unconscious- you may as well give up now, go ahead.

"The choice you make about what system you anchor in will determine the kind of response you get. If you want to involve the person's consciousness, anchor in all systems. If you want to be covert and go around a resistant conscious mind, anchor in any system that is not represented in consciousness. If the persons predicates and eye movement patterns give you the information that they are kinesthetic, don't anchor in that system unless you want their conscious resources involved. If you anchor that same person tonally, they have no conscious representation of it. "

pp105 Frogs into Princess. Bandler & Grinder

Every experience includes multiple components: visual, auditory, kinesthetic, olfactory and gustatory. Anchoring refers to the tendency for any one element of an experience to bring back the entire experience

pp 61Trance-formations Bandler & Grinder

" *You can't <u>not</u> anchor. It's only a question of whether you do it in a useful way or not."*

pp 103 Frogs into Princes – Bandler & Grinder

Many products use a jingle within a commercial advertising format to anchor you. Double Reverse-Anchor advertising has created a consumer culture out of human experience. You'll believe it's not possible to notice things that are in the unconscious mind. Look at the box of wheaties, you're on it.

Digital and Analogue marking

Analogue marking - A special kind of anchoring is particularly useful when you want to elicit hypnotic responses. It's called analogue marking and involves marking out certain words nonverbally as you're talking with someone. I can mark out these words as separate messages with my voice tone, a gesture a certain expression or a touch.

Pp63 "Trance-formations " Bandler & Grinder

In other words, we can use anchoring to guide ourselves back or forward anywhere at anytime in anyplace. We can even research a technique called timed distortion. It's a wonderful time machine, which allows us to build new realities, creating new symbols and definitions all along the way. The contents of our unconsciousness can be used as an anchoring tool for self-exploration and to build a better understanding of our behavior and that of others. This power is found in our unconscious mind.

Embedded Commands

With a thorough knowledge of embedded commands, you would be able to easily identify them when they are used. Take Martin Luther King's famous speech where he says " I HAVE A DREAM". With knowledge of embedded commands, his words can begin to take on new meaning and different tone. Have a DREAM, won't you? Sure, don't mind if I do…The structure of words began to make sense to me when I started reading about Linguistics, Logic and Semantical Abstracts. Just like successful ad campaigns on Television or a politician/preacher talking and persuading, they all do what they're designed to do: **access deep structure**. Communication formats that use Embedded Commands, Transderivational Search and Transformational Grammar are everywhere. Let's examine a few examples from the "Experts "on hypnotic technique. I hope you find it useful:

Forms of Indirect Suggestions: Embedded Commands, Questions and Conversational postulates
There are three major types of "Lesser Included Structures" in which a listener responds to unconsciously: *Embedded questions, Embedded Commands and Quotes*

Embedded Questions:

"By skillfully selecting the question which he imbeds, the hypnotist can lead the client in a direction which will accomplish the objectives of the hypnotic work. "Pp238- The Hypnotic Techniques and Patterns of Milton H. Erickson MD, Vol I

Step 1 - Identify the message which you wish someone to receive;
Step 2 - Form a question which will lead the person to the message which you wish them to receive;
Step 3 - Embed the question within a verb to form an embedded or indirect question.

Embedded Commands:

"Presenting the command in a covert way has all the other advantages which we have mentioned previously; e.g., avoids the authoritarian issue and thereby, resistance; engages active participation on the part of the client at the unconscious level of behavior. P 239- Patterns I

Step 1 - Identify some message to which you wish a person to respond;
Step 2 - Form a command with the message;
Step 3- Embed the command into a sentence without making the result ungrammatical.

Quotes:

"The listener's tendency to commit an error of logical typing at the unconscious level- That is to respond to a meta-statement (The quoted material) as though it were at a different logical level." p 240

Step 1 - Identify the message which you wish someone to receive
Step 2 - Form the message into a command
Step 3 - Make up a story in which one of the characters says the command (s) emphatically.

Analogical Communication: Analogical Marking of Verbal Communication:

When these three techniques are combined with Analogical marking, their effectiveness increases tremendously.

Step 1 - Identify the message which you wish someone to receive
Step 2 - Make up a series of sentences which include as a proper subset all of the words which, if they were extracted, would communicate the message directly;
Step 3 - Mark the subset of the words included in the communication Analogically (by tonal shifts, body shifts, tempo shifts, etc.) to communicate the included meanings.

Patterns of the hypnotic techniques of Milton H. Erickson MD II-Bandler, Grinder, Deloizer
Excerpt from pages 107/108

"… Another choice of responding to incongruency is that offered by any of the covert induction techniques we have mentioned earlier. For example, the hypnotist/communicator may choose to question the client closely about his understanding of what a deep trance would be like (working his way systematically through the variables of the 4-tuple). As he does so, he is alert to note the responses by the client and to covertly anchor the responses which in combination will yield the type of the type of altered state which will be useful for the purposes of the hypnotic encounter. The client, of course, is conscious only the he is having a harmless conversation with the hypnotist. Once the components of the altered state the hypnotist desires have been solidly anchored, he need only trigger the anchors for the components simultaneously, and the altered state will result. In making choice about which system to anchor in, the 4-tuple and it's associated R operator provide the hypnotist/communicator with a principled and effective way of deciding- specifically , with incongruent clients, anchor in any system which is ~ R . Another excellent choice with incongruent clients is to converse comfortably with the client about a relatively harmless topic while marking analogically certain portions of the verbal communication for special attention at the unconscious level. Again the R operator indicates which system to use which system to use for the marking of verbal messages – that is any of the ~ R systems. A third class of covert inductions which are effective with incongruent clients are those involving the intersection of TOTE's as detailed in tracking model II. In using this model with incongruent clines the hypnotist/communicator may usefully select 4-tuples which involve TOTE's where the intersection occurs in one of the ~ R systems. For example, if you as the hypnotist were working to get eye closure with a client whose R operator was V using tracking model II, you might have a conversation which included a discussing of among other things: watching a sunrise, diving into cold water, walking down a dusty, dirt road with a lot of traffic on it. Visually (the client's consciousness) these 4-tuples have very little in their intersection but kinesthetically, each includes a TOTE which leads in the direction of eye closure."

The power of questions goes underestimated. The embedding of questions is extremely powerful. Pacing and leading is accomplished naturally. Reading the above excerpt leads us to another theory. One that hypothesizes embedded questions covertly elicit hypnotic response potentials. For example…

Hi, my name is Charles A. Sherwood. I'm a hypnotist; Here are a couple of questions before we get started…

Advanced Language Patterns Mastery: by Larry McLauchlin (1992)

Embedded Commands
(Statements that include indirect commands embedded within the statement itself)

a) We people like yourself, **Jim, attend my seminar** they **get excited** about how they can **make many changes** in their lives**.**
b) When clients **hire my firm, Jim,** all the work we do is to **get results** right **now.**
c) All the experts who study **NLP** in depth **agree with me** that it's the **world's greatest communication model.**

Before we start our interview I'd like to let you know up front that there are some things you may not **want to tell me,** now and I'd like not to **tell me those things** until **you are ready to tell me, Now,** we can **start.**

I'll be glad to help when you **want to talk to me again.**

(Put commands behind modal operators)
If you will **use commands** you will **be amazed** at how you'll be able **to persuade** more rapidly and if you **want to accomplish** this, you will **become driven** to **learn these now.**

Embedded Questions
(Questions that include commands embedded within the question itself)

a) I'm not sure if you want to **make comprehensive changes** enough to **come to my seminar.**
b) Can you **think of all the reasons** that you **want to hire** my firm to **get the results** that you want, **now.**
c) Do you **think that NLP is the greatest communication model** in the world or do you need to know more about it before you **reach that conclusion.**

You may now be noticing things that you didn't before. There's a pattern in all this talk about "Anchoring: Digital and Analogue marking with embedded commands". We do this stuff to each other every day. See what others mark out for you unknowingly, you may be surprised to find out.

Unconscious Behavior: *T.O.T.E.'s Pattern Interrupt, Confusion, Overload and Stacked Realities*

"Confusion and overload can also be accomplished by telling stories involving spatial and/or temporal disorientation."
pp99"Trance-formations" Bandler & Grinder 1982

The patterns of unconscious behavior we humans display is infinite. To understand them is to live wisely. e Pattern Interrupt is one example of how an idea about unconscious behavior can make it possible to accomplish the " Handshake-Interrupt". Milton Erickson was a master of this technique. First we need to understand unconscious behavior and it's least common denominator, the T.O.T.E.

TOT'E's - Plans and the Structure of Behavior: short sequence of behavior occurring at the unconscious level…. "An example of the utilization of a TOTE in the context of hypnosis is the interruption of the standard handshake as the first step in a kinesthetically based trance induction." P 6 patterns II

"In our experience, the trance states which result from the interruption of a tote are typically profound, and deep trance phenomena are comfortably elicited. Further if care is taken to re-orient the client to the exact position at which the interruption occurred and the remainder of the TOTE is executed, the client will have no conscious representation that anything unusual has occurred. In other words, consistent with the interrupted pattern having attained the status of a single unit of behavior at the unconscious level of behavior, any experiences which occur in the interruption can have no conscious representation unless deliberate instructions are given the client to consciously recall those experiences upon awakening."
"pp 6-7 patterns II"

The whole idea of interrupting is gaining control of unconscious behavior, willingly. The whole point is to jam or redirect conscious attention so that unconscious resources can be accessed.

Confusion, Overload and Stacked Realities

All three: Confusion, Overload and Stacked Realities can induce hypnosis. Confusion was used as a hypnotic technique by Milton Erickson to induce trance, psychotherapeutically.

Confusion Technique:

1) Identify a dominant pattern in the subject's behavior.
2) Pace the pattern for a while.
3) Interrupt or overload the pattern in a way which confuses the subject.
4) Amplify the confusion a bit.
5) Use the confusion by introducing a simple leading statement "e.g.. drop into a trance"

pp 98- Ericksonian Approaches to Clinical Hypnosis

Milton Erickson used this technique and others while he talking to both a person's conscious and unconscious. Many attempted to define his hypnotic patter and technique. It wasn't until Patterns I & II that his way was defined in a manner that could be easily understood. As Bandler and Grinder studied Dr. Erickson they formulated understandings based on their own research and that of other intellects like Gregory Bateson (who laid the foundation for their study with Erickson and wrote the book "Steps to an Ecology of Mind") and George A. Miller (who wrote the paper "The Magic Number 7 +/-2" which explored the limits of how much the human mind can hold in conscious thought before experiencing overload). Confusion and Overload both open the door to hypnosis. Realities can be "Stacked" to create/induce a confusing/overload effect and that's when embedded commands have their greatest effect. It's shocking to see this stuff being used commercially to get people to do something without their knowing. Embedded commands, subliminal presentation and more, the point is to gain a better understanding of this stuff for yourself fast, I assure you there's plenty left to know. There's no need to be confused any longer, *continue to read along and begin to build more "Resistance" to brainwashing and unethical manipulation.*

Research proves hypnotic phenomena is real, it can be learned and it can be used. Let's now take a moment to review our own hypnotic understanding. **First,** I would like to impress upon you to remember how easy it is to form ideas. The key to understanding the human mind is inside of you. You are a miracle set in motion, a unique being creating thoughts from within thoughts. Ideas can come from anywhere, including somewhere other than you. **Second**, We can develop our own good hypnotic technique. By *achieving this level of practical understanding* and with *skillful use of these forces in action*, we can make it easy to create a more practical way of impacting world around us.

Here's an interesting little article on how simple and effective confusion can be:

The Hypnotic Power of Confusion
by Joe Vital

"Did you walk to work or carry a lunch?"

Huh?…

My father asked me that question more than 25 years ago. I still remember it. Why? Because it's a ridiculous question.

A famous comedian in the 1950s used to ask people, "Got a banana?" The question might make sense if asked in the right situation, but he asked it everywhere. I've forgotten the name of the comedian, but I still recall his question. Why? Because it's strange.

As I write this, I am creating new business cards for myself. I decided to add a confusing line to it. After some fun brainstorming with my girlfriend, I settled on, "Ask me about the monkey."

Why is "Ask me about the monkey?" worth putting on my business card? As with my father's question and the comedian's question, it stops your brain in its tracks. It makes you pause. It makes you focus on ME. The theory is that once you stop someone with a confusing line, you can then implant a hypnotic command right after it.

In other words, if I write something like, "Apples desk fly dirt," and then follow it with, "Read my new ebook," the chances are very high that you are going to want to read my new ebook.

Why? Because the first line jammed your mind, and the second line slipped into your brain while you weren't looking. I've just upped the odds that you will buy my new e-book. And if you don't, of course, it doesn't matter because I never really told you to go buy it. See? The same thing will happen on my new business cards. Since I'm now known as "The World's First Hypnotic Marketer," I wanted a strange, confusing line on my new card. When someone sees, "Ask me about the monkey," and then asks me about the monkey, I can simply point out that I practice hypnotic selling and I just got them to do what I wanted.

The Japanese practice this "hypnotic confusion," but probably unknowingly. A friend of mine who flew to Japan reported to me that the English phrases on all the Japanese products were bizarre. A tube of toothpaste might say, "Green days you not sing." A box of cookies might say, "Wood above fish."

How can you use this secret right now? Don't be afraid to be confusing. People tend to sort out whatever you say anyway and make sense out of it using their own terms. If you are describing your product in great detail, be willing to toss in something odd. It may increase sales…"

Resistance - *Understanding Resistance and Utilizing Polarity Response*

"What's it like not trying to awaken something deep inside? And don't think about it either."
Charles A. Sherwood

Resistance helps guide us from where we are now, a situation we're in that is causing resistance, to a new situation, one void of resistance and full of compliance. They key is changing what we are doing to doing something else. A persistent hypnotist finds what works best in minimizing resistance. A polarity response is an opposite response. You can use it like a switch that you can flip to turn things around…

> "Negation is particularly effective to use with anyone who has a polarity response. One good way to work through resistance and handle polarities is with the use of tag questions. A tag questions is simply a negation in the form of a question embedded on at the end of a sentence. I've talked about using negation and tag questions. You can have a greater impact if you add the use of embedded commands. Take the statement "And I don't want you to *become more relaxed* as you listen to the sound of my voice." If I change the tempo, pitch, or timbre qualities of my voice when I say "Become **more relaxed**" that instruction is marked out analogically for special attention at the unconscious level. ...You can use embedded commands with or without negation. "As you sit there you can begin to *relax*...Don't *close your eyes* only as fast as your unconscious mind allows you to *remember a pleasant time* from your past when you didn't *feel* too *comfortable*. If you analogically *mark out* the *instructions* you want someone to follow, you will gracefully have more impact.
>
> pp 68-69 Trance-formations Bandler/Grinder

Another important point is what really happens during communication exchange. Shared realities and contexts allow implication to be used by the conscious mind to influence unconscious processes…

> Shock, Surprise and Creative Moments*: Implication and the Implied Directive:*
>
> *Implication is a basic linguistic-psychological form that provides us with the clearest model of the dynamics of indirect suggestion. Most psychotherapists agree that it is not what the therapist says that is important but what the patient hears. That is, the words of the therapist only function as stimuli that set of many personal trains of association within the patient that actually function as a motor vehicle for the therapeutic process. This process can be disrupted when the therapist's innocent remarks have unfortunate implications for the patient, but it can be greatly facilitated when the therapist's words carry implications that evoke latent potentials within the patient. A great deal of communication in daily life as well as in therapy is carried out by implication in a manner that is, for the most part, not consciously planned or even recognized by the participants. We witness this in everyday life when a housewife bangs her pots and pans a bit louder when she is displease with her husband but may hum softly to her self when she is pleased. She may not recognize what she is doing, and her husband may not always know how he is getting the message, but he feels it at some level. Body Language and gesture (Birdwhistell, 1952 1971: Scheflen, 1974) are nonverbal modes of communication that usually function via implications. In such implication the message is not stated directly but is evoked by a progress of inner search and inference. The inner search engages the patient's own unconscious processes that the response that emerges is as much a function of the patient as it is of the therapist. Like all the other forms of indirect suggestions, our psychological use of implication ideally evokes and facilitates the patient's own processes of creativity.*
>
> *What is the value of such implication? Ideally such implications bypass the consciousness and automatically evoke the desired unconscious processes that will facilitate trance induction in a way that the conscious mind could not because it does not know how. We can prepare ourselves to go to sleep, but the conscious mind cannot make it happen. Thus if we directly order a naive patient, "Sit down and to go into trance" (apparently an indirect compound contingent suggestion in itself) he or she may well sit down while politely protesting, " But I've never gone into a trance, and I'm afraid I don't know how." Since the essence of hypnotic suggestion is that responses are carried out at an autonomous or unconscious level, it is usually futile to expect the conscious mind to carry them out via direct suggestion. When direct suggestions are successful, , They usually involve preparation for hypnotic work in the same sense as brushing one's teeth and lying in bed are conscious preparatory acts that set the stage for going to sleep, which is then mediated by unconscious processes. With implication and all other indirect forms of suggestion, we are presuming to do something more: We are making an effort to evoke and facilitate the actual unconscious processes that will create the desired response. As we reflect upon the process of implication, we gradually become aware that everything we say has implications.*
>
> *pp 39 Hypnotherapy -Rossi-Erickson, 1979*

Trance Inducing Words and "Weasel" Phraseology

Overcoming resistance and anchoring products are what advertisers do best. As individuals, we sell ourselves and each other with their ideas and contexts. Manipulation is everywhere. We can investigate how powerful hypnosis has become as a tool of persuasion. This last section is from a set of flash cards based on a seminar by Ross Jeffries on Speed Seduction. He was also a former pupil of Dr. Erickson. Today's world requires an open mind to understand what the implications of mind manipulation really are. Life involves everything. Are you listening? Are you aware?

The purpose of your communication is to get you a result!

The purpose of your communication is not to give an understanding. The purpose of your communication is to get a result!

Super Influence Pattern # 1
Entrain Attention Induce Amplify & Intensify State Link to action

Simple enough - get `em fixated, start `em going, get `em to step on the gas and link to what you want `em to do!

Super Influence Pattern # 2
1. Have you ever X? 2. Give Example 3. Describe Process 4. Optional amplifier: move sub-modalities

This is most useful for complex processes that you want them to run when you aren't even around.

Trance Word # 1
instantaneously

All trance words work because they imply a process that takes place outside of conscious awareness or control. When something happens instantaneously in a person's mind, it's got to come out of an unconscious process.

Trance Word # 2
immediately

Again, when you immediately "realize" or "convince yourself" it's happening out of our control or awareness which means T-R-A-N-C-E!

Trance Word # 3
find yourself

What does it mean to "find yourself" doing something? That it wasn't Consciously planned or executed! Which means T-R-A-N-C-E?

Trance Word # 4
suddenly

Same effect as instantaneously, immediately. It means that the thought comes from another awareness ... the unconscious, T-R-A-N-C-E!

Trance Word # 5
picture

Don't picture yourself having mastered these skills! Picture requires visual internal processing; day dreaming, hallucinating - T-R-A-N-C-E!

Trance Word # 6
suppose

Suppose you were to master these skills! It means the same thing as "imagine." T-R-A-N-C-E!

Trance Word # 8
realize

When will you realize you can master these skills? To realize means to have a thought just suddenly pop up in T-R-A-N-C-E!

Trance Word # 7
convince yourself

Don't convince yourself to master these skills! In order to convince yourself you have to go inside yourself And access all of your internal processes! Very powerful way to induce a T-R-A-N-C-E!

Trance Word # 9
ponder

To ponder means to "mull it over" or "think about it", usually in an altered, day-dream type state. In other words: T-R-A-N-C-E!

Trance Word # 10
mysterious

For whatever mysterious reason, you might realize suddenly that you can master these skills! Mysterious has shades of unknown, hidden, unconscious T-R-A-N-C-E!

Trance Word # 11
imagine

It's not important to me that you imagine having mastery of these skills! To imagine requires using your internal processes visually; similar to day dreaming or hallucinating! In other words …T-R-A-N-C-E!

Trance Word # 12
remember

As you remember a time when you were an exquisite learner, you can realize how easily you can master these skills. Remember means "go inside" and access internally ... T-R-A-N-C-E!

Trance Word # 13
wonder

To wonder requires a state of inner focus, awareness, attention ... T-R-A-N-C-E!

Trance Word # 14
allow

As you allow yourself to master these skills, won't it feel great after you've accomplished it?
To allow something means it will happen without conscious effort; in other words, unconsciously in T-R-A-N-C-E!

Trance Word # 15
curious

Have you ever been curious as to why and when things just happen?
To be curious is to strongly desire to discover what is unknown and making that connection is done in your head. T-R-A-N-C-E!

Trance Word # 16
pretend

Just pretend you are getting all the messages in these cards and that these words are becoming an unconscious part of your vocabulary. To pretend you must go inside and construct something new in T-R-A-N-C-E!

Trance Word # 17
understand

It's only important that you understand what is puzzling only as fast as you master all these induction techniques. Understanding requires you to internally process especially if the statement is vague. Ummmmm, know what I mean. T-R-A-N-C-E!

Trance Word # 18
enchant

Have you ever been enchanted by a person, me, I know its happened.
To be enchanted you must go inside and enhance those images recalled in euphoria. T-R-A-N-C-E!

Trance Word # 19
awaken

It's as if you awaken feelings long lost to the point where you become totally alive again.
What does it mean to awaken something on the inside of your head. T-R-A-N-C-E!

Super Weasel Phrase # 1
Have you ever

The 3 words that open the gates of hell! To ask a person "have you ever" is actually commanding them to go inside and remember when they did, re-experiencing all those feelings! A powerful, no, super powerful way to induce states, triggers processes and influence at all levels! "Have you ever experienced incredible excitement, thinking about mastering new skills?

Super Weasel Phrase # 2
What's it like when?

This super weasel phrase serves the same function as super phrase # 1 - Asking "What's it like" forces the person to go in and recall the circumstance, state or condition. "What's it like when YOU GET VERY SLEEPY?

Weasel Phrase # 1
When you...

"When you" presupposes that you're going to do the thing discussed or enter the state so it's no longer open to debate. "When you get incredibly aroused do you find yourself compelled to act on it?"

Weasel Phrase # 2
What would it be like if ...

This statement is in effect a command for the person to imagine the condition or occurrence named or described after it. "What would it be like if you were to find yourself growing very aroused.

Weasel Phrase # 3
A person can …

By talking about a "person's" experience it deflects any resistance on the part of your subject since you aren't really talking about them. "A person can become incredibly aroused, talking with someone they really like!

Weasel Phrase # 4
If you were to ...

This is a really useful weasel phrase! By saying "if" it deflects resistance while at the same time directing the person to imagine experiencing the condition, feeling or behavior. "If you were to become very aroused ...

Weasel Phrase # 6
It's not necessary to …

An example of negation - by saying your command isn't necessary to - dissipates any resistance. "It's not necessary for you to find me more and more fascinating

"Weasel Phrase # 5
As you...

This phrase presupposes the person will do the behavior or undergo the experience. "As you grow more and more aroused ..."

Weasel Phrase # 7
You really shouldn't …

Another negation pattern. Since you're saying they shouldn't, it's not like you're trying to get them to do it, aren't you!" You really shouldn't think about amazing sex!

Weasel Phrase # 8
You might find (yourself)

Useful as, the start of an intensifying chain of phrases, it implies that they're going to experience what just happens, so not only can they not resist it, but it implies that you had nothing to do with it! "You might find that a picture of you and me being together in a special way pops right into that space in your mind.

Weasel Phrase # 9
to the point where …

Really, this phrase connects one thing they are experiencing with the next thing you want them to - so it's useful both as a connector and amplifier. "You might find those pictures start to get bigger and brighter to the point where that arousal just gets UHH - incredibly intense

Weasel Phrase # 10
Invite you to notice …

Same effect as "you might find" - implies that what you describe is going to happen. Plus, "invite" has pleasant connotations of it being voluntary and polite! "And I invite you to notice how the deep, rich warmth of my voice is beginning to spread…"

Weasel Phrase # 11
Notice what it's like …

Same effect as WP # 10. It implies that the condition or experience is going to take place. Very useful for moving people's internal pictures. "Notice what it's like as that picture, for whatever mysterious reason, pops itself into that location.

Weasel Phrase # 12
What Would it feel (be) like if …

Presumes condition is going to take place plus is very non-threatening as it uses "what if". Note: (Feel variation forces a body sensation) . -- What would it feel like if you were to instantaneously find yourself growing very aroused by the sound of someone's voice?

Weasel Phrase # 13
as to when

This phrase connects and presupposes the thing will happen. You may wonder as to when or what will trigger all of these teachings to flow naturally from your lips and bring you the pleasure you desire.

Weasel Phrase # 14
as if

Connector and enhancer. As you look back on reviewing these cards, I invite you to notice how they have already taken effect it's as if you already knew all this stuff and you are enabled and empowered now to do it. Doesn't it just seem natural and great when you look at it that way, Now.

Uptime Strategy - *Concepts in Positive Living*

> *"By utilizing an Uptime Strategy, a hypnotist/communicator stays in " up-time ' by having no consciousness of the transderivational search process while remaining congruent and creative in his responses. This allows him to have the maximum amount of sensory experience by using his 7+/- chunks of attention focused on externally generated experience."*
>
> *Pp68-- Patterns of the hypnotic techniques of Milton H. Erickson, MD Vol. II*

Once an individual begins to understand hypnosis, oftentimes this new found knowledge manifests itself as new behaviors, new habits of observation and action. This may also make way for personal life improvements. Dare to adventure forward, learning new practical knowledge about the world around you. Sure, it's weird and strange. It's the unusual behavior associated with the deeper cataleptic and somnambulistic trances that seems strange and mysterious and unknown. You'll get used to it. I'll keep talking, you keep reading and we'll work together.

> *"Once you understand the limitations of consciousness you can begin to understand both the necessity and usefulness of unconscious programming behavior."*
>
> *pp 73- Patterns of the hypnotic techniques of Milton H. Erickson, MD Vol. II*

Natural Strategies are methods which induce hypnotic behavior and induce waking suggestion "Naturally"- as it would naturally occur in regular, everyday experience. Natural Strategies are also the strategies we use to live our life, the ideas we have in our mental toolbox and which we use to make now a fine time. We can utilize knowledge of naturally occurring hypnotic states to hypnotize ourselves and each other. Naturally occurring mixed states of consciousness make it easy for anyone to practice hypnosis consciously and unconsciously. We may choose to create their own customized uptime strategy, avoiding downtime/Tranderivational search within uorselves and understanding communication at the content level instead of the process level where analog messages are being marked out for the subconscious to take hold.

Observe. Naturally occurring, mixed states of consciousness exist *naturally in nature*. Make it a habit of staying externally focused and being aware of EVERYTHING-AS MUCH AS POSSIBLE-ALL THE TIME!! In other words, you're not just talking to yourself; instead you are to pay acute attention to the world revolving around you. Every sensory channel is clear and open to pickup input. Again, stay focused on externally occurring events in their sensory modes and input/output channels.

Uptime Strategy exists thanks to the research of Bandler and Grinder. They studied Milton Erickson and explored the value of internally-externally generated 4 tuples. The formal mathematical notation for emotional signature clusters afterwards became the psycho-biological equivalent of mindspeak. Strategies of mind belong to all those seeking concepts in positive living and living a better life. Enjoy it and live it to the fullest. We all make it up as we go anyway so why not choose to give it a positive spin. You have input and generate output. Everything also has a spin, so make sure you spin well.

Just like a gig factor describes "Current Awareness Conditions", using an Uptime strategy helps us to observe with an acute awareness all parameters of the ongoing "Tupleage" or state of experience in time we call now. A hypnotist can pay attention to what's going externally and stay in Uptime to observe effectively. In order to assess the situation, total awareness using an Uptime strategy can mean the difference in who holds the power to control and who moves unknowingly in reaction. When we harness the power of our own imagination to make our lives what we positively wish for, we truly reach our goals magically with our thoughts and move on with our happy evolution.

> *Experimental Introspection : The Nature of Immediate Experience: attempting to analyze experience in process rather than reflecting upon it after it had occurred.*
>
> *Physiological -Psychology Wilhelm Wundt 1961*

Concepts in positive living are collections of great mechanisms which you must create for your self. Your strategies allow you to live a better life. We must be in charge of our own direction; we must plan and decide if we are to say **we're in charge of ourselves**. Freedom is an interesting word that reflects the deep structured tone I want charging this book. This is my own unique Uptime strategy, now go find yours -that's the whole point of everything anyway. What are you waiting for, start now.

Bill O'Connell:
C.O.V.E.R.T. *and* M.A.G.I.C.- *models of Hypnosis*

I first sent away for a video tape on hypnosis that I won on an e-bay auction. It was narrated by Bill O'Connell and called COVERT Hypnosis. He came up with strategies for covertly inducing hypnosis. If you don't know anything about hypnosis, you would have little defense. His strategy was to illicit post hypnotic responses activated by triggers which he formed after he induced some degree of trance using the conversational model of hypnosis. He accomplished this specifically through the use of organized multiple stories, verbal breathing synchronization, encrypted instructions and repackaging sensory input. He called it the COVERT model and strategies like these are very powerful.

Some corporate trainers have been teaching top CEO's these type of strategies for years. They in turn have shared it with others in week-long seminar presentations and retreats. The whole point is that strategies like these exist, they are out there and if you don't know, now maybe you should....

C.O.V.E.R.T. MODEL
The C.O.V.E.R.T. Model of Hypnosis is by Bill O'Connell of Hypnosis Secrets Inc.

C *conversational* model
O *organized* multiple stories
V *verbal* breathing synchronization
E *encrypted* instructions
R *repackaging* sensory input
T *triggering* post-hypnotic instructions

The M.A.G.I.C. model came afterwards. He wanted to press along with a therapeutic perspective of the hypnotic process and developed the MAGIC Model below:

M.A.G.I.C. MODEL

The Magic Model came after as

M *mind*-synch
A *access* problem
G *generate* solutions
I *innovative* suggestion matrix
C *consequential* link

He also said wrote how advertisers use hypnotic techniques:

They grab your attention
They capture your imagination
They induce powerful states of positive emotion
They link those emotions to their product
The result? A post hypnotic suggestion!
And some like..
Anthony Robbins talk extensively about using NLP skillsets as tools

Both models are useful in understanding hypnosis, waking suggestion and the process of Trance. I recommend them as tools to help you better understand the link between hypnosis and everyday life environments. Check them out. Most of these operations are happening everywhere, all by themselves.

Stephen Lankton

Discrete Communications Operations

Here's some basic information about Dr. Stephen Lankton's work in Discrete Communication Operations. It's structured within four analytical schemes: Process Operations, Content Operations, Linguistic Operations and Input Operations. This work dates back 25 years or more and is a good foundation to discuss. I believe it to be relevant in furthering the study of artificial intelligence.

Process Operations: Matching, Reversal and Disruption:

Three patterns are identified by which verbal and/or nonverbal communication is expressed:

Matching involves mirroring the client's communication channel, reflecting the particular mode of the moment. To match movement, gesture, breathing or tone to that of another requires careful attention to the rhythm of change. Matching can be used simultaneously, with other patterns of both a verbal and nonverbal nature.

Reversal involves an opposite response involving a deliberate projection or reverse of what the client is doing. For example, Erickson might speak slowly to a resistant client who is speaking rapidly, while making a paradoxical statement such as "You can't go into a trance."

Disruption is a technique for interrupting the ongoing process and related associations. It may be accomplished in a number of ways, including distraction, humor, making an irrelevant comment and so forth.

Just as several channels of verbal and nonverbal communication may exist at the same time. Two or more of these operations can occur simultaneously. Thus the hypnotist might match voice tone, tempo, volume and body posture while reversing the client's verbal content.

Content Operations: Utilizing Patterns of Influence:

In content operations, one utilizes various patterns to influence client verbal responses-specifying response questions, detailing communications and meta-comments.

A Specifying Response Question is designed to elicit more complete ground information for assessment purposes.

A Detailing Communication specifies desired behavioral responses. For example, Erickson might instruct a client to sit down, lean back uncross your legs like this, and listen to my words. Here, Erickson detailed four responses he expected from the client.

A Meta-Comment is a comment about a communication. Meta-comment refers to both the simple labeling of an event and an ongoing explanation of some experience or communication. In Hypnotherapy, meta-comments allow the hypnotist to subtly shift the meaning an experience or symptom has for the client, as when the hypnotist says " Your unconscious mind wants one thing while your conscious mind wants something else." Jay Haley (1963) speculated that Erickson employed such content operations to achieve therapeutic control.

Both process and content channels can be used singly or in combination. For example: the hypnotist could match body posture, voice tone and breathing of the client, while meta-commenting, " I', going to tell you the real reason why you came to see me today.' Then follow with the detailing communication, "...so sit down in that chair, relax, close your eyes and listen to my words." The very next moment, the hypnotist might employ a process reversal like, " Not that fast, I don't want you to go into a trance this soon," thus achieving response inhibition or fractionation which would serve to deepen the trance.

Language/Linguistic Operations: Search Language, Induction Language and Metaphor

The grammatical syntax of verbal communication used by the hypnotist can also be divided into three distinctive categories:

Search Language initiates an internal search process within the client. This techniques utilizes unspecified, vague, and general language forms to stimulate the client to search for personal meaning.

Induction Language employs embedded commands, indirect suggestion, and presuppositions of consciousness, time and number to suggest options to the client.

Metaphor refers to a noncasual liking of facts which involves matching content and processes in the client's situation, or to an illustrative anecdote or explanation used which incorporates symbolism. Metaphor develops a theme using search language and induction language.

Input Operations: Packaging, Directing and Associating Input

Involve the differing effects upon client visual, kinesthetic and auditory experiences, due to the verbal and nonverbal communications of the hypnotist or therapist.

Packaging input consists of the communicator's determining a client's perception of reality, then incorporating these subjective needs into his response patterns through the verbal matching of language processing words.

Directing input assists the client in selecting the most useful sensory processing mode.

Associating or Anchoring , pairing a particular stimulus with a specific client experience, may be induced consciously or unconsciously, using any of the sensory input channels or verbal labeling. Cueing is used as re-induction signal in hypnotherapy.

Stephen Lankton The Occurrence and Use of Trance Phenomena in Non-hypnotic Therapies, Ericksonian Approaches to hypnosis and psychotherapy, 1982, p134-136

The Boundaries of Suggestion:

B.A.T.'s, Cues of Immediacy, and New Strategies for the School of Tomorrow

Effective teaching is equated with successful control of students in the classroom (Hoy, 1968)

If you're reading these words right now, you can thank the classroom for the role it played. The Educational Systems we have today are the result of where we've been. When I think about possible classroom applications, I recall a tracking model effective with children; *as so much of children's experiences are altered states which approximate trance- Patterns II page 94*. The reason to examine early childhood education is simply this: our future exists in the minds of the youth and it's encapsulated by their imagination. Advertising makes a lot of money using children and their sponge like brains. Kids pick it all up without a fight. Those in control of their minds can have control over the world. Reality is shaped easily when the minds of the youth can be exploited with little or no resistance at all. They have no defense. Early childhood learning and development trains us to live in society full of mind control. The point of the matter is: *life training starts early and right away*.

> *Non-verbal messages typically provide the framework for interpreting verbal messages. (Burgoon, 1980) Teacher non-verbal behaviors in the classroom may well provide the context for student's interpretations of those verbal control messages teachers employ. Non-verbal behaviors that, in that combination, have been shown to communicate an approach or liking orientation are referred to as immediacy cues*
>
> *(Anderson, 1979: Mehrabian 1967)*

> *Selective use of Behavioral Alteration Techniques (B.A.T.'s) and specific messages of those techniques (Behavioral Alteration Messages- B.A.M.'s) were most recently found to be associated with different levels of student affective learning.*
>
> *(McCrosky 1985)*

> *Collectively, the non-verbal behaviors that comprise the immediacy construct indicate an approach orientation towards others, resulting in interpersonal closeness, sensory simulation, warmth and friendliness. As originally conceived, immediacy characterizes the role of these approach behaviors in determining attitudes between communicators*
>
> *(Mehrabian, 1967, 1968, 1969: Weiner & Mehrabian 1968)*

> *Immediacy is based on approach avoidance. All communication is comprised of relational and content components. Both co-exist to assist in the eventual assignment of meaning. (Watzlawick, Beavin and Jackson 1967-, they worked at Palo Alto like Bandler and Grinder, all studying Erickson)*

> *The relational Component defines the nature of the relationship between interacting the framework for understanding the content component of the message exchange. Relational messages are communicated primarily through non-verbal channels, whereas content messages are reflected primarily in verbal channels*
>
> *(Burgoon et al., 1984: Burgoon and Saine, 1978)*

> *Conceptually then, verbally based BAT's (i.e. content) may be interspersed within the framework of nonverbally-based immediacy cues (i.e. relational).An attempt to address the role of teacher non-verbal immediacy in the selective use of verbal control strategies and students attitudes toward the learning environment. POWER IN THE CLASSROOM VI: Verbal Control Strategies, nonverbal immediacy and affective learning. Plax Kearney, McCorsky and Richmond: Communication Education Volume 35, Jan 1986)*

T.X. Barber defined hypnosis in terms of non-hypnotic behavioral parameters, such as task motivation and the labeling of situations as "hypnotic ". In addition to Erickson and Hull, modern scientific research into hypnosis is often associated with a period of intense experimental research in the late1950's and early 1960's by other notables such as J.P Sutcliffe, M.T. Orne, E.R. Hilgard, R.E. Shor, and T.R. Sarbin. The work of these researchers had been particularly influential on the current scientific view of hypnosis, especially as viewed in medicine. Secretly, they all researched for our government on mindcontrol projects. Dr Cameron, Dr. Delgado and Dr. Mengele are just but a few who worked for the "Government ". They were all teachers… now let's get back to hypnosis.

The 'skeptical' modern conception of hypnosis was pioneered by Theodore Sarbin in 1950, as a social-psychological *alternative* to the views that (1) a single distinctive neurological and psychological state underlies all hypnotic phenomena (Paris school), and (2) that suggestions somehow mechanically produce responses without the participation of the subject (Nancy school).

Sarbin instead saw hypnosis as a social encounter, in which the hypnotist and subject play out pre-determined roles. Sarbin's role theory was influenced by R.W. White, who in his "A Preface to a Theory of Hypnotism," in *The Journal of Abnormal and Social Psychology* in 1941 discussed various serious limitations of both the ideo-motor action and dissociation theories. He pointed out that the responses of hypnotic subjects are too complex to consider them as automatic results of suggestions, that subjects often creatively and actively improvise a performance based on their interpretation of suggestions. Thus for just about the first time, posing hypnotic behavior as *creative* and *goal directed;* rather than mechanical.

In addition to the use of social role theory to replace mechanistic theories of hypnotic response, 'skeptical' theories of hypnosis often refer to empirical research to illustrate that hypnotic subjects do not in fact transcend the behavioral capabilities of non-hypnotic subjects. The empirical objective approach to hypnosis, effectively introduced to the study of hypnosis by Clark Hull in the 1930's, involves an implicit mistrust of verbal reports of subjective experience, and the use of quantifiable response indices.

Key questions remaining in the modern study of hypnosis within active role theory and other non-special-state frameworks include: (1) whether a hypnotic procedure is necessary (first studied by T.X. Barber in the late 1960's and in the 1970's); (2) in what specific ways active cognitive functioning might be altered in hypnotic contexts (studied by Orne and by Shor starting in the late 1950's), and (3) the degree to which *dissociation* of aspects of consciousness actually occurs in each of the various hypnotic phenomena (Janet, Prince, later E.R. Hilgard).

All this leads to the crucial theoretical distinction of whether it is meaningful and useful to postulate such a thing as unconscious goal directed activity. What exactly is the nature of volition, compliance, belief, and imagination? Who are we and where are we going? Is there a truth that can really be said?"

Brainwashing is all really about education anyhow. Like the way we invade somewhere to bring in education. Invade the little village to bring books, bring schools that teach our ways. Spread the word and enjoy conforming to a more civilized way. Why speed up development in little villages where the men may still live off the hunt and civilization can still study its roots? Change, it is what it is and maybe it's easier not to ask questions. Maybe we should never wonder, its *hard work*.

The boundaries of suggestion exist all around us. Soon we'll find out the results of what's been done here in the US. Today, we face a new direction in childhood education: **One involving more security, accountability and direction.** There's not much than can be done to avoid the manipulation of their minds. Children pick up their cues from role models and those that set the pace of their realities. We must realize that it is our own conditioning which is dependent upon socio/psycho-ecological parameters and ultimately… cultural conformity. Be aware of "Mob Psychology and Mass Mindsets". When you begin to realize that manipulation occurs on all levels of government and religion, the urgency of our own self-education becomes paramount. We ask ourselves, "What are the effects of the words and thoughts that we've been programmed with?" Results are obvious everywhere, everyday.

Sub-Natural Strategy

Sub-Natural Strategy

Patents, research and technology leading us into the next century

"Some say hypnotic strategies are too powerful to impress upon people. Although some minds crumble, I disagree because our survival and happiness are at stake. "

Charles A. Sherwood

Sub-Natural Strategy: *Those methods, which induce hypnotic behavior and waking suggestion "Sub-naturally". These types of strategy use machines and advanced scientific technology to hypnotize a subject.* Sub-natural Strategies induce hypnosis by applying the laws of hypnosis, subliminal communication and para-psychophysical manipulation of the human nervous system. All together they form a purposeful "Invisible and Silent" way of modifying behavior and contexts. This type of strategy is usually kept top secret. In fact, it's usually best if people were made to believe these strategies could never exist. It's all a matter of national security.

Today's technology sometimes leaves a trail that can be researched. These "Threads" lead to a bigger picture, one of complicity, one of enormous proportions. We have just begun to experience this new century and already we find ourselves besieged by all sorts of influence.

When I talk about Sub-Natural Strategy, it's not just about the impact of commercial advertising on our collective unconscious. People live in the realm of ideas. It has everything to do with the cultural trends and the psychology behind suggestion, motivation, anchors and getting into peoples heads. Rulers, religions, governments, psychologists and everyone we come in contact with all have their turn in our heads and us in theirs. What's the point?

"Unrecognized ideodynamic processes can be measured by electronic instrumentation."
Prokasey & Raskin (1973)

A political TV campaign called "Daisy" was organized by Tony Schwartz for the 1964 Barry Goldwater election. It's old but check it out, if you can. Through the power of the imagination, the fear of nuclear annihilation is transformed into a single hope found in placing your vote for Goldwater, it's all about saving Daisy and saving the world. Appeal has influenced culture and it's been researched. It existed long before newspapers and we can't NOT pay attention. Appeal exists, choice is contemplated and in this instance, it's your vote.

When Apple launched a TV commercial during the super bowl in 1984, they introduced the Mac computer as the savior to a drove of mindless zombies seated in an archaic cave-like auditorium *screen room.* An athlete coming out of nowhere wielded a sledgehammer and ended the slavery of the masses. In reality we find web-cookies anchoring themselves to our profiles and surreptitiously recording every keystroke. BOOM, they got us…it's a pop up!

Computing can be hypnotic. The very idea of an unconscious mind in and of itself means that things can go by, unnoticed by the conscious mind. The idea of using hypnosis to unlock the ways of influence can be found as a common theme with some patents. Combine that with an information hungry world, governments and religion. Be forewarned.

History of Experiments: *the science of Mindcontrol Technology®*

There's a long history of experiments in hypnotic communication and human mental process functions. Research continues to this day and results of some of these experiments provide just a small glimpse into the actions and possible motives of those involved. This outline is just one way of making sense of strategy. The whole point of my book is to inspire you to research on your own and to seek out information for yourself.

Indirect and Subliminal Communication:

Weber, Miller and other cornerstones of research into the unconscious mind

Real life examples of stimulus response, operant conditioning patterns and programming are everywhere. Investigating experiments done with Radio, Motion pictures and TV will help us gain better insight into the manipulation of the unconscious mind. The further history is researched, the more reality as we know it is questioned. Start with the fact that Hal C. Becker worked with Precon Process and Equipment Corporation and was granted US patent 3278676 on October 11, 1966. The significance here is that in the next couple of pages you'll read about all the fuss and claims it doesn't work yet here's a patent proving it does. What's more, he originally filed for it May 7, 1958. Even before Becker, Philo T. Farnsworth fathered TV and Cold Fusion.

Here's the situation, television is a subliminal behavior generator. Go look it up. Precon, Hal C. Becker and Robert E. Corrigan got the patents to prove they ushered us in to the subliminal days…

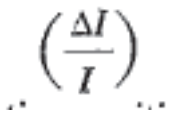
Early Experiments are well documented. As early as 1956, a New Jersey Movie theater was experimenting with flashing words **"Hungry? *EAT POPCORN*"** and **"Drink Coca-Cola".** They flashed it every 5 seconds at the subliminal level of one three-thousandths of a second during the film. This type of research was revolutionary. Later it was discredited. Yet it's patented so no one else can use it without permission. Experimental Films Inc., The Subliminal Projection Company & Precon Process and Equipment Corporation conducted early research in this field.

For two weeks in September 1957, WTWO of Bangor Maine flashed: **"If you have seen this message, write WTWO"** every 11 seconds for 1/80th of a second on alternate days. In 1956 England, BBC-TV experiments with subliminal projection 352 times, alternately 1/5 and 1/2 of a second in duration. WAAF Chicago, WCCO, Minneapolis; KLTI, Longview, Texas; KOL, Seattle; and KYA, San Francisco ALL used added recall devices or phantom spots as they were known back then. People have been manipulated unknowingly for a long time.

We can talk about early experiments with subliminal perception by investigating an old CIA research protocol dated May 1, 1958: MK ULTRA Sub-project No. 83 provided support of a) b) c) subliminal perception d) hypnosis e) f). - We can investigate a FCC public notice issued (FCC 57-1289) that entitled use of subliminal perception and advertising by television stations. Section 303 sub-paragraph (b)-(I) /// section 326, it's all there and we can uncover some it for ourselves. I believe the impact of this type of communication in the fields of advertising and media is all thanks to research like that that brought us the *Weber fraction*. Today's world can have Ambient Radio (aR) and Ambient TV (aTV) which are just two out of a zillion of ideas…

In 1981, Dr. Norman Dixon Summarized over 748 references on subliminal stimulation in his book "Preconscious Processing." Dixon provides a model for understanding the flow of information and it's entry into the consciousness. According to his model, five factors determine whether a stimulus surfaces at the conscious level: Direction of Attention, Signal Strength, External Noise Level, Internal Noise Level and Signal Importance (Meaning). The point is, what year is it, what's the research about now? Are we involved? Are we?

DR. E. H. Weber



Dr. Weber's general area of research is known technically as *psychophysics*. It deals with the relations between experienced intensity and physical intensity: *and it's old.* The methods used to study these relationships are known as *psychophysical methods*. It says so on page 586 of **Psychology**- The fundamentals of human adjustment-Fourth Edition Norman L. Munn Bowdoin college Houghton Mifflin Company; Boston. "Under the editorship of Leonard Carmichael, Director of tufts research laboratory of Sensory psychology and physiology.

The powerful influence of advertising is due in part by the use of subliminal methods and hypnotic techniques. Check for yourself and you'll soon discover it's been going on for quite some time now. The methods for influencing are endless. Those reaching levels defined by brainwashing will focus on suggestively altering states to hypnotically induce and modify behavior. Science has researched human perception. The *Weber fraction* is just one odd result. What happened next is evident in today's youth and society. Imagine what's next now.

Dr. Becker & Dr. Corrigan's had patents that utilized the Weber fraction to develop it's subliminal calculations. Review US Patent # 3,060,795 which shows in diagram form how to use subliminals on TV and Movie screens. Yes, this is a real invention and patent that's registered. Go look it up to reall all the details.

Studies in Intelligence

CIA Study: THE OPERATIONAL POTENTIAL OF SUBLIMINAL PERCEPTION

by Richard Gafford -1958

This CIA report on "The Operational Use of Subliminal Perception" was written by Richard Gafford and appeared in the Spring 1958 issue of the agency's classified journal *Studies in Intelligence.* Declassified in the mid-1990s, the document may be the CIA's first serious assessment of subliminal persuasion.

THE OPERATIONAL POTENTIAL OF SUBLIMINAL PERCEPTION

Perception is demonstrated to have occurred below the threshold of conscious sensory experience when a person responds to a stimulus too weak in intensity or too short in duration for him to be aware of it. Individual behavior without awareness of the stimulus, of which subliminal perception is a subtype, has been a subject of study in psychological laboratories for at least 70 years, and a great deal of technical data has been collected on the subject. Recently it has been associated with some theories of depth analysis and popularized for possible commercial exploitation by the advertising world.

In the most sensational of these popularized experiments, an increase in popcorn sales in a New Jersey movie theater is said to have been stimulated by subliminal interruptions of the feature film with an advertisement urging the patrons to buy popcorn. The exposure time used, a small fraction of a second, was too brief for conscious discrimination by an observer absorbed in the film story but presumably long enough to have some stimulating effect. The advertising men who re currently interested in this phenomenon as a sales technique argue that the short-duration stimulus appeals to a positive motive, for example an appetite for popcorn, without arousing the rational, conscious sales-resistance of the individual, based perhaps on the desire to save money or lose weight. The argument becomes more complicated with respect to a product, which there is no specific preexisting positive motive to acquire. The appeal is now said to be directed to a "deep" underlying motive presumed to be always operating, never satiated, say the sex drive. The masked stimulus arouses some aspect of this ubiquitous sex drive, a drive which can hardly be directly satiated in polite society and one of which the conscious recognition is more or less anxiety-producing.

The vague discomfort the individual feels as a result of subconscious stimulation must be allayed by some associated gratification, and this gratification -- the advertiser hopes -- is the socially acceptable acquisition of the product, which he is trying to promote. It is evident that there are several mighty leaps in logic in the advertising man's argument, and a great many places where his scheme can go astray. He has taken several psychological phenomena, which have been demonstrated to a limited degree in controlled laboratory experiments and strung them together into an appealing argument for a "technique." Because part of what he is promoting is supported by laboratory data, however, it has enough status to warrant serious attention.

The operational potential of other techniques for stimulating a person to take a specific controlled action without his being aware of the stimulus, or the source of stimulation, has in the past caught the attention of imaginative intelligence officers. Interest in the operational potential of subliminal perception has precedent in serious consideration of the techniques of hypnosis, extrasensory perception, and various forms of conditioning. By each of these techniques, it has been demonstrated, certain individuals can at certain times and under certain circumstances be influenced to act abnormally without awareness of the influence or at least without antagonism.

After careful research on each of these methods, however, it has become apparent that although they occasionally produce dramatic results, their lack of reliability and their requirement for extremely precise controls to obtain the desired effect have limited their operational utility to a very few very specialized instances -- situations where just the right persons can be put together at just the right moment under closely controlled circumstances.

The primary danger observed in connection with this unreliability is that of a "flashback," of inadvertently producing just the opposite effect to that desired. Subliminal perception as a practical control or persuasion technique is prone to the same difficulties.

There are four principal categories of behavior without awareness.

The individual may be unaware of:

a) His behavior itself.

He may be whispering without realizing he is whispering, or he may be moving into a trap without knowing that the trap is there. A special case here is abnormal behavior in which the individual fails to realize what he is doing because his normal awareness and self-control have been interrupted by disturbing agents such as fear, anxiety, illness, drugs, or hypnotic suggestion.

b) The relation of his behavior to some stimulus.

The individual may be unaware of the fact that his interrogator is influencing him by saying "Right" after certain statements and by remaining noncommittal after others. The process called "operant conditioning" falls into this category.

c) The stimulus itself, because of its slight impact.

The individual may be unaware of a very faint sound or a quick flash of light, unaware in the sense that he lacks the usual visual sensations. Subliminal perception falls into this category.

d) The precise nature of the stimulus, as well as its relation to his behavior, because of inattention.

The individual may be aware of vague sensations, but he is not aware either of the source or of the significant content of the stimulation, although his behavior may change in accordance with changes in the stimulus. This category includes a great deal of perceptual activity affecting ordinary social behavior. A person is often unaware of the specific cues and clues to which he is reacting not because the stimulus is insufficient to reach the consciousness but because the effort to be fully aware of all the cues all the time would create too great a cognitive strain.

In persuading a person to do something he normally or rationally would resist doing an intelligence operative can make use of any one of these categories of psychological processes. Usually the purpose is to produce *behavior* of which the individual is unaware. The use of subliminal perception, on the other hand, is a device to keep him unaware of the *source* of his stimulation. The desire here is not to keep him unaware of what he is doing, but rather to keep him unaware of why he is doing it, by masking the external cue or message with subliminal presentation and so stimulating an unrecognized motive.

In order to develop the subliminal perception process for use as a reliable operational technique, it would be necessary a) to define the composition of a subliminal cue or message which will trigger an appropriate preexisting motive, b) to determine the limits of intensity between which this stimulus is effective but not consciously perceived, c) to determine what preexisting motive will produce the desired abnormal action and under what conditions it is operative, and d) to overcome the defenses aroused by consciousness of the action itself.

As to the composition of the subliminal cue, it cannot be supposed that just any message presented close below the threshold of recognition will be translated into appropriate action. The determination of the right kind of message in terms of content, number and type of words or symbols, grouping of symbols, and so forth has been the object of a great deal of psychological experiment. There is a good deal of lore and a few rather vague principles available, but generally they concern rather trivial areas of action from the viewpoint of the intelligence operative. Since the effectiveness of the procedure depends on not arousing the person's defense mechanisms, and since defense mechanisms are nor only peculiar to each individual but hard to discover, it is difficult to specify even what is to be avoided in the composition of the subliminal cue in order not to arouse the defenses.

Thresholds of recognition are variable and difficult to determine. If the intensity of the stimulus is much below an individual's threshold it doesn't get through to even the most automatic areas of his sensorium. But recognition thresholds vary tremendously, not only among individuals, but also in the same individual from one time or another, in accordance with his physical situation, his physiological condition, and above all the degree to which he is psychologically attuned to the particular content of the message. A normal human being is an infinitely more complex receiving instrument than any electronic gadget, and adjusting a stimulus for such a variable receiver is difficult. In most of the laboratory studies on which the current theory of subliminal perception is based (1) there has been a long pretrial period requiring the subject's full cooperation to zero him in on the subliminal signal. Such preparation is clearly not feasible for operational use. The message must therefore be transmitted on a much wider intensity band and may frequently not get through or may on the other hand penetrate to the subject's consciousness and arouse his defenses.

The message once received is presumed to trigger some sensitive subconscious motivation to action. There are numerous psychological theories about such inner functions, but little definitely known about them. If a somewhat homogenous sample of people is tested a number of times, most of them will be sensitive most of the time to the subliminal cue; but some individuals, for a great variety of reasons we can little more than guess at, will be insensitive. In this minority of instances the individual may do nothing, may do something trivial and irrelevant, or may do the exact opposite of what was intended.

If the subliminal cue is to work by tripping off an existing motive to action, one must know what motives are positive and operant at the moment. The obvious basic drives (e.g. hunger, sex) are sometimes satiated and sometimes subordinated. With a great deal of knowledge about the individual, some predictability can be attained, but it is still a matter of probabilities. The percentage of instances will be high where the opposite motive to that desired will be tripped off.

There appears thus to be such a myriad of factors that even the most simplified empirical tests carried out with the best possible cooperation of the subjects are rarely marked by really significant reliability. Furthermore, with such a large number of variables and relatively low reliability, it is difficult to determine whether the controlled variable or uncontrolled artifacts are producing whatever results one does observe.

Finally, the subliminal device to avoid alerting an individual's defenses by masking the cue and the basic motive does not cover the effect of awareness of the resultant abnormal action itself, with its implications and consequences. Assuming that one could persuade to such action by presenting a cue subliminally, there is no way of effecting the action without awareness and without tripping off defenses and rational resistance. It must be concluded that there are so many elusive variables and so many sources of irregularity in the device of directing subliminal messages to a target individual that its operational feasibility is exceedingly limited.

[document ends]

Well, there you have it folks. Here's more proof as to where we've been - where we were headed back in 1958. They presented factual information, evidence that early experiments existed. This next segment of official documents comes from the same era. It's a spotlight on some of the official communication that addressed these types of concerns some had back then. I'm sure you're aware that today few acknowledge what's happened and what continues to happen everyday. We're transfixed. Impervious to a subjugated reality: Just like sheep, many are unknowingly herded throughout this make believe world.

It's a Wonderful world; yes it's a *wonderful World* indeed.

CHARLES A. SHERWOOD

Subliminal Telecasts, the FCC and denials from 1958

This collection of materials was entered into the Congressional Record on January 28, 1958 by Representative William Dawson, who led the legislative fight against subliminal advertising when the technique first came into use. In a statement included here, Dawson gives his arguments for banning subliminals. Also included are several letters between Dawson and the chairman of the Federal Communications Commission, in which the two men debate the FCC's power to clamp down on the use of SNEAK PITCH and Subliminal Advetrising. The end result is both obvious and dubious, just turn on the television and prepare to be manipulated beyond your conscious control. Becker filed his patent in May 7,.1958 He also filed for another patent with Robert E. Corrigan – another subliminal design. Some where designed to deter shoplifting, while others encouraged you shop…Great!

CHARLES SHERWOOD

[document begins]

Proceedings and Debates of the 85th Congress, Second Session
Volume 104 -- Part 1, pp. 1228-1230.

House of Representatives, January 28, 1958

NEED FOR REGULATING USE OF SUBLIMINAL PERCEPTION TELEVISION ADVERTISING

Representative William A. Dawson (R-UT): Mr. Speaker, I hate to add to the current troubles of the Federal Communications Commission. But I feel that it is my duty to inform the Members of the House of my to-date unsuccessful campaign to get the Commission to take action to protect the public from a new television-advertising technique, at least until such time as it can definitely be determined whether the technique is effective.

I refer to the so-called subliminal projection advertising, or sneak pitch, as I prefer to regard it. Using this technique, a television station flashes a slogan of advertising message on the television screen so instantaneously that the viewer cannot see it. The promoters of this technique, however, maintain that the message infiltrates the viewer's subconscious and is all the more effective because the viewer does not realize that he has been subjected to salesmanship or propaganda.

This technique should not be used until it is definitely determined by a controlled experiment whether or not it works. If it does not work, television stations should be so informed. If it does work, it should be strictly regulated, if permitted at all. Heaven knows, the blandishments of visible advertising are hard enough to resist. Contemplate, if you will, the effect of an invisible but effective appeal to drink more beer being poured into the subconsciousness of teen-age television viewers.

I first called this matter to the attention of the FCC in early October. At that time and again on November 5 and still again on December 17, I asked the Commission to advise stations against using this SP advertising technique until its effectiveness could be determined.

As I said in my most recent letter -- as yet unanswered -- the Commission should make its position clear.

I wrote--

"In the present limbo, television stations are not sure whether they can use subliminal advertising, but the public is not sure they cannot. I see no reason for extending this ambiguous situation when most of the television industry itself agrees that the process should not be used until it has been fully evaluated."

In defense of the FCC's inaction, I can say that the Commission has received assurance that it will not be used over the major networks. It does not have the assurance, however, that SP will not be used by independent stations. And because of the nature of the advertising, the viewer himself does not when he is being subjected to it.

Now, apparently emboldened by the FCC's inaction, at least one independent station is going for sneak pitch propaganda. I submit to the RECORD a copy of an Associated Press story which appeared in the Alexandria, Va., Gazette, January 24.

Once again, I urge Members of the House and particularly those in the Interstate and Foreign Commerce Committee to join me in getting the FCC to take a definite position on subliminal advertising.

For the information of the House I also am submitting a chronological copy of my letters to the FCC and replies thereto.
[From the Alexandria (Va.) Gazette of January 24, 1958]

SUBLIMINAL PERCEPTION: LATEST METHOD OF COMMUNICATION

HOLLYWOOD. -- Let's suppose, now, that in a couple of months some strapping young chap springs from his chair in front of the TV, grabs his coat and streaks downtown to join the Army -- without knowing why.

Well, some people might say it was a simple case of subliminal perception.

This hard-to-pronounce combination is actually nothing more than a somewhat creepy device for sneaking things into your head without your conscious knowledge.

Television station KTLA here says that in 60 days or so it will become the first station in the country to undertake a planned program of subliminal communication.

To pull the trick off, the station will employ special transmitting equipment that will (Q) an image or a message across the screen. It will be on and off so fast that the home viewer won't consciously know he's seeing anything. But, if it works, the flash will leave an impression in his mind.

Lew Arnold, KTLA's general manager, said the gimmick will be used at first only for public service messages. "We'll flash on something like 'Join the Army' of Give to the 'March of Dimes.'"

"The next step would be to promote our own shows. Then -- and I have a feeling this in a long way off -- we might go into the commercial end of it."

HOUSE OF REPRESENTATIVES
Washington, D.C., October 5, 1957
John C. Doerfer,
Chairman, Federal Communications Commission, Washington, D.C.

Dear Chairman Doerfer:

Publicity has been given recently to a new device in television advertising -- the so-called subliminal perception, usually referred to as SP, for brevity's sake.

Secret pitch perhaps would be more meaningful to the uninitiated. An advertising symbol or slogan is flashed on the television screen so instantaneously that the viewed cannot see it. Allegedly, however, the message infiltrates the viewer's subconscious, all the more effectively because the viewer does not realize he has been subjected to salesmanship.

A call to your Commission has disclosed that the Commission has no official knowledge of this new process and that there is some doubt whether the Commission would have the authority to regulate or supervise such advertising methods.

The purpose of this letter is to request that you look officially into the entire proposal under your general regulatory powers, determining whether controls are necessary and whether additional legislation would be required to provide such controls, if needed.

If this revolutionary advertising means is as effective as claimed, it offers some worrisome, if not frightening, aspects. Put to political propaganda purposes it would be made to order for the establishment and maintenance of a totalitarian government. Even in the commercial usage for which it is intended, surely the potential customer has a right to know he is being advertised at. His prerogative of exercising buyer's resistance is as much an American tradition as the advertising industry itself.

Sincerely yours,
William A. Dawson,
Member of Congress.

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC, October 10, 1957.
Hon. William A. Dawson,
House of Representatives,
Washington, D.C.

Dear Congressman Dawson:

This is with reference to your letter of October 5, 1957, concerning subliminal projection advertising. You request information concerning this matter.

You may be interested to know that I have referred this matter to the staff to determine whether this method of advertising may be adapted for use on television under our present rules and, if so, what further action on the part of the Commission may be necessary or advisable in handling this problem. I will advise you of the developments in this matter.

Sincerely yours,
John C. Doerfer,
Chairman.

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC, November 1, 1957.
Hon. William A. Dawson,
House of Representatives,
Washington, D.C.

Dear Congressman Dawson:

This is in further reference to your letter of October 5, 1957, concerning subliminal perception advertising, and to the telephone conversations between our staff and the Commission's staff concerning the subject.

Subliminal perception advertising appears to be a new technique concerning which the Commission has little information and no experience. According to the trade press, subliminal perception is described as "the faculty of absorbing fleeting visual information without being consciously aware of it." It is stated that the technique was tested by having the symbols of a nationally known soft drink flashed for one three-thousandths of a second once every 5 seconds during a dramatic film presentation in a theater. At this writing, there is some indication in the trade press that the above technique may have been used on television.

The Commission is, of course, interested in the above matter and its staff is accumulating pertinent available information on the subject. When sufficient data has been acquired, it will be studied by the Commission. Please be assured that the matter will receive the Commission's most careful consideration, consistent with its authority under the Communications Act of 1934, as amended. As you may know, under existing law, the Commission does not determine the particular programs or types of programs to be presented over the air, the content of advertising copy, or the manner of its presentation. Indeed, under the provisions of section 326 of the Communications Act, the Commission is prohibited from exercising the power of censorship over broadcast material. Accordingly, the selection and presentation of program material, including advertising, is the responsibility of the individual station licensees. However, such licensees are required to operated in the public interest and periodically, usually upon application for renewal of license, the Commission reviews the overall operation of station licensees to determine whether their obligation to operate in the public interest has been met. If, for example, it were determined that a particular station had knowingly or deliberately engaged in fraudulent or deceptive advertising, or permitted its facilities to be so used, or to be used for some other unlawful purpose, a substantial question would be raised as to the station's continuing ability to serve the public interest. The Commission would consider such activities in the course of its licensing proceedings involving the station.

As we have indicated above, this problem is so new that specific data is not readily available and no conclusive information has been received which we can predicate an informed opinion. At the present time, we are unable to state whether controls are necessary or whether additional legislation may be required in the event controls are needed. I am sure you will understand that, as additional facts are made known to us, we will be in a position further to evaluate the situation and to arrive at a definitive position. You may be sure that you will be advised or our ultimate determination.

Sincerely yours,

John C. Doerfer,
Chairman

HOUSE OF REPRESENTATIVES
Washington, DC, November 5, 1957.
Mr. John C. Doerfer,
Chairman, Federal Communications Commission,
Washington, D.C.

Dear Mr. Doerfer:

Thank you for your letter of November 1 (reference 8420) advising me of the present status of your staff's investigation into the new television advertising technique, subliminal perception.

I can appreciate the difficulties of compiling substantial information about such a new and little-known process, and I commend you for the progress made so far.

However, I am concerned -- as I am sure you are -- at your finding that SP may already have been used on television. Reports reaching me indicate that the device is being perfected and actively promoted by at least two commercial firms. It would certainly seem anomalous to permit random usage of this device during the very time a study is being made to determine whether the public interest requires its regulation.

For that reason I strongly urge the Commission to protect the buying public against any possible advertising abuses by advising all television stations and networks that subliminal perception is under investigation and requesting them to forego its usage until a determination has been made. I am sure the stations would lend their cooperation in the public interest upon which their licenses are based.

The bulk of the mail which I have received has been in definite opposition to this type of invisible selling. I am convinced that the general public feels it is entitled to know when it is being subjected to advertising. If subliminal projection techniques are eventually allowed to be used at all, a minimum regulation should require prominent announcement during the program of products being so advertised.

Again let me congratulate you and the Commission staff on the energetic and direct way in which you have addressed this problem.

May I be advised whether you agree that the television stations should be asked to reject subliminal advertising pending your study?

Sincerely yours,

William A. Dawson,
Member of Congress.

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC, November 12, 1957.
Hon. William A. Dawson,
House of Representatives,
Washington, D.C.

Dear Congressman Dawson:

This is with reference to your letter of November 5, 1957, concerning subliminal perception advertising. In your letter you urge that, to protect the buying public from possible abuses by this advertising technique, the Commission advise all television stations and the networks that subliminal perception advertising is being investigated by the Commission and request the stations and networks to forgo its usage until a determination has been made.

As you are doubtless aware, the determination to take the action you recommend could be made only by all of the Commissioners. Accordingly, you will be interested to know that I have made arrangements to have your recommendation presented to the full Commission. I wish to assure you that the Commission will give careful consideration to the views you have expressed in your letter in arriving at a decision.

I appreciate your writing to me concerning this matter. You will, or course, be advised promptly of the disposition of this problem.

Sincerely yours,

John C. Doerfer,
Chairman.

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC, November 27, 1957.
Hon. William A. Dawson,
House of Representatives,
Washington, D.C.

Dear Congressman Dawson:

This letter concerning subliminal perception advertising is with further reference to your letter of November 5, 1957, and supplements the response thereto dated November 12, 1957. In your letter, you urge that the Commission advise all television stations and the networks that subliminal perception advertising is being investigated by the Commission and request that they forgo its usage until a determination has been made.

At the outset, it should be pointed out that on November 21, 1957, the Commission was advised that one station in Bangor, Maine, had tried the technique of subliminal messages with respect to station promotional announcements and hadn't been able to make them work. The Commission knows of no other television station which has engaged in subliminal perception advertising. As you indicate in your letter, two companies are known to be promoting the above technique. They are the Subliminal Projection Co., Inc., and Experimental Films, Inc. Since the previous letter to you, we have communicated with the first-named firm and have been advised that there has been no demonstration of the technique on a television broadcast station; that the firm has used the facilities of a private closed circuit system for testing the technical operation of its apparatus; and that the firm is prepared to demonstrate the technique on a closed circuit system should the Commission so desire. This offer is being considered by the commission.

We have also communicated with the local representative of the second company and are awaiting a reply to specific questions submitted to him for transmittal to the company.

As you may know, on November 13, 1957, the television code of the National Association of Radio and Television Broadcasters announced that it had recommended to its subscribers that any proposals to use the television medium in the process called subliminal perception be referred to the board immediately for review and consideration. The board stated that "experimentation or the use of the process should not be permitted on the television broadcast medium pending such review and consideration." Additionally, we have communicated with representatives of each of the major television networks and have been advised that have not used the above technique.

The Commission, at this time, with the exception of the unsuccessful attempt noted above, is not aware that subliminal perception advertising has been used by any television broadcast station. In view of this, and the fact that the Commission's consideration of this matter includes consideration of the extent of its statutory powers with respect to thereto, it is believed that a caveat to the licensees may be inappropriate at this time. In this connection, we would like to point out that the Communications Act contains no provisions which deal specifically with subliminal perception. From present indications, however, it seems fair to say that reasonable protections may be available to the public under the general provisions of the act. For instance, by the Commission's licensing procedures the United States maintains control of and regulates radio transmission in the channels of interstate commerce. Various sections of the act, including sections 303, make it clear that in exercising the power of control and regulation the Commission must be guided by public interest, convenience, or necessity. It would appear that the use of the subliminal perception technique may be subject to our control under such provisions of section 303 as subparagraph (b) on the nature of the service to be rendered by each station; subparagraph (e) on the type of apparatus to be used; subparagraph (g) authorizing studies of new and experimental uses; and subparagraphs (f) and (r), as well as section 4, subparagraph (i), giving the Commission wide authority to make rules and regulations in carrying out its functions and the provisions of the act.

As you may know, under existing law the Commission does not determine the particular programs or types of programs to be presented over the air, the content of advertising copy, or its presentation. Moreover, the act prohibits the Commission from exercising the power of censorship over broadcast material, which includes advertising. However, at this time it does not appear that the regulation of this particular technique would necessarily constitute censorship. It may be pertinent to draw attention to section 317 of the Communications Act of 1934, as amended, which reads as follows:

"All matter broadcast by any radio station for which service, money, or any other valuable consideration is directly or indirectly paid, or promised to or charged or accepted by, the station so broadcasting, from any person, shall, at the time the same is so broadcast, be announced as paid for or further furnished, as the case may be, by such person."

Undoubtedly section 317 would prohibit broadcasters from subjecting audiences to messages received from undisclosed sources.

We have attempted to discuss the question with you fully at this time even though the matter is in its formative stage. We are sure you will understand that as additional facts are made known to us, we will be in a position to further evaluate the situation and to arrive at a definitive position. You may be assured that you will be advised of our ultimate determination herein.

By direction of the Commission:
John C. Doerfer,
Chairman.

HOUSE OF REPRESENTATIVES
Washington, DC, December 17, 1957.
Hon. John C. Doerfer,
Chairman, Federal Communications Commission,
Washington, D.C.

Dear Chairman Doerfer:

Recently I suggested that, in view of the widespread interest in, and the apparent imminence of, subliminal advertising, the Commission put the television broadcasting industry on official notice that this technique is being investigated by the Commission to determine what regulation may be needed in the public interest.

Your reply indicated that the Commission feels "a caveat to the licensees may be inappropriate at this time." You go on to say, however, that reasonable protections may be available to the public under the general provisions of the act.

It is true that a major part of the television broadcasting industry, including the major networks and the television code board, voluntarily have recognized the potential dangers of subliminal advertising. Nonetheless, my mail continues to reflect widespread public concern over this method of manipulating minds.

That these fears are not entirely baseless is implied in the enclosed article from the Wall Street Journal of December 5, 1957, concerning the reaction of one of the subliminal projection firms to the networks' ban on the secret pitch. I direct your attention to the quotation attributed to one of the company's vice presidents:

"We never tried to sell TV networks subliminal advertising. All we wanted was an industrywide test. But if they don't want to use it, we've still got plenty of interested independent stations."

In view of the concern over premature usage of this invisible selling method, it would appear timely to me for the Commission to remove the uncertainty by a definite prohibition against television use of subliminal advertising until your investigation has been completed and a final determination made.

In your letter of November 17 you point out that one of the available protections is section 303 of the Communications Act giving the Commission control over services rendered and apparatus used by stations. Another is section 317, requiring sponsor identification, which you say "undoubtedly would prohibit broadcasters from subjecting audiences to messages received from undisclosed sources."

Since the Commission does have this authority, I recommend that subliminal advertising be specifically prohibited for the duration of your present study.

In the present limbo, television stations are not sure whether they could use subliminal advertising but the public is not sure they could not. I see no reason for extending this ambiguous situation when most of the television industry itself agrees that the process should not be used until it has been fully evaluated.

May I be advised whether there is any reason why this definite prohibition should not be put into effect?

Kind regards and best wishes for a joyous holiday season.

Sincerely yours,

William A. Dawson,
Member of Congress.

CONSCIOUSNESS

Addendum A - The Concept of Generalized Reality-Orientation

In an article entitled "Hypnosis and the Concept of Generalized Reality-Orientation", Roland Shor speaks of a 'usual orientation to reality', a frame of reference existing in the background of attention which, as he puts it, "can temporarily disintegrate in special states of mind." In the following passage he introduces this notion of a 'usual generalized reality- orientation. The point we understand Shor to be making is that in entertaining an object of attention in normal states of consciousness we are subsidiarily aware of a frame or context that can consequently be understood to have an orientational function.

> A series of twelve propositions has been formulated in regard to the processes that produce the altered state, along with their implications and ramifications for hypnosis, related states, and cognitive theory in general.
>
> *The usual state of consciousness is characterized by the mobilization of a structured frame of reference in the background of attention which supports, interprets, and gives meaning to all experiences. This frame of reference will be called the usual generalized reality-orientation.*
>
> Perhaps the best way to explain what is meant by this proposition is to describe a state of consciousness in which the usual generalized reality-orientation is not mobilized, in order to see more clearly the psychic functions that are imputed to it Many experiences could be cited as illustrations -- from literature, "mystic" experiences, or pathologic states.
>
> The best of these have the quality of *merging* of self and world (as in the typical Nirvana experience), whereas the clearest illustration of our proposition would be an instance of the *loss* of self and world entirely.

We find this passage consistent with our descriptions of altered states of consciousness in Part III; note especially that the loss of the usual generalized reality-orientation, it s temporary disintegration in special states of mind, is connected with a concomitant loss-of-self experience.

Having connected the sense-of-self that we experience in normal states of consciousness with the presence of the generalized reality-orientation it is not surprising that he should go on to identify the generalized reality-orientation as the Freudian 'ego' in the following way.

> Those who wish to view our discussion in general Freudian terminology may consider the generalized reality-orientation roughly equivalent to the cognitive components of the ego or the secondary-process orientation.

We might recall that for Freud there is a special connection between secondary process and the preconscious:

> We have found that processes in the unconscious or in the id obey different laws from those in the preconscious ego. We name these laws in their totality the primary process, in contrast to the secondary process which governs the course of events in the preconscious, in the ego.

We have suggested relating the concept of subsidiary awareness to Shor's concept of generalized reality-orientation. Now we see that the latter is intimately associated with the notion of the 'preconscious'. Can we expect, then, that the concept of the preconscious could be articulated in terms of the concept of subsidiary awareness? The next section investigates this possibility and related matters.

Generalized Reality-Orientation was brought to us by Roland Shor. He termed so a structured frame of reference that characterizes a normal state of consciousness and supports, interprets and gives meaning to all the experience of an individual. (Shor 1959, 585) Shor stated that hypnosis is a complex of two processes, one of which is the construction of a special, temporary orientation and the other is the relative fading of the generalized reality-orientation into non-functional unawareness.

R.E. Shor, "Hypnosis and the concept of the generalized reality-orientation." In C.T. Tart (ed.), Altered states of consciousness (Garden City: Anchor Books,1969), p.243.
S.Freud, "An outline of psycho-analysis." In J. Strachey (ed.), Standard edition, vol. 23 (London:Hogarth Press, 1964), p.164

According to Webster's dictionary, "trance" implies an inability to function or being in a state of daze or stupor. For this reason the light trances of everyday life (I'll give some examples of them in a minute) are frequently confused with the trances of deep hypnosis, where a person has only limited contact with her surroundings and may be quite unable, afterward, to recall what went on during the trance.

Those deep states are certain kinds of trance, to be sure, but in actual fact they are neither the only ones nor the most prevalent. Light trance states, which are familiar to everyone, do not ordinarily possess alarming qualities. Dr. Ronald Shor, a specialist in hypnosis, has pointed out that these light trances are daily, commonplace occurrences for all of us. They simply involve a sharp narrowing of our attention, which becomes focused on one or only a few, objects or events or thoughts. Because of this narrowing of attention, our generalized reality-orientation -- that is, our awareness of our surroundings and of our usual ways of thinking and perceiving -- begins to fade, creating a "trance" effect. Shor describes his own experience with a spontaneous "everyday" trance this way:

"I was reading a rather difficult scientific book which required complete absorption of thought to follow the argument. I had lost myself in it and was unaware of the passage of time or my surroundings. Then without warning, something was intruding upon me; a vague, nebulous feeling of change. It all took place in a split-second and when it was over I discovered that my wife had entered the room and addressed a remark to me. I was then able to call forth the remark itself which had somehow etched itself into my memory even though at the time it was spoken I was not aware of this."

(R. E. Shor, "Hypnosis and the concept of the generalized reality orientation" in Altered States of Consciousness, (C. T. Tart, Ed.). NY: Wiley, 1969, pp. 233-250))

Pavlov, Russian Woodpeckers, Chinese-North Korean Brainwashing Protocols and the American Neurophone

- Pavlov was amazing. I recommend reading about him and his experiments. Somebody else gave "The Soviet Art of Brainwashing: A Synthesis of the Russian Textbook on Psycho-politics and the Suppression of Man and Civilization" as a talk given by Stalin's head of the KGB at the Lenin School of Psycho-politics. It was delivered to a group of American/Marxist Psychology students in 1933. Read that and it will all start to make more sense. As for Russian Woodpeckers/ Soviet ELF mass entrainment programs, they are not common knowledge. Research of embassy micro-wave espionage and experimentation on unknowing citizens is available. It all even continues to this day. Let's talk about Dr. Flanagan. Below is a current Ad Piece from the company. More sophisticated state of the art is out there and unknown. Behold, here's a good place to start.

- Pavlov IP: Conditioned Reflexes. London, Oxford University Press, 1927

- Pavlov IP: The identity of inhibition with sleep and hypnosis. Scientific Monthly 17:603-608, 1923

The Flanagan Neurophone

Model GPF-1011

The Neurophone transmits ultra sound frequencies through the skin to the brain, bypassing normal hearing channels. The Neurophone delivers a 40 kHz energy frequency through sensors, which are placed on the skin near the temples. For several decades, audiologists have experimented with the application of sound frequencies through the skin.

The Neurophone has a variety of beneficial uses such as:

1. to help concentration while studying
2. to assist in learning languages or other study materials
3. to listen to recorded music in a new way
4. to help achieve harmony and emotional balance personally or with partners
5. to help students and professionals improve grades and test scores
6. to assist in gaining a sense of calm mindedness, relaxation, and well being
7. to assist in meditation
8. to assist sound perception

The Neurophone is not a hearing aid for deaf people. However, it may help some who have auditory nerve damage depending on the type and severity. It is not meant to be a hearing aid, nor to diagnose or treat deafness.

The Neurophone can be connected to any audio device such as tape or CD player

HOW DOES IT WORK?

The skin is our largest and most complex organ. In addition to being the first line of defense against infection, the skin is a gigantic liquid crystal brain. The skin is piezo-electric. When it is vibrated or rubbed, it generates electric signals and scalar waves. Every organ of perception evolved from the skin. When we are embryos, our sensory organs evolved from the folds in the skin. Many primitive organisms and animals can see and hear with their skin. We now know that the skin transmits ultrasonic impulses to an organ in the inner ear known as the Saccule. The skin vibrates in resonance with the ultrasonic (40 KHz) Neurophone modulated carrier wave and transmits the sound from the carrier through multiple channels into the brain. When the Neurophone was originally developed, neurophysiologists considered that the brain was hard-wired and that the various cranial nerves were hard-wired to every sensory system. The eighth cranial nerve is the nerve bundle that runs from the inner ear to the brain. Theoretically, we should only be able to hear with our ears if our sensor organs are hardwired.

Now the concept of a holographic brain has come into being. The holographic brain theory states that the brain uses a holographic encoding system so that the entire brain may be able to function as a multi-faceted sensory encoding computer. This means that sensory impressions, like hearing, may be encoded so that any part of the brain can recognize input signals according to a special type of signal coding. Theoretically, we should be able to see and hear through multiple channels not just our eyes and ears.

The key to the Neurophone is the stimulation of the nerves of the skin with a digitally coded signal that carries the same time-ratio code that is recognized as sound by any nerve in the body.

All commercial digital speech recognition circuitry is based on so-called dominant frequency power analysis. While speech can be recognized by such a circuit, the truth is that speech encoding is based on time ratios. If the frequency power analysis circuits are not phased correctly, they will not work. The intelligence (sound) is carried by phase information. The frequency content of the voice gives our voice a certain quality, but frequency does not containinformation. All attempts at computer voice recognition and voice generation are only partially successful. Until digital time-ratio encoding is used, our computers will never be able to really talk to us.

The computer that we developed to recognize speech for the Man-Dolphin communicator used time-ratio analysis only. By recognizing and using time-ratio encoding, we could transmit clear voice data through extremely narrow bandwidths. In one device, we developed a radio transmitter that had a bandwidth of only 300 Hertz while maintaining crystal clear transmission. Since signal-to-noise ratio is based on bandwidth considerations, we were able to transmit clear voice over thousands of miles while using milliwatt power.

Improved signal-processing algorithms are the basis of a new series of Neurophones that are currently under development. These new Neurophones use state-of-the-art digital processing to render sound information with much greater clarity.

ELECTRONIC TELEPATHY

The Neurophone is an electronic telepathy machine. Several tests prove that it bypasses the eighth cranial nerve, the hearing nerve, and transmits sound directly to the brain. This means that the Neurophone stimulates perception through a seventh or alternative sense.

All hearing aids stimulate tiny bones in the middle ear.

Sometimes when the eardrum is damaged, the bones of the inner ear are stimulated by a vibrator that is placed behind the ear on the base of the skull. Bone conduction will even work through the teeth. In order for bone conduction to work, the cochlea or inner ear that connects to the eighth cranial nerve first must function. People who are nerve-deaf cannot hear through bone conduction because the nerves in the inner ear are not functional.

A number of profoundly nerve-deaf people and people who have had the entire inner ear removed by surgery have been able to hear with the Neurophone. If the Neurophone electrodes are placed on the closed eyes or on the face, the sound can be clearly 'heard' as if it were coming from inside the brain. When the electrodes are placed on the face, the sound is perceived through the trigeminal nerve. We therefore know that the Neurophone can work through the trigeminal or facial nerve. When the facial nerve is deadened by means of anesthetic injections, we can no longer hear through the face. In these cases, there is a fine line where the skin on the face is numb. If the electrodes are placed on the numb skin, we cannot hear it but when the electrodes are moved a fraction of an inch over to skin that still has feeling, sound perception is restored and the person can 'hear'.

This proves that the means of sound perception via the Neurophone is by means of skin and not by means of bone conduction. There was an earlier test performed at Tufts University that was designed by Dr. Dwight Wayne Batteau, one of my partners in the United States Navy Dolphin Communication Project. This test was known as the "Beat Frequency Test". It is well known that sound waves of two slightly different frequencies create a 'beat' note as the waves interfere with each other. For example, if a sound of 300 Hertz and one of 330 Hertz are played into one ear at the same time a beat not of 30 Hertz will be perceived. This is a mechanical summation of sound in the bone structure of the inner ear. There is another beat, sounds beat together in the corpus callosum in the center of the brain. This binaural beat is used by the Monroe Institute and others to simulate altered brain states by entraining (causing brain waves to lock on and follow the signal) the brain into high alpha or even theta brain states.

These brain states are associated with creativity, lucid dreaming and other states of consciousness otherwise difficult to reach when awake. The Neurophone is a powerful brain entrainment device. If we play alpha or theta signals directly through the Neurophone, we can move the brain into any state desired. Batteau's theory was that if we could place the Neurophone electrodes so that the sound was perceived as coming from one side of the head only, and if we played a 300 Hertz signal through the Neurophone, if we also played a 330 Hertz signal through an ordinary headphone we would get a beat note if the signals were summing in the inner ear bones. When the test was conducted, we were able to perceive two distinct tones without beat. This test again proved that Neurophonic hearing was not through bone conduction. When we used a stereo Neurophone, we were able to get a beat note that is similar to the binaural beat, but the beat is occurring inside the nervous system and is not the result of bone conduction. The Neurophone is a 'gateway' into altered brain states. Its most powerful use may be in direct communications with the brain centers, thereby bypassing the 'filters' or inner mechanisms that may limit our ability to communicate to the brain. If we can unlock the secret of direct audio communications to the brain, we can unlock the secret of visual communications. The skin has receptors that can detect vibration, light, temperature, pressure and friction. All we have to do is stimulate the skin with the right signals. We are continuing Neurophonic research. We have recently developed other modes of Neurophonic transmission. We have also reversed the Neurophone and found that we can detect scalar waves that are generated by the living system. The detection technique is actually very similar to the process used by Dr. Hiroshi Motoyama in Japan. Dr. Motoyama used capacitor electrodes very much like those we use with the Neurophone to detect energies from various power centers of the body known as chakras.

THE NEUROPHONE-*author unknown*

The Neurophone is an electronic invention that may enable us to hear by a completely new information channel to the brain. Ordinary hearing is the result of the stimulation of bones in the inner ear by means of vibration. Sound waves may reach these bones through ear canal via the ear drum, or by bone conduction in which sound waves are conducted to the inner ear vibrations in the cranial bones. When the sound waves reach the inner ear, a vibration is set up in the cochlea which then converts the waves into nerve inpulses that travel up the 8th Cranial Nerve to the sound recognition centers of the brain.

In 1958, Dr Flanagan, then a child of 14 developed a radio transmitter that made the brain into a radio receiver. This device transmits acoustic information to the brain by means of radio waves into the skin, bypassing the 8th Cranial Nerve. When he applied for a patent on the device, the patent examiner rejected the whole thing saying that such a device would go against all known laws of science. Over the following years, Dr Flanagan fought against insurmountable odds to prove that the device did indeed work. In the meantime, LIFE magazine ran a major article on Flanagan and the Neurophone, naming him as one of the top ten scientists in the US at the age of 17! In a final desperate move Flanagan flew to the patent office with a model of his invention and successfully demonstrated the device on a deaf employee in the patent examiner's office. The deaf man heard music for the first time in 15 years and broke down into tears. The examiner declared that the Neurophone was indeed a basic patentable device and approved the patent for release. Patent # 3,393,279 dated 16 July 1968.....

In the years that Dr Flanagan fought to receive deserved recognition by the patent office, he grew into manhood and was working on Man- dolphin Communications for the US Navy when the patent was finally issued. While involved in Man-Dolphin research, he became interested in nerve signal information encoding, and began to develop electronic circuits that duplicated the process of pattern recognition observed in the human nervous system. This work led to research in Cryptography. During that period he developed a top secret sound scrambler that was virtually impossible to decode. Part of the scrambler was based on his research into nerve encoding.

Dr Flanagan believed that the pattern of nerve encoding used in the human speech recognition system could be used to make a better Neurophone. He succeeded in perfecting an electronic circuit that he believes duplicates the precise encoding of the Cochlea and 8th Cranial Nerve. When he applied for a patent on the new circuit, the patent application was immediately placed under top secrecy by the National Security Agency. The only explanation given at the time was that the circuit had potential uses in the defense of the country. Dr Flanagan was happy that the government considered that his device could be used in his country's defense. The only problem was that the government wanted the device free, and he spent 14 years on it.

He hired attorneys and challenged the secrecy order for over five years. At the end of that period, the patent was released from secrecy and was approved for issue by the patent office. Patent # 3,647,970 dated 7 Mar 1972. Dr Flanagan then perfected the circuit for another five years. This circuit recognizes time-relationships in the signal waveform, and generates a square wave that is time encoded. Dr Flanagan believes that the nervous system uses a complex delay line time recognition computational system that recognizes time information. (50KHZ square wave pulse width audio modulation with double differentiator output) In July of 1978, he successfully applied the Time Recognition Processor to his Neurophone. When an audio signal is processed through his circuit, it is converted into a form which he believes is an electronic analog of the nerve signal released from the human cochlea, but with one major difference; in the cochlea hundreds of nerves carry the time-encoded signal to the brain. In the case of the Neurophone, the full signal processing is complete and may be carried to the brain by alternate pathways-Through the skin itself. In the original Neurophone, a 3000 volt amplitude modulated radio wave carried the signal to a pair of insulated electrodes that were placed on the head of the subject. In the present Neurophone, the voltage has been reduced to a 50 volt (maximum) square wave. This signal is applied to the body by means of ceramic disks. (Zirconium titanate) The ceramic disks allow the energy field to affect the skin without a current flow. The small electric field causes the skin to vibrate internally in rhythm with the stimulation. The intra-dermal vibration can be heard by others if they place their own ears near the point of electrode skin contact. The vibration is not powerful enough however, to vibrate the bone below the skin surface.

US Patent # 3,647,970 and find it in Life magazine May 1958. Ten years later. In 1969 a Yale Psychologist named Dr. Jose Delgado published his book "Physical Control of the Mind, Toward a Psychocivilized Society" which represented 30 years of research in mapping out the relations between different points in the brain and all kinds of activities, functions and sensations of humans and animals. His work below indicates he's been researching for decades. In the book "Body Electric" by Robert Becker, you'll find results of an experiment by J.F. Schapitz who in 1974 researched the use of Hypnosis conveyed by modulated electromagnetic energy directly into the subconscious parts of the human brain. That was even back then, imagine right now.

CHARLES SHERWOOD

Below are some additional threads for follow up:

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Quantum cryptography based on Bell's theorem - Artur K. Ekert (1991)

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Practical application of the generalized Bell's theorem in the so-called key distribution process in cryptography is reported. The proposed scheme is based on the Bohm's version of the Einstein-Podolsky-Rosen *gedanken experiment* and Bell's theorem is used to test for eavesdropping. ©1991 The American Physical Society

The Mind (machine) control systems that followed are a matter of national security. Some systems out of Taiwan, late 1970s can be translated as "Psychological Language Machine." In Mandarin it sounds as "Sin_Lee_Yue_Yan_Gi," and its words means the machine can be used to read the human mind. You can research the Tavistock Institute. They formed in 1947 and developed brainwashing techniques too, which were first used experimentally on American Prisoners of war in Korea. It works with the Stanford Research Institute; Tavistock controls the National Education Association too…

CHARLES A. SHERWOOD

The History of Mind Control:

What we can prove and what we can't

Lecture by Dr. Alan Scheflin

From the Ryerson CKLN FM (88.1 in Toronto) Mind Control Series
CKLN-FM 88.1 Toronto the International Connection
Producer/interviewer Wayne Morris

Alan Scheflin:

... for you in the next two hours, is that mind control is a valid subject, we can prove a good deal of its history and its postulates, and especially in this litigious climate when people argue that therapists and others are crazy in believing in things like mind control, it's my function to show that the subject has validation across several centuries, and especially a rich history in this century. What I want to do is use slides to illustrate my talk, and so if we could lower the lights you'll be able to see the slides better, and let's begin. let me begin.

Can we... Yeah. Great. Let me see... {pause} All right. Naturally, the history of mind control begins with the proverbial hole in the head. This is the, an illustration of a trephined skull, the first known medical intervention for mental illness. There are many such skulls that have been recovered from civilizations throughout the world, suggesting that trephining, which is as you can tell an early form of lobotomy, was well-practiced by many ancient civilizations. The reason why the proverbial hole-in-the-head here is important to us, is that this was a therapeutic procedure built upon a medical philosophy, and the philosophy is one of possession. It seems to me that in many ways as I'll suggest to you, these notions have come back again in the twentieth century, and so I thought it appropriate to start with them now. The possession idea carried through well into the Middle Ages, when possession theories of mental illness were prevalent, and cures based on them were equally as prevalent and indeed necessary. This is an illustration of medieval Moon Madness, and some of the dancing episodes that went throughout the Middle Ages. The treatment of choice was exorcism which you seen an illustration of here, if you look all the way over on the left, the woman being held by a group of men, there's a devil coming out of her head.

This was, of course, the early equivalent of Multiple Personality Disorder and the notion of possession theory, the body being inhabited by other beings, is an important aspect of dissociation. The theory may have changed somewhat, but there is certainly a direct history from the possession ideas to the dissociation ideas that we experience today. The first, the first real treatise, I think, in mind control, which brought together possession ideas in to a textbook, is THE MALLEUS MALEFICARUM, which is written in 1484, it's called THE WITCH'S HAMMER, and I was interested to note that in the latest issue of, I think, NEWSWEEK MAGAZINE, with the cover story on the brain, there is a one-page description of THE MALLEUS MALEFICARUM by a novelist who wrote a woman's novel based on its terms.

THE MALLEUS was used as a bible for witch-hunting, and it tells you how to identify witches and how especially to interrogate them, and how to cure them--the cure usually being killing them--but the value of THE MALLEUS, I think, is two-fold. It is probably the second known text book in history on cross-examination techniques, the first one being THE PLATONIC DIALOGUES. And so, we get in THE MALLEUS, a systemization of the knowledge of how to do interrogations to lead people to give confessions that you want them to give, and so in the history of mind control it plays a very important role, because this is, this is the work that was used by the inquisitors throughout the Middle Ages and thereafter to obtain confessions and indeed false confessions. THE MALLEUS itself then was read by police departments centuries later and used as the beginning of the development of police manual. Let me jump ahead a couple of centuries until last century, the #1800's, with the birth of psychiatry, and it perhaps is no surprise that there is a common link to possession theories and the birth of psychiatry, in that most psychiatric treatments had the same elements of violence that we see in THE MALLEUS and that we see in the exorcism, and beyond that. It's the cast-the-demons-out... I'm gonna run through a series of slides here, all taken from psychiatric text books, on the way in which people were treated. This one is an individual who was chained to a wall, and this is a form of a straitjacket as you can see, where a person is tied directly to a drain pipe in the wall. Here is an early version of the, of the straightjacket itself. It was beliefs that these people were inhabited by demons, and that in order to get those demons out exorcism was replaced either with violence or with severe restraint. But a century ago they also had something that we tend to consider as modern but is not--shock treatment. The shock done, however, was usually a different form than electricity since they had not yet invented electricity. This is a water shock treatment, and another version of it appears here, where an individual is left blind-folded on the platform, suddenly the platform falls from beneath him and he's dumped into a bucket of ice cold water. This was intended to be shocking. Another form of shock treatment was to fire a cannon behind somebody without them knowing that it was gonna happen. Again, the idea was to use a form of violent cure because of a theory of violent possession. Interestingly enough, even electric shock has a history in antiquity. It did not... We did not need the development of electricity to have electric shock.

The ancient Egyptians used to take a torpedo fish and slap it on the forehead of people who were possessed, and the fish would discharge an electric current, and that's the earliest record of electroshock treatment. This is a device that {pause} nobody can ever guess the importance of. It's an ovary compressor, and I'll leave it to your imagination to, to consider how painful it must be to have experienced it. Seclusion in its worst form is the wooden crib here. This is a form of containment in which you can see that person is totally strapped into a crib with no way to move. This, however, was not the worst form of restraint. It took a leading psychiatrist to develop that. This is the rotating chair. A person could last only a few seconds in this chair without becoming nauseous and eventually losing consciousness. And then there was the tranquilizing chair, all of these devices were used in the late #1800's, the last two of them were developed by Benjamin Rush, a signer of the Declaration Of Independence, and his face appears on the seal of the American Psychiatric Association as its founder. It's not my desire to criticize psychiatry here, but rather to make the point, in terms of mind control, that we began studying the human mind and mental illness with a theory of possession and a theory of cure based on violence, and from that we'll see the various refinements. Perhaps the first of the refinements, and the one that's notoriously wrong, was the leading psychological theory of the 1800's, and that is phrenology--that you can measure the exterior of the brain or rather of the skull in order to understand the interior of the mind, and this is an illustration of a phrenologist's chart, the theory being that there is a direct correlation between a person's characteristics as an individual, and their skulls and the lumps and other aspects to be found on the skull. The theory, of course, is completely wrong, but it occupied a good deal of the 1800's and was the leading theory of psychology at that time. It led to further variants in terms of face- reading...

The importance of the theory is not that it was wrong, but rather that it led people to begin to try to measure internal states. And so, from an erroneous theory people began to look inside the brain to see how you can find external correlations with the brain, and we come across what I think is the great paradox in all of healing, and that is that the more you learn how to cure people the more you learn how to harm them, and for every step forward in relieving mental illness you can take a step backwards in causing it. And so, for people whose interest is in control of the mind, their data comes from how to help the mind, and so there is no step forward that does not involve equally, in the hands of malevolent people, a step backwards. The idea of mind control turned more serious however and in our concerns more contemporary when we come to hypnosis. This is Hypnos, the Greek god of sleep. Of course, hypnosis is not sleep and so the name itself is deceptive as to the mechanism of hypnosis, but hypnosis began the modern era with Mesmer, whose theories were also wrong not only wrong but plagiarized, on inter planetary or planetary magnetism affecting mental states and so forth. What Mesmer really happened upon without realizing it was the beginning of the idea of the laws of suggestion, and what he did is set up what is called a baquet, and you can see here it's an oak tub from which iron bars extrude, and the French nobility would come and touch the iron bars which were in the tub, the tub was filled with water with iron filings, and people would then have convulsive states which were pleasant enough for them to repeat quite frequently. Some slides of the baquette...

This was high society, not only treatment but also entertainment. You can see at the left a woman has fainted. That was quite common. Here's a color slide of the same kind of event. Mesmer was, his work was studied by a Presidential Commission or rather a King's Commission. King Louis XVI appointed a special commission to study Mesmerism. At the time it was receiving rave notices from the public and condemnation from medical societies. Here's a cartoon of the time of animal magnetism, you can see the animal doing the hypnosis, and another cartoon debunking animal magnetism. The report that was issued on the work of Mesmer's student des Lond, was highly critical. The commission found that there was nothing to the interplanetary theories and the magnetic theories, but they were then forced to explain why Mesmer got so many curs, and they attributed the cures to the power of imagination, and rather than study the power of imagination as a way to cure individuals, the commission left the issue alone, and it took a hundred years for people to pick up that essential point, that manipulation of the imagination could be used to manipulate the mind. The commission also issued a secondary report that was stamped "eyes only" for the King's eyes only, and in that report the commissioners said that there was an aspect of magnetism that was so dangerous that the practice would be stopped at once. It was a menace to morals, that the attraction that developed between the magnetizer and the subject being magnetized was so great that seductions were inevitable, and therefore we have the first inkling of the relationship between hypnosis and hypnotic seduction in this secret report for the King's eyes only.

Mesmer died in disgrace and in exile after the report appeared, and hypnosis, which was still called animal magnetism at the time, fell into disgrace but not into complete abandonment. It wasn't until about fifty or sixty years later that James Braid, a Scottish physician, coined the term hypnosis and hypnotism, and it wasn't until about fifty years after that that hypnosis begins to be studied in a serious way, and the problems of mind control, using hypnosis as the vehicle again resurface. The Victorians were interested in hypnosis 'cause it was fun to be hypnotized. They lacked the joys that we have, such as Geraldo, and so they had to entertain themselves by using hypnosis for their parlor games. And you can see a man here drinking milk out of a saucer on the floor, he had just been hypnotized. And so, stage hypnosis at the turn of the century, from the 1890's to the 1910's and '20's, was one of the most well-known and well-attended and lucrative forms of entertainment. ... just a couple of artifacts from that time. Here's a brochure from a stage hypnotism show. Walter Bodey, an English hypnotist, was perhaps one of the most famous of the stage performers. He had a hypnosis and electrical show. You can see on there that, a statement, "The real Trilby," going back to Svengali. We'll return to that in a moment. This is James Bodey. He lives on in history for a reason people don't remember any more, and that is, he was the inspiration for an extremely young comic who got his start by mimicking Bodey, and here's the young comic, here's the two of them together, Bodey on the right and Charley Chaplain on the left. And so, Charley Chaplain's career began by studying Bodey's mechanisms and his mannerisms on stage, and then making comedy of them.

During the Victorian era people's exposure to hypnosis was not only as a form of entertainment, but it seemed like a form of mind control as well. You could get people to do anything that you asked of them. You could have them be suspended between two chairs, you could even stand on them when they were suspended between two chairs, and you could do a lot worse as well. If you're sensitive, please don't watch the next two slides. This is an iron bar held by eyelets, put into the eye lids of a subject, and this a stage hypnotist in Georgia, and as if that isn't bad enough to suspend an iron bar from the eye lids, he took it one step further and then pulled a young woman on roller skates. So, it's not always fun to be hypnotized, and some people have taken the idea of stage hypnosis, it seems to me, far beyond where it should be entitled to go. One of those people is Barry Konnikoff, who traffics under the name of Potentials Unlimited. In one of his later... He has self-hypnosis tapes which were available all over the place. I've heard he's gone bankrupt now and I certainly hope that's true. In his later round of tapes he argued that women who have been sexually abused or raped deserve it because of what they did in prior lives. Now, the First Amendment perhaps protects that. On the other hand, it is... There aren't words that would describe a person who would make money out of that kind of a theory, so I won't waste our time on him. I want to get back to the central theme of mind control, which starts with Jean Martin Charcot, who was the foremost neurologist of the time. While the stage hypnotists were persuading people that minds could be controlled by hypnosis, the professionals were learning hypnosis as well, and they were learning it largely from a small group of people, the most influential of whom was Charcot. Charcot, as the greatest neurologist in Europe at the time, was frequently visited by kings and princes and certainly all of the most elite of the medical profession from around the world, and in his clinic at La Sault Petrier in Paris, he would demonstrate hypnotic phenomena. He would, in his demonstrations, induce neurotic symptoms in people. People who came in with an inability to move one limb, in hypnosis would be able to move that limb, but he would transfer the neurotic symptom to the other limb, and so he could create and destroy and eliminate and transpose neurotic conditions, and this was a remarkable demonstration which impressed a number of people in the audience, but his theories were at odds with his major contemporaries, le Beau who was on the left and HipoHypolee Bernheim who was, on the right.

There was in France at the time, this second school of thought about hypnosis. Charcot believed that people who could be hypnotized were hysterics and that hypnosis was a form of hysterical dissociation. Bernheim, based on the work of le Beau and his own work thereafter, believed that hypnosis was a form of suggestion, and that the manipulation of suggestion did not need a former neurotic condition. Here's Bernheim. Bernheim and Charcot often appeared against each other in a series of criminal cases that appeared throughout France, on the issue of the anti- social production of crime with hypnosis. A person who studied from both of these people and was influenced by both of them was Sigmond Freud. This is a picture of him on his wedding day, and a better-known portrait of him in his old age, and then the infamous couch. In his London office over the couch Freud had a picture of Charcot's demonstration, doing the demonstration that I showed you a few slides back. Let me get to that. This was the, a picture that hung over the couch in Freud's office in England. Now, Freud was very much influenced by the hypnosis theories, and worked with hypnosis for a year, but then abandoned it, and it wasn't clear why he did abandon hypnosis. Some theorists have argued, and I think correctly, that he was a lousy hypnotist, {laughter from audience} and that seemed to be true, and he couldn't, as a result, get deep enough trances to have effect on his patients. Other theorists have argued, and Freud's own writings tend to support a secondary hypothesis, and that is that Freud was scared of the seductive power of hypnosis, that the ability to move people into altered states of consciousness gave a feeling to the hypnotist of some such omnipotence that it was in itself seductive. And Freud wrote that in one of his patients, as soon as the hypnotic encounter had ended she jumped up and threw her arms around him and hugged and kissed him, and he did not attribute that to his handsome demeanour. He said it must be some other force at work and it so frightened him, he said, that he never used hypnosis again. And I think that he's harking back to the Mesmer Commission's noticing that there is a manipulative power in hypnosis that the subject may not be able to resist, but also the hypnotizer may not be able to resist as well. Bernheim, by the way, and Albert Muhl, a German hypnotist in the 1880's and the 1890's, had already given the world the false memory syndrome. They called it retroactive hallucinations at the time, and they wrote quite openly in their works that they were concerned that through the power of suggestion you could create an impenetrable witness for a court of law.

That by hypnotizing somebody, you could induce them to tell a false story, that story would be impervious to cross-examination, because the individual would sincerely believe in the truth of what he or she was saying, and therefore you would never be able to effectively cross- examine that person, because they would continually insist on the truth of what they were reporting. And so, by the early 1890's the phenomenon of false memory had already been noted and been written about extensively, and its application for courts of law had already been written about. There is absolutely nothing new in the false memory issue. It is simply a failure to read the literature from a hundred years ago. What's more important is, where are we gonna go from now with false memory, and I think the answer is where we have already come from a hundred years ago. The next step beyond false memory was the beginning to use these techniques deliberately for purpose of mind control. And essentially the first steps are taken by A. R. Luria in his institute in Moscow. Luria reasoned that if you can get people to have false confessions with hypnosis, you probably could build affective complexes on those false confessions. In other words, you could not only get people to report things that never happened, you could get them to experience the entire range of emotions affiliated with those events. And so, Luria and his colleagues in Moscow in the 1920's began doing research on developing neuroses built upon the implantation of false memories. That work was replicated in the 1930's by Milton Erikson, Lawrence Cubey, and others, who verified the truth of what Luria was reporting. Now, Luria's work was not merely academic.

It had its operational uses in the next decade in the Moscow Show Trials, which are an extremely important historical event for our purposes. During the Moscow Show Trials, Stalin purged his old enemies. Now, one way you can do that is simply have them disappear, or you could have public executions. It is generally true throughout histories that regimes try to improve their own legitimacy by discrediting their predecessors. Stalin's way of doing it was to put on trial all his former friends, and what was different about the Moscow Show Trials is that when these defendants went on trial they not only confessed to a series of crimes and sins, they could not possibly have committed, but they begged to be shot as enemies of The State.

Some recent books on the prosecutor's role in programming during the Moscow Show Trials have added some new information to our understanding of them. It was at this point that American intelligence agencies began to take notice of the mind control potential that seemed to be apparent from the Moscow Show Trials. The actual paper record though is hard to trace from the 1930's, easier to trace from the 1940's, and the trial that ultimately set the C.I.A. off on its investigation of mind control was the trial of Cardinal Mindszenty. Mindszenty was a staunch anti-Communist who was then arrested by the Communists and put in the Androsi Street Prison in Hungary. The... Six months later he was put on trial, and as his predecessors a decade before, he confessed to crimes and sins that could not possibly have been true. These are a series of slides showing him at trial. The experience of Mindszenty was so frightening to American intelligence agencies, that they began to investigate whether or not the Soviets possessed some new form of mind control unknown to The West.

Here two stories develop that are both true and completely contradictory. In secret C.I.A. files you will find both of these stories validated. On the one hand the C.I.A. argued that it was afraid that it was losing the war for control of the mind, and that the Soviets had developed this new, sophisticated psychology or whatever to control the way people think and act, and that America had to catch up. We were on the defensive now and we had to, a lot of work that had to be done. One the other hand, in a document that was extremely highly classified, eyes-only for the Director of the C.I.A.'s Eyes-only, it turned out that there was a spy in the Androsi Street Prison who was reporting back to the C.I.A. everything that was happening to Mindszenty, and this Eyes-only report which I've read is a wonderful document. It details exactly what happened to Mindszenty. It names the Soviet hypnotists who did the work and the drugs that they used to assist them in that work. It's a step-by-step manual for the programming of Mindszenty. And what's particularly interesting is if you read Cardinal Mindszenty's autobiography of the events, he really doesn't know what happened to him, and at this point the C.I.A. had a better knowledge of the programming of Mindszenty than he had of his own programming. And so, on the one hand the Soviets, the C.I.A. knew everything that the Soviets were doing, yet on the other hand they were reporting that they were afraid that they were losing the war, and I think both of those stories are true, though they're contradictory, and both are supported by secret C.I.A. documents. Meanwhile, a related event begins to happen.

In the late 1940's, Edward Hunter in 1949 for the first time coins the term, "brain washing," and writes a book on it. This is one of the two books that Hunter wrote. It turned out that Hunter was an O.S.S. and later C.I.A. propagandist, and the word brainwashing was particularly useful because American prisoners of war were starting to give confessions of using germ warfare during the Korean War, and America needed a way of stopping that kind of propaganda, and the term brainwashing which had been coined by Hunter to explain the thought control programm in Communist China proved a useful vehicle. This is Edward Hunter. I was able to do one of the last interviews with him before his death. In the deep literature on brainwashing, the more academic literature on brainwashing, his view of it is called The Robot Theory, the notion that with brainwashing techniques you can turn somebody into an automaton. The Robot Theory of brainwashing is not the only theory of brainwashing, but it is the most flamboyant and it's also the most frightening. The idea of brainwashing then in the 1950's became the object of a lot of study and books like IN EVERY WAR BUT ONE, people who had actually gone through the experience wrote about what had happened to them and researchers like Biederman in books like this were reporting what happened to American prisoners of war and other prisoners of war.

In Hawaii, an American camp was set up to be a mock prisoner of war camp to use the techniques that were being used of brainwashing. This an illustration from that camp. These are actually all Americans, but it's a simulated exercise in brainwashing because Americans were searching for a way to inoculate our soldiers if they should get captured and put through a brainwashing experience. Would it have been possible for us to inoculate them previously so that the brainwashing would not take? While the brainwashing studies were going on, another development was happening simultaneously important to the development of mind control and these are the sensory deprivation experiments that began in Canada with Donald Hebb and others. It was... Hebb's original work was essentially on what's called highway trance, the phenomena that people who will drive on highways in long stretches of road that's pretty monotonous will to into trance. And this is a form of sensory deprivation, if you've got... If it's dark at night, there's a long road, there's no scenery, you probably all have had the experience of realizing that suddenly you've driven a couple of miles but have no memory for that couple of miles passing, or you've gotten very drowsy. Well, the phenomenon of sensory deprivation became the subject of a good deal of study in the 1950's. What would happen to the mind if it were deprived of sensory input, since the mind needs sensory input the way the body needs food? And in a series of studies, this is on isolation, inside the black room, students across the country in Canada and other places were put in a black room. Here's an illustration of it. There's essentially almost no sensory input at all. What happens to the mind? Floatation tanks and other ways of decreasing sensory input, all had the effect of causing the mind when it is deprived of sensory input to throw out a hallucinated world in order to get input back from that hallucinated world. And people, in fact, kept in isolation too long could become psychotic.

Books studying the phenomena of isolation and also in conjunction with manipulating people's mind through techniques of brainwashing began to appear. THE BRAIN BENDERS is one, THE BATTLE FOR THE MIND by William Sergent is the foremost British book on the subject. Robert J. Lifton's study, THOUGHT REFORM AND THE PSYCHOLOGY OF TOTALISM is the classic work on the Chinese thought reform programme. Edgar Shein's book on coercive persuasion on the Americans taken prisoner in the Korean War, RAPE OF THE MIND by Mirrileau, another classic.

As all of this was happening, this was what you could call a form of coercive persuasion as Shein had suggested, but there was another event that was occurring simultaneously. The 1950's is, in many ways, the birth of mind control experimentation, because you have the brainwashing issue, the hypnosis issues, the isolation and sensory deprivation studies, and you now get the next stream of research, which involves obedience to authority studies. I mentioned the other night Solomon Ashe's studies on opinions and social pressure, and what Ashe did at Yale was the simplest of experiments on conformity. He drew on a blackboard a line that was one foot long and another line directly under it, parallel to it, that was two feet long. He then got six or seven people in a room, all of whom except one had been bribed, and the last one had no knowledge of the bribing of the others. He then asked them in order which one was the shorter line, and to the horror of the one who was not bribed, everyone reported that the two-foot line was the shorter line, and it was visually obvious that that was untrue, but everybody else in the room was reporting it as true. And what Ashe discovered was that the subject would report seeing the longer line as the shorter line, that he would conform to peer pressure. Cynics dismissed it on the grounds that it just showed the stupidity of Yale graduates, {slight laughter from audience} but that was not a sufficient scientific explanation, and as Walter reported the other night the experiments were done in the Navy and other places as well.

Now, I want to distinguish this group of work from the others that I've just reported on. Here we're talking about a form of manipulation of the mind that does not involve physical coercion. In the brainwashing work, in the isolation work, there is a form of physical intimidation that involves taking over the body and controlling the body, controlling all of the input in the mind and so forth, and so this is... A person in that situation that he or she is in that situation, that they are captive in some way. With this kind of experiment, we have what I call conversational persuasion. This is the beginning of the attempt to develop theories of social influence on free- standing populations where people are not aware that they are being held captive in any way, and indeed they're not. The next step along the lines of obedience research, and some ways the most frightening, is the work done by Milgrim and his book OBEDIENCE TO AUTHORITY. If you're not familiar with Milgrim's work I'll give you a very brief explanation of it. Milgrim wanted to test the hypothesis that people in Germany, good people in Germany, during the Nazi regime, were manipulated in a way to do evil, or let me restate that, Milgrim wondered why so many good people in Nazi Germany could allow such evil to happen around them knowingly. And his thesis was not the idea that there's something inherent in the German character, but rather that there's something inherent in people, and he was interested in showing whether or not if a Hitler-type character arose in the United States, that person would be able to get good people to do evil in this country. And so, he built a box, I don't have a slide of it here, he built a box with thirty switches, just little light switches, and the thirty switches were in fifteen-volt increments. They were marked in fifteen-volt increments.

As you moved over towards the right of the box there began to be some writing which said, "Caution! Danger! Extreme danger!," and the last group of switches were marked in triple red X's. Now, he then put an advertisement, again this is at Yale, so you know, maybe the cynics are right. He put an advertisement in the local New Haven newspaper for people to volunteer for the experiment. People came in and they were told that the experiment involved pain and learning, and that they would be the teachers, and that there was a student and that they could see the student, and the student they were told was hooked up to an electric grid, and every time that... The teacher was to give the student a question, and every time the student gave a wrong answer one of the switches was to be pushed. When Milgrim and his associates talked about the experiment, they concluded that nobody would push all the switches, and most people would stop pushing the switches about halfway through, because each switch was intended to deliver a higher voltage shock. The subject as about half the switches were pulled, would increasingly flinch and then scream and then yell, would then say, "I don't want to do this any more," would then say, "I have a heart condition! Please stop!," and then would refuse to answer any question and would slump over. If the teacher balked at pushing the next switch, there was an experimenter there in a long, white laboratory coat with a clipboard and a pencil, who was instructed to say first, "Continue," and then, "Please continue," and then, "You must go on with the experiment," and finally, "I will take responsibility." And what Milgrim discovered is that the overwhelming number of people pushed all of the switches, and that the simple reenforcement of saying, "I will take responsibility," or that there was an experiment going on, was sufficient to allow them to do that. Now after Milgrim's experiments were replicated in other places, and what eventually evolved is that the horror of what he was proving was so ghastly that the scientific literature turned away from it and instead focussed on the ethics of doing that kind of experiment. Because after all, what he was doing was taking people from the street and not telling them that they were what he was studying.

They thought he was studying the subject. And a lot of these people as you can imagine had severe emotional reaction once they realized that they had shocked somebody with a heart condition on a machine that went beyond extreme danger to triple X's in red, and so the ethics of doing that type of work then created a movement in universities and other places for institutional reviews boards, etc., and the research can't be done any more, and what Milgrim was proving, how easy it is to manipulate people by the simplest of commands, was no longer being studied and certainly not in that manner. But books like COMPLIANT BEHAVIOUR: BEYOND OBEDIENCE TO AUTHORITY, were being written to increase and replicate and extend the work of Milgrim, and here's a report called CONFORMITY, COMPLIANCE AND CONVERSION, from the Air Force in I think around the 1950's, an Air Force report using Milgrim's work in Air Force conditioning. Let's go back and talk some more about hypnosis since it plays a central in the rest of the development of mind control. Let me say that also, given

the nature of the subject of mind control, there are a lot of things I'm not talking about. I'm not gonna be talking to you about the physiological aspects of mind control, to take you through the lobotomy and psycho- surgery and electrical-stimulation-of-the-brain literature, and I won't be talking about the pharmacological aspects of mind control, the use of drugs and botanicals and chemicals for mind control, you know, but that should give you an idea of how vast the subject is. We're just concentrating here on the psychological aspects of mind control. All right. The notion of hypnotic seduction had been noticed in the secret report to the King in France, it had been noticed by Freud in his work, and it had been noticed by many others--a series of slides on hypnotic seduction. The idea of hypnotic seduction got, I think, its greatest impetus in an #1894 book called TRILBY. And this is illustration from it with the infamous Svengali as the hypnotist, and to this day the portrait of Svengali as a hypnotist is almost as powerful as Sherlock Holmes as a detective. It's almost the stereotype of the field. Trilby, today, would be a No. #1. Best-seller, the equivalent of a No. #1. Best-seller, and even bigger. It was probably the first block-buster novel. It was published in a magazine in serial form, and after the first issue appeared the magazine had to print an additional one hundred thousand copies because of the desire for people to continue the story. It...

The author, George du Maurier, was launched into such public light that he ultimately hid from all, in order to preserve his privacy. He had lecture tours through the United States and Britain. Do you remember PATEN PLACE, how huge a novel that was at the time? This was the equivalent and even bigger. The story of TRILBY is the story of a hypnotist who gets total control over the personality of a young woman, and the novel itself I find to be incredibly boring, but the portrait of portrayed of the hypnotist is tremendously exciting and has lived on almost as an icon of the subject itself. There was a town in Florida, and I haven't checked to see whether this is still true, that changed its name to Trilby, and at the centre of town they have Svengali Square. There were TRILBY parties, TRILBY hats, TRILBY clothes. It was an enormously popular and influential novel, which introduced people to the idea of the potential for hypnotic seduction, and also even worse. Let me... Since I don't want to dwell on this aspect of mind control, let me sum it up and say that the traditional thinking has been that you cannot get people to do with hypnosis what they would not otherwise do. There is value in that thinking, because it then doesn't encourage people to try, but if you go and talk to the hypnotists who will tell you that and you talk to them in private, they will tell you the opposite story, that within certain parameters you can get people to do things they would otherwise not do, with hypnosis, and that while hypnosis is not a magic wand or a magic potion, it is an effective facilitator for seduction or anti-social conduct. There is an increase in court cases of hypnotic seduction now, but I want to turn to the more frightening prospect of using hypnosis for the creation of anti-social crimes. Can you get... "You are in my power, you will do what I tell you." How far can you get control of somebody using hypnosis and forms of social influence? This has been the subject of a lot of fiction, just from my library here are some of the books. THE DARKER THE NIGHT, WAS THE HYPNOTIST THE KILLER, SEEING IS BELIEVING, YOUR EYELIDS ARE GROWING HEAVY, MURDER IS SUGGESTIVE, TELEFON, which of course is a movie as well. And there are academic books like HYPNOTISM AND CRIME. Interestingly there has been no major work on the anti- social aspects of hypnosis either in the legal literature or in the psychiatric, hypnotic, or psychological literature for over thirty years. 1960 is the last time we have a full discussion of the issue of hypnotic coercion, and 1972 was the last time a hypnosis journal directed itself primarily to that issue. The texts suggest that there are cases in which people, through hypnosis, have been induced to commit crimes, but the hypnosis community has been divided as to whether those are pure cases. There is what I call the methodological dilemma that arises at this point. If you... Usually the hypnotic encounter requires a certain amount of time and a certain amount of trust, and so hypnosis researchers argue that it's not hypnosis that facilitates either seduction or the production of anti-social acts, rather it is the relationship between the hypnotist and the subject, and therefore hypnosis is not at fault. The experimentalists discount any clinical, anecdotal material, because it's not rigorously scientific and therefore can't prove the conclusion of hypnotic coercion. But the experimental literature itself is discounted, because as Albert Muhl wrote a hundred years ago and Martin Orne has written as well, at some level a subject always knows that he or she is participating in an experiment. And so, there is no way to test the validity of the hypothesis that you can induce through hypnosis anti-social conduct. On the other hand, such conduct is produced on a regular basis whatever the explanation. The one place where the studies were done, where there was no fear of ethical violation or legal consequences, was in work done by the Central Intelligence Agency, and since the work has never been fully published, I have an article that will be coming out in THE AMERICAN JOURNAL OF CLINICAL HYPNOSIS, on the C.I.A. hypnosis experiments. It's not my function here to criticize the intelligence agencies or to condemn what they have done. I'm instead trying to argue the point that the hypnosis community in general and psychologists and psychiatrists as well, need to know the data that was produced and which still exists in C.I.A. files.

If we are going to be accused by the false memory people of using undue suggestion to get people to do things they wouldn't otherwise do, we need to know the limits of those possibilities, and that material is in C.I.A. files, therapists are being sued across the country, they need access to that information to help defend themselves. And so, it is in the spirit of science and in the spirit of protecting therapists and patients, you know, for the good of the country, that I present this material so that we can hope that the full amount of it is ultimately revealed. I also must make a caveat. I can only report on information that I've seen, either through my search of C.I.A. files and my interviews with C.I.A. hypnotists and other hypnotists. There may be mistakes in what I present. I cannot correct that unless I have access to all of the material. And so, if I have made a mistake, it is a mistake that comes from not being given the material. Of course, I have in good faith worked through the material I have to tell as accurate a story as I know how.

The C.I.A. began experimenting as soon as it was born in the late 1940's. The experimentation in mind and behavior control had already begun in the O.S.S. with hypnosis experiments, truth cerems, truth tablets, and lethal pills, as well as other kinds of experiments, but it was after the Cardinal Mindszenty episode that the C.I.A. began to really become concerned about the possibility of hypnotic coercion, and let me quote to you from a C.I.A. document at the time. This is a February 10, 1951, C.I.A. Top Secret Memo, called DEFENSE AGAINST SOVIET MEDICAL INTERROGATION AND ESPIONAGE TECHNIQUES, "Hypnotism has been reported to have been used in some cases by the Soviets as an adjunct to interrogation. It would be possible for a skilled Soviet operator to lower a prisoner's resistance to questioning, and yet leave him with no specific recollections of having been interrogated. With respect to inducing specific action on the part of a subject by hypnotism, it would be possible to brief a prisoner or other individual, subsequently dispatch him on a mission, and successfully debrief him on his return, without his recollection of the whole proceeding." A June 1951 C.I.A.Memo says, "C.I.A. interest is in the specific subject of devising scientific methods for controlling the minds of individuals." And so, in the late 1940's some essentially uncontrolled experimentation was begun by various people within the C.I.A., and a more structured programm was also undertaken which had the name Blue Bird, and that name was then changed to Artichoke, and under Projects Blue Bird and Artichoke the attempt was made to bring together all known knowledge of interrogation techniques, truth serums, polygraphs, and hypnosis, to create essentially an elite interrogation team with facility in all of those endeavors, and have them do the work that would be needed, first of all to protect against infiltration by enemy agents, and also to protect the minds of American agents who might get captured by Communist individuals.

Part 2

Wayne Morris:

We have been in the middle of an extended series on mind control here on the International Connection. This is Week #11, and we have heard so far, if you haven't been listening for the last few months a lecture by Dr. Colin Ross and an interview with him about the U.S. government CIA and military use and creating Manchurian Candidates by creating Multlple Personality Disorder. We also heard testimony given at the Human Radiation Hearings ... survivors of this ... and we also heard the story of Ronald Howard Cohen, writer and activist who was abducted and drugged by CIA military. We are hearing this week, a lecture Part Two of a lecture given by Dr. Alan Scheflin, and this is entitled "**The History of Mind Control: What we can prove and what we can't**". This was given back in 1995 in Dallas, Texas at a conference and we are going to listen to Part Two today.

Alan Scheflin:

It is not my function here to criticize the Intelligence Agencies or condemn what they have done. I am instead trying to argue the point that the hypnosis community in general and psychologists and psychiatrists as well need to know the data that was produced and still exists in CIA files. If we are going to be accused by the False Memory people of using undue suggestion to get people to do things they wouldn't otherwise do, we need to know the limits of those possibilities and that material is in CIA files. Therapists are being sued across the country. They need access to that information to help defend themselves. And so, it is in the spirit of science and in the spirit of protecting therapists and patients, and for the good of the country, that I present this material so we can hope that the full amount of it is ultimately revealed.

I also must make a caveat. I can only report on information that I have seen, either through my search of CIA files and my interviews with CIA hypnotists and other hypnotists. There may be mistakes in what I present. I cannot correct that unless I have access to all of the material. If I have made a mistake, it is a mistake that comes from not being given the material because I have in good faith worked through the material I have to tell as accurate a story as I know how.

In the late 1940's, some essentially uncontrolled experimentation was begun by various people within the CIA, and a more structured program was also undertaken which had the name BLUEBIRD and that name was then changed to ARTICHOKE, and under projects BLUEBIRD and ARTICHOKE, the attempt was made to bring together all known knowledge of interrogation techniques, truth serums, polygraphs and hypnosis to create essentially an elite interrogation team with facility in all of those endeavours, and have them do the work that would be needed. First of all, to protect against infiltration by enemy agents, and also to protect the minds of American agents who might get captured by Communist individuals.

In the early 1950's, Walter Smith, the Director of Central Intelligence in an EYES ONLY MEMO said he wanted to know the issue in order to know the answer to the question, "...whether effective practical techniques exist whereby an individual can be caused to become subservient to an imposed control, and subsequently that individual be unaware of the event." The purpose of the CIA experiments by the early 1950's was to discover the ways to control the minds of individuals. BLUEBIRD and ARTICHOKE were only one part of it. There were other parts as well.

The CIA's facility in Langley did not exist at that time. They used office buildings throughout the Washington area, and safe houses around the country and throughout the world. Eventually in 1953 we get a new program from the CIA which is the most expansive mind control program in the history of the world. It's genesis begins in 1953 with a speech given by Allen Dulles who was the new CIA Director. In his speech, Dulles said that we were losing control of the battle of the mind, that we were at war with the Soviet Union. He called it brain warfare, and the Soviets possessed knowledge with the United States did

not. A top-secret memo two months later in June, 1953 states, "...interrogations of the individuals who had come out of North Korea across the Soviet Union to freedom recently, apparently had experienced a blank period or a period of disorientation while passing through a special zone in Manchuria." By 1953 in other words, the notion of the Manchurian Candidates in almost those exact terms, had been theorized by the CIA. I will come back to that point in a moment, but in Dulles' public speech on April 10, 1953 to Princeton Alumni in Hotsprings, West Virginia, he argued we had to do something to make sure we did not lose the war with the Soviet Union. About a week and a half later, he signed into law what was called MKULTRA. Walter Bowart has speculated, and I think it is a good speculation, that the MK stands for Mind Kontrol, and ULTRA was the code name given to breaking the Japanese and German codes, and so this was the code name given to breaking the code of the human mind. MKULTRA was the umbrella for 149 sub-projects. All of them were under the auspices of Sidney Gottlieb, and later directed by his boss, Richard Helms. The 149 sub-projects -- you can read something about this in government documents. This is a project MKULTRA from a Joint Hearing from the United States Senate and some of the material has been made public by the Congress. Other material has not been made public but the existence of MKULTRA is not a secret, and its contours are known to some extent. Another government document explores the same territory. This one is on biomedical and behavioral research by the government.

The goal of all 149 sub-projects was mind and behavior control. Some of them involved botanical. Some of them involved psychosurgery and electrical stimulation of the brain. 9 of the sub-projects involved hypnosis. Some of the sub-projects involved things like voodoo. One of them involved circumcision to create anxiety and then manipulate the anxiety. Almost anything you could think of and things you wouldn't think of were funded and studied. Maybe one of the more well known studies, and one of the more notorious is the work that was done by Ewen Cameron in Canada. Cameron was the President of the Canadian Psychiatric Association, the American Psychiatric Association, and the World Psychiatric Association. In his work at the Allen Memorial Institute in Montreal he had a theory that sounds unique but actually exists in "Brave New World Revisited" and even goes back to the Ancient Greeks -- his notion was that you could completely erase personality by regressing an individual back to an infantile state - process he called de-patterning. Then you could program that individual with a new personality - a process he called psychic driving. In order to destroy the original personality, Cameron put his subjects to sleep for up to two months, injected them with LSD, mescaline and other psychoactive chemicals, and essentially engaged in a form of regression therapy. Age regression may be a hypnotic phenomenon, but in this sense regression was an actual regression. This was the attempt to manipulate people back to a state of infantilism. These were people who came to him who were depressed ... this was the local psychiatric institute. This is where you went when you needed help. One of the people who came to him, I don't have a slide of her, but I have done some TV shows with her, was the wife of a Member of the Canadian Parliament, Val Orlikow was her name. She is dead now. Val had just had a baby and she was suffering from post-partum depression. This meant she didn't feel she was able to care for her baby, or for herself, and in general she was feeling unequal to the task of wifehood and motherhood, and her husband suggested maybe she could benefit from some psychiatric care, and she thought that was a good idea. They made the mistake of winding up going to Ewen Cameron and Cameron destroyed her life. She along with 10 or 11 other people ultimately sued the Canadian government and the CIA because the CIA contributed funding to Cameron's experiments. SIXTY MINUTES did a show on this that I show from time to time. One of the people went there because he was feeling badly, and he went through the same kind of process, and they later discovered he had a minor skin disease and a single shot of cortisone would have cured it. His life was ruined, and as he put it, "Where do I go for help? I don't trust any psychologists, or psychiatrists or therapists any more after what they did to me, and I know I need their help, but I am programmed to not trust them, so where do I go for relief?"

The experiments have been written about in detail in a number of books. This is the least reliable, Gordon Thomas' "Journey Into Madness". Harder to find, a Canadian book "I Swear By Apollo" is more accurate. Perhaps the best of the books is Anne Collins', "In the Sleep Room". In some ways the most compelling and the most, I wouldn't want to say important, but the one that is most emotional perhaps, is Harvey Weinstein's, "A Father, A Son and the CIA". This is the Canadian edition. There is a slightly revised version printed by the American Psychiatric Press, "Psychiatry and the CIA". Harvey's father was one of those people who was depressed and went into the Allen Memorial Institute as a human being and came out as a vegetable. He never did become a whole human being again. Indeed, it was what happened to his father that led Harvey into psychiatry and Harvey's conclusion is something that should be read by everybody in the mental health field. "After all of the knowledge of the CIA experiments, and the Army experiments and Air Force and Navy experiments have come out, after all of what we know ... NOT A SINGLE RESEARCHER HAS BEEN SUBJECTED TO A SINGLE LAW SUIT OR EVEN CENSURE BY A PROFESSIONAL ORGANIZATION FOR WORK THAT WAS CLEARLY ILLEGAL AND CLEARLY UNETHICAL, EVEN AT THE TIME. THE MESSAGE MUST BE, IF THERE ARE NO CONSEQUENCES TO DOING THIS KIND OF WORK, THE WORK WILL CONTINUE." And indeed, this is most likely what has happened. Harvey's conclusion is that if the professional organizations are not going to step up and condemn this kind of experimentation, then it will be repeated and other generations will suffer the horror that his family suffered.

Cameron's experiment was simply considered a part of a series of brainwashing tests to regress people back to this infantile state. Now the Greeks had sleep temples that had a similar focus, but modern technology added to Cameron's work. He used a tape loop. He would interview an individual. You have heard about Erikson's "power words" ... Cameron would use words that were important to his patients, and he would program those words in messages that he would construct on tape loops that would be played into their brain one half a million, to a million to a million and a half times ... in fact these people were quite literally "programmed".

In a state of infantilism Cameron wrote that they could endure sensory deprivation indefinitely, whereas most people would crack in about 8 hours, those people could stay there indefinitely. The psychic driving in which the tape loops were used was the attempt to reconstruct the personality and I wondered where such a fiendish idea would have come from and I found it in a 1951 science fiction novel called "The Demolished Man" by Alfred Bester, and if you are a science fiction buff I certainly encourage you to find that book and read it. Basically the theory of the novel is that when somebody commits a crime, that shows a certain boldness that society should appreciate, but it's in the wrong direction. What they do is take criminals to the hospital and they regress them back to infantilism and then they re-build a new personality -- exactly the idea that Cameron was working on with his subject had been written about a few years before he began as a science fiction novel. I won't ever know if he had read that novel, but the studies from his work shows that it did not work and indeed it caused a great deal of pain to a great number of people.

The idea of manipulating people with hypnosis in ways that are effective, and in ways that are quite bizarre, was born in the brain of George Estabrooks. Estabrooks, a very interesting character, was working in Morton Prince's laboratory at Harvard in the 1920's and he had the idea that if you could cure a multiple personality with hypnosis, maybe you could create one with hypnosis. Why in the world would anyone want to create a multiple personality? Estabrooks had the solution. You could create then, a super spy or a super assassin, somebody who would do the bidding of his country and have no knowledge that he was engaged in those acts. Estabrooks said in 1928 that "...my views are somewhat different than most psychologists. I believe the hypnotist's power to be unlimited, or rather only to be limited by his intelligence and his scruples." In the 1920's he went around trying to convince the military to create hypnotically controlled individuals, create a multiple personality and use that one as a courier. They thought he was crazy and ignored him until the Moscow Show Trials, and then they took him seriously, and in the archives of his work at Colgate ... there is a notation that he stopped publishing in the mid-1930's because his work had then become classified. If you read his book, this is Morton Prince's "Dissociation of a Personality" ... the classic work on multiple personality ... if you read Estabrooks' book "Hypnotism" through its various editions, what you discover is that each edition is more assertive about the validity of creating hypnotically programmed couriers and finally in an interview he gave in a local Rhode Island newspaper in 1963, he claims that, "... this is not science fiction, it is fact, I have done it." Working for the FBI and the CIA, he would create a multiple personality, program that personality to be a courier, send that personality somewhere in the world have them return and be amnesic for all of that.

The idea may have originated with Estabrooks but he may not have been the first to actually publish it as such. Writing in "The Psychoanalytic Review" of 1947, Major Harvey Leavitt of the U.S. Army Medical Corps described the hypnotic creation of a secondary personality, "... hypnotically induced automatic writing was established early in the course of treatment as a means of expeditiously gaining access to unconscious material. After this procedure as utilized for a time, a hypnotic secondary personality was produced by suggesting that the writing was under control of a certain part of his personality unaware to him." Leavitt then said that he created another personality in direct contrast to the one already established so he could work the two created personalities off against one another. He concluded, "... regardless of whether the production of multiple personalities by means of hypnosis could be construed as additional proof that hypnosis is an artificially induced hysteria or whether the multiple personalities were artificial entities resulting from direct suggestions ... there exists a close relationship with personalities spontaneously arising in hysterical dissociation. The importance of producing multiple personalities experimentally lies in the fact that certain elements of the original personality may be isolated which manifest a minimum of censorship influences and thus may serve as helpful ajuncts in hypno- analysis."

That was not the purpose for the intelligence agencies in working with the idea of creating a multiple personality. The story of the intelligence agencies creating multiple personalities to use as couriers and assassins may have begun with Estabrooks, and indeed in CIA documents you can see Estabrooks' theories worked out and discussed, but the genesis of the work begins in 1951 in the CIA Office of Security where an official named Morris Allen got the idea that CIA agents should be trained in hypnosis and in order to train them in hypnosis, he arranged with them to go up to New York and get training from a stage hypnotist. As soon as he and the agents got to New York, the stage hypnotist spent an hour and a half with them, regaling them with tales of hypnotic seduction - of how when the hypnotist went on the road, the he would sleep with a different woman each night - some of them he would give hypnotic hallucinations that he was their husband, others he would use other techniques - but this was a technique he had found very productive for his own sexual favours. The CIA was of course delighted to hear all of this and reported so in the documents. If he could use the technique to manipulate people that way, this was what they wanted to learn and so that's how they got trained.

Then from 2-3,000 pages of documentation going from 1951 to 1954 - Morse Allen and his group replicated all of the known hypnosis experiments involving people putting their hands in acid or jars of snakes, in shooting people dead, involving the French and Germans - there are all of those experiments American researchers, Estabrooks and others had conducted. But they (CIA) wanted to go further and explore the possibility of using hypnosis to create a programmed courier and a programmed assassin. The multiple personality itself may have come from Jekyll and Hyde which was very popular at the time. Another illustration of that idea in which two entirely different people can be within the same body - one being the embodiment of good, the other the embodiment of evil. It was good fiction, but it also was part of the genesis from Morton Prince's work. {slide: an Italian depiction of multiple personality - you can see the two faces pointing in other directions}

By the 1950's, the popular press was reporting in "The Three Faces of Eve", the existence of multiple personality - the three faces of course were more than three faces - and the final face was not the final face. Eve was Chris Sizemore finally telling the story with her real name and then telling it again in "A Mind of Her Own". Well, her mind may be her own, but her life isn't. She is now suing the film company which claims that the movie, "The Three Faces of Eve", means they own the story of her life. She claims they only own up to the time she had three faces, and that the other faces still belong to her. So she is still not in control of her identity and the fight goes on. [slide: here she is in person} Sybil was then the next known or highly reported case of multiple personality disorder. Herb Spiegel tells me that Sybil was not a multiple, and that when he treated her in Cornelia Wilbur's absence, that Sybil never had any need to express any other personalities with Herb. Herb admits she was brilliant, and also extremely mentally ill, but that she was not a multiple, and he refused to participate in the writing or publishing of the book if that was the spin they were going to take on her case. On the other hand Herb believes that multiples exist, but that the condition is extremely rare and so people have argued that she was smart enough to know he wouldn't believe it, and therefore smart enough to know to conceal the personalities so the debate goes on.

The use of hypnosis to create multiple personalities and in general for intelligence purposes appears in a number of confidential secret documents just a few of which I will throw up on the screen. Some stories have leaked out about how the CIA hid it, and they didn't tell anybody about it. It's very simple. The CIA explodes the old theory of hypnotic moral curb. They came to the conclusion that people can be induced to do things that would violate their moral codes, and the folklore that you can't get people to do things against their will was simply untrue, and they carried those experiments further in to study ways to create unwitting killers. CIA documents tell of a 1954 project to create involuntary assassins. This is the end product of Morse Allen's work. By 1954 he had exploded the moral code theory; he had replicated all of the experiments of hypnotic coercision; and had conducted other experiments on his own, but all of these were in fact laboratory type experiments. He wanted to do more and see whether operational use could be put to these principles. His group prepared a film called, "THE BLACK ART". In the film, an "Oriental Character" is having a drink with an American agent. A drug is surreptitiously placed in the drink that causes the Oriental man to fall asleep. While dozing, he is hypnotized and programmed. The CIA had already experimented on hypnotizing people in sleep conditions and so forth. The next scene shows the Oriental man opening a safe that contains secret files. He removes the files and brings them to an American agent who reinforces the hypnotic suggestion. At this point, there is a voiceover by a narrator who asks, "Could what you have seen been accomplished without the individual's knowledge? Yes. Against the individual's will? Yes. With complete amnesia of performing the act? Yes. How? Through the powers of suggestion and hypnosis."

Again by 1954, Morse Allen was pushing hard to have operational tests of the thesis that you could construct a multiple personality and have that personality commit crimes, come back, and have no knowledge in the host that that act had been committed. In other words, The Manchurian Candidate scenario had been worked out by the CIA five years before the novel was published. But would it work? In order to know whether it worked, you had to conduct what Morse Allen called "terminal experiments". These were experiments that could result in the death of the subject. The CIA gave clearance for those experiments to be done and in reference to one researcher who was asked if he would participate in them, he said, "if you set up terminal experiments, I will do them for free." By 1954, the literature demonstrates that Morse Allen's concerns had reached the higher levels of the CIA and that they were willing to engage in a field test for the Manchurian Candidate type scenario. By January, 1954, an ARTICHOKE memo says, "Could an individual of a certain descent be made to perform an act of attempted assassination involuntarily under the influence of ARTICHOKE?" Then later in the memo it says, as a trigger mechanism for an even bigger project, the CIA proposed that, "an individual of a certain descent, approximately 35 years old, well educated, proficient in English, and well established socially and politically in a foreign government be induced under ARTICHOKE to perform an act involuntarily of attempted assassination against a prominent foreign politician or if necessary, against an American official."

It was clear then, by summer of 1954, that the ARTICHOKE team said we can create an artificial personality, program that personality to conduct an assassinatiion, that assassination would occur. If in fact the individual was captured, he would never reveal the knowledge that he had engaged in the assassination, the host would know nothing about the alter, the amnesia would be impenetrable, and even under torture the host would not reveal the secrets. CIA research in many universities around the country explored topics such as programming people by way of telephone, whether somebody could answer a telephone, a secret word would be given, they would slip automatically into a trance, nobody around them would know they were in trance, they wouldn't know they were in trance, so forth. Experiments on pain, experiments on creating unconscious recorders, experiments were done on whether people would commit suicide under hypnotic instructions, and so on. Albert Mole had written one hundred years ago that it would be possible to give people hypnotic instructions to have them commit suicide. These were the subjects of CIA experiments. What ultimately happened, we don't know because the government files closed up at the point of reporting on the assassination attempts. But a year later, in May, 1955, a top secret report called "Hypnotism and Covert Operations begins with the following paragraph:

"Frankly I now mistrust much of was written by academic experts on hypnotism, partly because this is because many of them seem to have generalized from a very few cases, and partly because much of their cautious pessimism is contradicted by Agency experimenters. But more particularly because I have personally witnessed behavior responses which experts have said are impossible to obtain." By l954, the Manchurian Candidate scenario had already been thought of and was already under operational testing.

This is Richard Condon who wrote The Manchurian Candidate, as Walter Bowart discovered when he wrote him, he had no

idea he was writing fact. He thought he was writing fiction. The only case that has come out of the literature that suggests that someone may have been an experimental subject is the control of Candy Jones. Candy was quite a beautiful woman, second only to Betty Grable. She was a pin-up girl during WWII, but her artificial personality, Arlene Grant, was programmed by the CIA according to the book to be a hypnotic courier and she was sent around the world, and occasiionally captured and tortured. Her last instruction was to have a two week vacation in Berlin and then jump off a cliff. It did not happen because her husband, John Neville, who was a very famous all night disc jockey in New York and an amateur hypnotist, shortly after they were married began to feel he had actually married two different women and could not account for the mood swings and the differences in personality. Using hypnosis with her, this story unravelled. Candy was sent to Herb Speigel for evaluation. Herb did a work-up on her using the hypnotic induction profile and other tests, and found she was very very high in the positive. And while he couldn't conclude that what she was saying was true, he could conclude that it would be true with her if it were true. In other words, she was the kind of person that this manipulation would have worked with. The Candy Jones story, which we cannot validate and we cannot invalidate ... I have seen a CIA file marked "Grant", but I have not been able to get the contents. It may be true, it may not be true. But the story about hypnotically programming couriers and assassins clearly is true. That book was published before the CIA documents were made available.

All of this of course violates the Nuremburg Standards but those Standards have had no application in covert activities. We found a document from the Attorney General of the United States to the Director of Central Intelligence which said '... if any of your agents are caught during their work, they will not be prosecuted for crimes' and therefore there is essentially the 007 license to kill that CIA agents will not be prosecuted for their crimes, therefore Nuremburg Standards do not apply.

It wasn't until the Nelson Rockefeller Report to the President in June, 1975 that we had any inkling about this material and then basically just a paragraph or maybe even a sentence mentioning mind and behavior control sent researchers looking for the files. In his testimony before Congress Stansfield Turner corroborated the existence of the mind control programs.

Some people wrote about them at the time. Peter Watson's book (from England) "The Military Uses and Abuses of Psychology" touch on but do not give in any detail the experiments done by the CIA and Army, but do talk in general about the use of psychology for military purposes. The classic works are of course, Walter Bowart's book, "Operation Mind Control" which is hard to find, and a collector's item, an extremely important book. John Marks' book, "The Search for the Manchurian Candidate", and my book, "The Mind Manipulators" -- these were the only three books to appear on the subject of mind and behavior control by the CIA and the Army experimental programs.

I want to move the story forward some more, from the CIA experiments in the 1950's into the 1960's and beyond. The 1960's brought us a new variation in operational utilization of the techniques of brainwashing and sensory deprivation and so forth that had been explored in the 1940's and especially in the 1950's, and this is the religious cult issue. This is Steve Hassam's book, "Combatting Cult Mind Control" - there is a revised edition available for sale, probably the best of the deprogramming books on mind control. But it was in the 1960's that the idea of using these techniques on essentially freestanding populations was experimented with and the cults provide the laboratory setting for social influence processes where the people are not taken into complete physical custody. The cults themselves represent, I think, the step from the laboratory experiments into real world operational use and then beyond them, there are books like "Mindbending on Cult Deprogramming". Then we move into the books on satanism and programming. This one I think is available for sale ... "Satan's Children", linking the multiple personalities with satanism. Can we prove this? Where do we stand with our knowledge of satanism?

Speaking as a lawyer, it's going to be very rough going to prove a widespread, intergenerational network of satanic cults in court. Part of the reason for that is the report issued, "In Pursuit of Satan", by Ken Lanning FBI, who has concluded that though instances of satanic abuse do exist, there is no evidence to suport intergenerational, widespread, multinational networks of satanic abuse. Also, within the next two months, the most major study in the country on this issue will reach the same conclusions as Ken Lanning. And that report is due in about two months. But the tentative conclusion which will be the final conclusion, will be that Lanning's perception is correct. That the evidence does not exist for intergenerational satanic cults. Now, the methodology can be challenged, in any event the question of whether therapists who work with people who claim to be abused in satanic cults should be sued, is a separate issue from what can be proven.

Is it reasonable for you to believe that widespread satanic abuse occurs? The answer to that I think, is yes. Despite the Lanning Report and despite the conclusion that will come out later on, it is your job to believe your patients, at least within the therapy setting, and if they say it happened, then you work effectively with them by believing that it happened. It's when there is a real world corollary that the trouble begins. I am using my lawyer hat now. Do not tell your patients to go out and sue their parents or sue other people. Do not tell them to give newspaper accounts and so on, and to protect yourself in your clinical notes, say that this is the story your patient told, you have no way of knowing whether it is true or not, in any event, that's not your function. Your function is to make the person whole with whatever material they present to you. As long as you do not advise that they do not go out and sue other people, you can advise them to seek legal help if they say, "should I sue?" You say, "that's not my job, I am not a lawyer ... you should go to a lawyer and see what the lawyer thinks ... I will support you in this session whatever you decide to do ... but what you decide to do in the outside world is a decision that must be made by you and other professionals, not by me." As long as you do that, there should be no legal liability. If your patient sues you for believing all the crap that you are being told, in your notes somewhere should be "it's not my job to evaluate the historical validity of this information, but I will work with it as if it is true, because for my client at this point in time it is true." That should protect you.

There are isolated instances, there is also a large accumulation of information from local police departments who are not as influenceable as the FBI - the FBI did deny the existence of the Mafia - when I went to an FBI friend of mine who oversees the Behavioral Science program there - I said why does the FBI deny the existence of widespread satanism - he looked at me and said they also denied the existence of the Mafia. Their conclusions can be rebutted in court by a lot of data from local police that have found ritualistic killings. The book "Mortal Remains" is an illustration of a case in Massachusetts where a satanic cult was practicing ritual murder. There are instances in which it can be proven. The existence of satanism is provable for over many centuries and the existence of cults and mind control programming is provable beyond question. For therapists to believe that there are some cults that are satanic is true, to believe that those satanic cults may be more widespread than we think or thought beforehand is reasonable, to believe that they engage in a bunch of horrendous practices - look what the Nazi experimenters did and look what Ewen Cameron did and how can you say there is a limit on human depravity? It is not unreasonable to believe that these kinds of things can occur, and in any event, when you work with trauma, you work more effectively by believing the story that it has come from.

Let's go further. In breaking bodies and minds, the role of psychiatric abuse and mental health professionals in creating torture victims and mind control victims is discussed - the complicity between torturers and professionals who help them to torture has been documented - this is the Irving Janus report from 1949 that validated the use of hypnosis as part of conditioning techniques being used by the Soviets; Rand report in 1958 again reaches the same conclusions; the involvement of hypnosis and other forms of programming - the book "Why Men Confess" is written by a former Assistant Attorney General of the United States, traces modern mind control back to the Malleus Maleficorum through the Moscow Show Trials and other places. It's a good legitimate source for understanding the modern "False Memory" stuff which I will get to right now.

There has been only one completely litigated case involving false memory. Can you implant false memories? Of course. We knew that 100 years ago. We have come a long way since then as you can see in this talk. This is Eileen Franklin and her daughter - this case is the only criminal case that has gone to trial in which repressed memory played a major role. She claimed that her father killed her friend, Susan Nasen. The story that Eileen Franklin tells us, that she was looking into her daughter's eyes one day and suddenly the image of watching her father kill her friend Susan (when Susan was 8 years old twenty years earlier) came into her mind, and then the memories started to flood back about that experience. {This is her father when he was arrested. Take a good look at him. Here is at trial on the right.} You learn a lesson about lawyering. That's his lawyer on the left. You clean up the client. You don't bring him into court looking like that ... you bring him in looking like that - on the right. You can introduce pictures but it is not as powerful as the present appearance.

The Franklin case is a very troubling one, and we have to be very honest about that because we are first and foremost scientists, and unlike the False Memory, do not need to have a political agenda here. Eileen Franklin is a liar. She told four different stories about the genesis of her memory one of which was that she was hypnotized in therapy. If that story were true, she would have been disqualified as a witness in California courts. When she learned that, or we hypothesize that when she learned that, she went back to her brother and said I told you I had been hypnotized. Forget that. That's tampering with evidence. She told actually four different stories about how she recovered her memories, and that's grounds to disbelieve her because there is clear evidence of lying in the way she presented herself. On the other hand the fact that she is a liar does not mean that the story she told is false. The False Memory make that assumption but that's bad logic. They may be right that she's a liar and her story is false, but you cannot make that jump as a logical matter. On the other hand her father is ... my first real knowledge of the case came from a cab ride with Beth Loftus on my left and David Spiegel on my right in Chicago when Beth and I were both plenary speakers at the ISSMPD in Chicago a few years back. Both of them had just come from testifying in the case, both of them testified against Eileen Franklin and each of them in the cab in my presence concluded that if her story were true, and it might be true, it would have been true of this man. This man physically abused his son and sexually molested his daughters.
He had a violent past. It is well documented. When he was arrested he had a large collection of child pornography. He had an active correspondence to have sexual relations with their seven and eight year old daughters. He had pictures of those activities involving him.

Her memories may be true, and they may not be true. He is the kind of person it would be true of. It was independent physical corroboration of his pedophilia, of his violence, and the fact that this is the kind of man who would have committed that sadistic molesting and murder. It is the up to the jury then to decide if that evidence is enough. But her repressed memory was not the only basis of the testimony. The defense argued that everything she remembered was available in a newspaper somewhere. She had no independent memory of anything apart from what was in a newspaper somewhere and that point was made to the jury. The jury convicted, and Franklin, the father, is now in jail for life. The California courts have rejected his appeal and his lawyers have filed a motion in federal district court. They have imported Richard Ofshe, a specialist in social influence to work over the mother who testified against her husband in the trial and she has now changed her mind. Of course, this is not an unusual phenomenon. Now that he is in jail and she can have recriminations she might have changed her mind anyway, but the introduction of a social influence specialist with a political agenda to spend a lot of time with her to reach the certain conclusion, seems to me if there is a new trial is a point that will be raised at that new trial.

What I found very interesting is I interviewed the prosecutor, his lawyer, and his appellate lawyer and in their brief on appeal, the appellate lawyers wrote that ... no responsible person would believe that the concept of robust repression was false ... in other words the Ofshe/ Singer hypothesis that you cannot forget traumatic events over a sustained period of time and that it is the "scientific quackery of the twentieth century" is, in the opinion of these lawyers, irresponsible thinking, and I agree. The evidence shows that the Ofshe/Singer hypothesis is wrong. The evidence comes from biological studies of memory and how the brain processes traumatic memories differently than ordinary memories and it also explains how Loftus' research on normal memory is irrelevant to the issue of traumatic memory, a point which she is now reluctantly starting to recognize.

Is Eileen Franklin on trial? Is Freud dead? If you knock out the notion of robust repression as the False Memory people have been trying to do, you have a very simplistic idea. If a person can be repeatedly traumatized as a child, have no adult recollection of that trauma, go into therapy and then have a recollection, then the therapist must have implanted it if robust repression is not real ... So the existence of robust repression as the underpinning of the scientific foundation for the False Memory argument is quite crucial, but that argument is now shown to be scientifically invalid which doesn't mean that the False Memory position is wrong. They are right about what therapists should be doing and shouldn't be doing - on the issues of social influence procedures - but they are wrong about the robust repression. That means that somebody can go to a therapist and have that memory refreshed and that memory can be true

And then memory can be true. Which makes it a harder case, the world is no longer black and white. You cannot use the iatrogenic cause argument in every case of robust repression. The Father Porter cases are an illustration of robust repression, memories that were recovered without hypnotic intervention and in the absence of a therapeutic encounter. You may know the Father Porter story. My time is short, so I can't go through it with you now. In any event he recovered the memories of having been molested. He was able to validate those memories as to himself and Father Porter is now in jail having confessed to having molested between 50 and 100 young boys and girls. In the search for the unravelling of the human mind, mind control is real. It has a rich history. I have only given you a fraction of the history. We haven't touched on the physiological or pharmacological aspects. We haven't talked about behavior modification and conditioning techniques, and so forth, we have just concentrated on the issues that are closer to the work that you will be doing. We haven't talked about social influence theories in general, but the existence of mind control its work in secret laboratories, its work in CIA and Army experiments, its spilling over into religious cult settings, and its use in freestanding populations are all validated and that ought to give mind control the kind of respectability it deserves, and give you the background to believe the kinds of stories that your patients are telling you as at least possible. Thank you.

You have been listening to a lecture by Dr. Alan Scheflin, "The History of Mind Control: What we can prove, and what we can't". CKLN 88.1 on this series on Mind Control. Next week we are going to be featuring an interview with Claudia Mullen, Valerie Wolf and Chris Ebner the day that they had given the mind control testimony to the President's Advisory Committee on Human Radiation Experiments in March 1995. If you have missed any of the shows, stay tuned for this message and find out how you can remedy that. CKLN is rebroadcasting a ground-breaking radio series, Mind Control in Canada, currently airing on the Sunday morning show, The International Connection. Starting June 2nd on alternative radio, Monday nights from l0pm to llpm, the eight month radio series, Mind Control in Canada, will be aired. This series looks into the Canadian and U.S. government history of mind control experimentation, and particularly the experiments done to children in creating programmed multiple personalities by means of severe trauma and abuse. If allegations of the survivors are true, and what government documentation would point to, the leaders, intelligence agencies and militaries of North America have been using mind control for political, military and criminal purposes for decades. To hear interviews and lectures with survivors, researchers and therapists on this important topic, tune into CKLN 88.1 FM Monday evenings 10pm to 11pm for re-broadcasts or Sunday mornings, 9.30am to 10.30am for the breaking story on mind control.

Mk-Ultra & Intelligent Interrogation®

1950 - Project Bluebird
1952 - Project Moonstruck CIA-HF/ELF transceiver implants-ESB/electronic stimulation of brain
1953 - Project MK-Ultra CIA-149 sub-projects -
1958 - Project Orion USAF - ELF Modulation " Dreamland" vhf/hf/uhf modulated at ELF- Electronic Dissolution of Memory
1960 - Project MK-Delta CIA - vhf / hf /uhf modulated at ELF "Deep Sleep" Fine tuned subliminal programming
1983- Project PHOENIX II USAF- NSA / Radar, Microwaves, EHF UHF modulated -" ZAP- Rainbow"
1989- Trident ONR- NSA / UHF - 100,000 watts Black Triad - AEMC-Large group mgmnt/behavior-riot control
1990- RF MEDIA - CIA- ULF VHF HF Phase Modulation " Buzz Saw " EEMC
1990 - TOWER CIA- NSA - Microwave EHF SHF Programming through neural resonance and encoded information
1995 - HAARP CIA NSA ONR Atmospheric phase-locked resonant UHF VHF
1997 - PROJECT CLEAN SWEEP - CIA NSA ONR -Emotional wavelengths-broadcast through GWEN Networks

Forget the fact that nowadays most interrogations are done by civilian professionals on payroll to private companies… That today we live in a different world than before. What's next? Well, let's take a look first at where we've been recently. In the mid-1970s, congressional committees investigating MKULTRA discovered that the CIA had become involved with a startling array of brainwashing experiments. The methods studied under MKULTRA included electroshock, subliminal communication, sensory deprivation and stimulation, the use of drugs (from "truth serum" to hard narcotics to LSD), and yes, even hypnosis. Many of these experiments were conducted on unwitting human subjects, and several MKULTRA projects are listed among the most appalling CIA abuses on record. Hypnosis, in fact, had attracted the interest of military and intelligence agencies years before MKULTRA. In *The Search for the "Manchurian Candidate,"* a thorough history of the CIA's mind control work, author John Marks devoted an entire chapter to the study and use hypnosis. "No mind-control technique has more captured popular imagination -- and kindled fears -- than hypnosis," Marks noted. For the CIA officials tasked with turning mental abilities (and vulnerabilities) into Cold War weapons, "hypnosis offered too much promise not to be pursued."

The CIA's first major involvement with hypnosis originated in the Office of Security, which in 1950 formed special interrogation squads -- each of which was staffed with an expert hypnotist -- for the purpose of evaluating potential foreign agents and defectors from enemy countries. Code-named BLUEBIRD, the program was put under the command of Morse Allen, a former officer of both Naval Intelligence and the State Department, who developed an avid interest in hypnosis when he joined the CIA's Office of Security. (Shortly thereafter, BLUEBIRD took on the new code-name ARTICHOKE, the project that directly preceded MKULTRA.)

According to Marks, not only did Allen consult with and employ some of the top academic experts on hypnosis, he also conducted his own experiments:

> "He asked young CIA secretaries to stay after work and ran them through the hypnotic paces -- proving to his own satisfaction that he could make them do whatever he wanted. He had secretaries steal SECRET files and pass them on to total strangers, thus violating the most basic CIA security rules. He got them to steal from each other and start fires. He made one of them report to the bedroom of a strange man and then go into a deep sleep."

Allen recorded the observation that "this activity clearly indicates that individuals under hypnosis might be compromised and blackmailed." Those were helpful abilities for a spy agency, to be sure, but Allen later envisioned a more extreme use of hypnosis. In 1954 he hypnotized another secretary, and convinced her while in the trance to pick up and shoot an (unloaded) gun at another secretary.

The implications were serious: agents could conceivably be induced to assassinate a target without knowing what they were doing. However, Allen had learned enough about hypnosis to be skeptical that such an operation could actually be pulled off. No one could be sure that such experimental successes could be carried over into the operational realm. Hypnosis was surely attractive, but it was also unreliable; there were simply too many variables in how subjects might act under hypnosis or under the power of post-hypnotic suggestion.

One CIA psychologist who was heavily involved in later hypnosis research, John Gittinger, saw promise but pratfalls with the technique. "Predictable absolute control is not possible on a particular individual," he concluded, and absolute control, after all, was the objective. The pre-programmed assassin remained an elusive goal.

Still, the CIA would do everything in its power to identify intelligence uses of hypnosis. In 1977, the agency informed Congress that of the 149 subprojects that were launched under MKULTRA, eight dealt with hypnosis -- including two that studied "hypnosis and drugs in combination." Hypnosis research was conducted by several world renowned scientists, whose funding would later be traced to the CIA. At major universities and top research institutes, as well as military bases and prisons, subjects were put into trance in experiments that were intended first and foremost to advance the CIA's ability to operationalize hypnosis. In 1960, the CIA's counterintelligence (CI) staff became involved in the effort. Intent on discovering and improving on the Soviet Union's mind games, the CI officers saw hypnosis as a "potential breakthrough in clandestine technology," as it was described in one CIA document.

For the CI staff, interest in hypnotism went beyond the theoretical into the operational. In July 1963, the CIA issued a 128-page "Counterintelligence Interrogation" manual, a document that was not made public until 1997. Among the tactics described for "coercive" interrogation of "resistant sources" was hypnosis. (ParaScope has made available both an online and a print version of this startling document.)

"The problem of overcoming the resistance of an uncooperative interrogatee is essentially a problem of inducing regression to a level at which the resistance can no longer be sustained," the manual said. "Hypnosis is one way of regressing people."

The manual cited the work of Martin Orne, a famous psychologist who received several CIA subsidies under MKULTRA for his research on hypnosis and interrogation. Like other experts, Orne concluded that hypnosis would probably be of marginal use for this purpose. To the CI staff, Orne's generally skeptical view of the technique was "somewhat too cautious or pessimistic."

The manual suggested, for example, that a CIA interrogator "could tell a suspect double agent in trance that the KGB is conducting the questioning, and thus invert the whole frame of reference" for the interrogatee. "[O]nce the subject is tricked into believing that he is talking to friend rather than foe, or that divulging the truth is the best way to suit his own purposes, his resistance will be replaced with cooperation. The value of hypnotic trance is not that it permits the interrogator to impose his will but rather that it can be used to convince the interrogatee that there is not valid reason not to be forthcoming."

The manual added that hypnosis "offers one advantage not inherent in other interrogation techniques or aides: the post-hypnotic suggestion." In certain cases, the manual instructed:

> "[I]t should be possible to administer a silent drug to a resistant source, persuade him as the drug takes effect that he is slipping into a hypnotic trance, place him under actual hypnosis as consciousness is returning, shift his frame of reference so that his reasons for resistance become reasons for cooperation, interrogate him, and conclude the session by implanting the suggestion that when he emerges from trance he will not remember anything about what has happened."

Although the CIA's hypnosis work had advanced considerably by the early 1960s, you wouldn't know it from reading Deshere's report for *Studies in Intelligence*. At the same time, Deshere does have plenty to say about potential roles for hypnosis in the spy trade, exploring several crucial questions about the utility of the technique. Can interrogatees under trance be made to tell the truth and nothing but the truth? Can they be hypnotized without their quiescence or their knowledge? Can they, though post-hypnotic suggestion, be turned into virtual spy-robots to do the CIA's bidding? Can amnesia be induced by the hypno-handlers to erase memories of spy missions?

After conducting a lengthy analysis, Deshere concluded that there was probably some use for hypnosis in interrogations, of a very limited nature. He wrote that "the *hypnotic situation,* rather than hypnosis itself, could be used to relieve a person of any sense of guilt for his behavior, giving him the notion that he is helpless to prevent his manipulation by the interrogator." Deshere described how such an operation could work:

"A captive's anxiety could be heightened, for example, by rumors that the interrogator possesses semi-magical techniques of extracting information. A group of collaborating captives could verify that interrogees lose all control over their actions, and so on. After such preliminary conditioning, a 'trance' could be induced with drugs in a setting described by Orne [the MKULTRA researcher discussed above] as the 'magic room,' where a number of devices could be used to convince the subject that he is responding to suggestions."

Once the interrogatee was persuaded that he was under the control of his handlers, Deshere reasoned, "the individual could legitimately renounce responsibility for divulging information, much as if he had done it in delirium."

Deshere's elaborate plan was pretty dry stuff, when compared to some of the more grandiose CIA hypnosis schemes hatched during the early years of the Cold War. Just how far did the CIA take its investigation of the uses of hypnosis? We may never know all of the answers, but this once-secret report offers more clues as to why the trance technique was added to the CIA's arsenal of mind-control weapons. Today people are encouraged to vote and empower themselves in electing an official to office. They should feel proud of themselves for doing that and should feel happy to have the freedom to do that. Electing puppets to read from teleprompters and to “Stand for something”. It all makes sense. You may even question things a little differently now, who knows.

KUBARK

COUNTERINTELLIGENCE
INTERROGATION
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TABLE OF CONTENTS

VIII. The Non-Coercive Counterintelligence Interrogation

A. General Remarks

The term non-coercive is used above to denote methods of interrogation that are not based upon the coercion of an unwilling subject through the employment of superior force originating outside himself. However, the non-coercive interrogation is not conducted without pressure. On the contrary, the goal is to generate maximum pressure, or at least as much as is needed to induce compliance. The difference is that the pressure is generated inside the interrogatee. His resistance is sapped, his urge to yield is fortified, until in the end he defeats himself.

Manipulating the subject psychologically until he becomes compliant, without applying external methods of forcing him to submit, sounds harder than it is. The initial advantage lies with the interrogator. From the outset, he knows a great deal more about the source than the source knows about him. And he can create and amplify an effect of omniscience in a number of ways. For example, he can show the interrogatee a thick file bearing his own name. Even if the file contains little or nothing but blank paper, the air of familiarity with which the interrogator refers to the subject's background can convince some sources that all is known and that resistance is futile.

If the interrogatee is under detention, the interrogator can also manipulate his environment. Merely by cutting off all other human contacts, "the interrogator monopolizes the social environment of the source."(3) He exercises the powers of an all-powerful parent, determining when the source will be sent to bed, when and what he will eat, whether he will be rewarded for good behavior or punished for being bad. The interrogator can and does make the subject's world not only unlike the world to which he had been accustomed but also strange in itself - a world in which familiar patterns of time, space, and sensory perception are overthrown. He can shift the environment abruptly. For example, a source who refuses to talk at all can be placed in unpleasant solitary confinement for a time. Then a friendly soul treats him to an unexpected walk in the woods. Experiencing relief and exhilaration, the subject will usually find it impossible not to respond to innocuous comments on the weather and the flowers. These are expanded to include reminiscences, and soon a precedent of verbal exchange has been established. Both the Germans and the Chinese have used this trick effectively.

The interrogator also chooses the emotional key or keys in which the interrogation or any part of it will be played.

Because of these and other advantages, " [approx. 6 lines deleted] ."(3)

B. The Structure of the Interrogation

A counterintelligence interrogation consists of four parts: the opening, the reconnaissance, the detailed questioning and the conclusion.

1. The Opening

Most resistant interrogatees block off access to significant counterintelligence in their possession for one or more of four reasons. The first is a specific negative reaction to the interrogator. Poor initial handling or a fundamental antipathy can make a source uncooperative even if he has nothing significant or damaging to conceal. The second cause is that some sources are resistant "by nature" - i.e. by early conditioning - to any compliance with authority. The third is that the subject believes that the information sought will be damaging or incriminating for him personally that cooperation with the interrogator will have consequences more painful for him than the results of non-cooperation. The fourth is ideological resistance. The source has identified himself with a cause, a political movement or organization, or an opposition intelligence service. Regardless of his attitude toward the interrogator, his own personality, and his fears for the future, the person who is deeply devoted to a hostile cause will ordinarily prove strongly resistant under interrogation.

A principal goal during the opening phase is to confirm the personality assessment obtained through screening and to allow the interrogator to gain a deeper understanding of the source as an individual. Unless time is crucial, the interrogator should not become impatient if the interrogatee wanders from the purposes of the interrogation and reverts to personal concerns. Significant facts not produced during screening may be revealed. The screening report itself is brought to life, the type becomes an individual, as the subject talks. And sometimes seemingly rambling monologues about personal matters are preludes to significant admissions. Some people cannot bring themselves to provide information that puts them in an unfavorable light until, through a lengthy prefatory rationalization, they feel that they have set the stage that the interrogator will now understand why they acted as they did. If face-saving is necessary to the interrogatee it will be a waste of time to try to force him to cut the preliminaries short and get down to cases. In his view, he is dealing with the important topic, the why . He will be offended and may become wholly uncooperative if faced with insistent demands for the naked what .

There is another advantage in letting the subject talk freely and even ramblingly in the first stage of interrogation. The interrogator is free to observe. Human beings communicate a great deal by non-verbal means. Skilled interrogators, for example, listen closely to voices and learn a great deal from them. An interrogation is not merely a verbal performance; it is a vocal performance, and the voice projects tension, fear, a dislike of certain topics, and other useful pieces of information. It is also helpful to watch the subject's mouth, which is as a rule much more revealing than his eyes. Gestures and postures also tell a story. If a subject normally gesticulates broadly at times and is at other times physically relaxed but at some point sits stiffly motionless, his posture is likely to be the physical image of his mental tension. The interrogator should make a mental note of the topic that caused such a reaction.

One textbook on interrogation lists the following physical indicators of emotions and recommends that interrogators note them, not as conclusive proofs but as assessment aids:

(1) A ruddy or flushed face is an indication of anger or embarrassment but not necessarily of guilt.

(2) A "cold sweat" is a strong sign of fear and shock.

(3) A pale face indicates fear and usually shows that the interrogator is hitting close to the mark.

(4) A dry mouth denotes nervousness.

(5) Nervous tension is also shown by wringing a handkerchief or clenching the hands tightly.

(6) Emotional strain or tension may cause a pumping of the heart which becomes visible in the pulse and throat.

(7) A slight gasp, holding the breath, or an unsteady voice may betray the subject.

(8) Fidgeting may take many forms, all of which are good indications of nervousness.

(9) A man under emotional strain or nervous tension will involuntarily draw his elbows to his sides. It is a protective defense mechanism.

(10) The movement of the foot when one leg is crossed over the knee of the other can serve as an indicator. The circulation of the blood to the lower leg is partially cut off, thereby causing a slight lift or movement of the free foot with each heart beat. This becomes more pronounced and observable as the pulse rate increases.

Pauses are also significant. Whenever a person is talking about a subject of consequence to himself, he goes through a process of advance self-monitoring, performed at lightning speed. This self-monitoring is more intense if the person is talking to a stranger and especially intense if he is answering the stranger's questions. Its purpose is to keep from the questioner any guilty information or information that would be damaging to the speaker's self-esteem. Where questions or answers get close to sensitive areas, the pre-scanning is likely to create mental blocks. These in turn produce unnatural pauses, meaningless sounds designed to give the speaker more time, or other interruptions. It is not easy to distinguish between innocent blocks -- things held back for reasons of personal prestige -- and guilty blocks -- things the interrogator needs to know. But the successful establishment of rapport will tend to eliminate innocent blocks, or at least to keep them to a minimum.

The establishment of rapport is the second principal purpose of the opening phase of the interrogation. Sometimes the interrogator knows in advance, as a result of screening, that the subject will be uncooperative. At other times the probability of resistance is established without screening: detected hostile agents, for example, usually have not only the will to resist but also the means, through a cover story or other explanation. But the anticipation of withholding increases rather than diminishes, the value of rapport. In other words, a lack of rapport may cause an interrogatee to withhold information that he would otherwise provide freely, whereas the existence of rapport may induce an interrogatee who is initially determined to withhold to change his attitude. Therefore the interrogator must not become hostile if confronted with initial hostility, or in any other way confirm such negative attitudes as he may encounter at the outset. During this first phase his attitude should remain business-like but also quietly (not ostentatiously) friendly and welcoming. Such opening remarks by subjects as, "I know what you so-and-so's are after, and I can tell you right now that you're not going to get it from me" are best handled by an unperturbed "Why don't you tell me what has made you angry?" At this stage the interrogator should avoid being drawn into conflict, no matter how provocatory may be the attitude or language of the interrogatee. If he meets truculence with neither insincere protestations that he is the subject's "pal" nor an equal anger but rather a calm interest in what has aroused the subject, the interrogator has gained two advantages right at the start. He has established the superiority that he will need later, as the questioning develops, and he has increased the chances of establishing rapport.

How long the opening phase continues depends upon how long it takes to establish rapport or to determine that voluntary cooperation is unobtainable. It may be literally a matter of seconds, or it may be a drawn-out, up-hill battle. Even though the cost in time and patience is sometimes high, the effort to make the subject feel that his questioner is a sympathetic figure should not be abandoned until all reasonable resources have been exhausted (unless, of course, the interrogation does not merit much time). Otherwise, the chances are that the interrogation will not produce optimum results. In fact, it is likely to be a failure, and the interrogator should not be dissuaded from the effort to establish rapport by an inward conviction that no man in his right mind would incriminate himself by providing the kind of information that is sought. The history of interrogation is full of confessions and other self-incriminations that were in essence the result of a substitution of the interrogation world for the world outside. In other words, as the sights and sounds of an outside world fade away, its significance for the interrogatee tends to do likewise. That world is replaced by the interrogation room, its two occupants, and the dynamic relationship between them. As interrogation goes on, the subject tends increasingly to divulge or withhold in accordance with the values of the interrogation world rather than those of the outside world (unless the periods of questioning are only brief interruptions in his normal life). In this small world of two inhabitants a clash of personalities -- as distinct from a conflict of purposes -- assumes exaggerated force, like a tornado in a wind-tunnel. The self-esteem of the interrogatee and of the interrogator becomes involved, and the interrogatee fights to keep his secrets from his opponent for subjective reasons, because he is grimly determined not to be the loser, the inferior. If on the other hand the interrogator establishes rapport, the subject may withhold because of other reasons, but his resistance often lacks the bitter, last-ditch intensity that results if the contest becomes personalized.

The interrogator who senses or determines in the opening phase that what he is hearing is a legend should resist the first, natural impulse to demonstrate its falsity. In some interrogatees the ego-demands, the need to save face, are so intertwined with preservation of the cover story that calling the man a liar will merely intensify resistance. It is better to leave an avenue of escape, a loophole which permits the source to correct his story without looking foolish.

If it is decided, much later in the interrogation, to confront the interrogatee with proof of lying, the following related advice about legal cross-examination may prove helpful.

"Much depends upon the sequence in which one conducts the cross-examination of a dishonest witness. You should never hazard the important question until you have laid the foundation for it in such a way that, when confronted with the fact, the witness can neither deny nor explain it. One often sees the most damaging documentary evidence, in the forms of letters or affidavits, fall absolutely flat as betrayers of falsehood, merely because of the unskillful way in which they are handled. If you have in your possession a letter written by the witness, in which he takes an opposite position on some part of the case to the one he has just sworn to, avoid the common error of showing the witness the letter for identification, and then reading it to him with the inquiry, 'What have you to say to that?' During the reading of his letter the witness will be collecting his thoughts and getting ready his explanations in anticipation of the question that is to follow, and the effect of the damaging letter will be lost.... The correct method of using such a letter is to lead the witness quietly into repeating the statements he has made in his direct testimony, and which his letter contradicts. Then read it off to him. The witness has no explanation. He has stated the fact, there is nothing to qualify."

2. The Reconnaissance

If the interrogatee is cooperative at the outset or if rapport is established during the opening phase and the source becomes cooperative, the reconnaissance stage is needless; the interrogator proceeds directly to detailed questioning. But if the interrogatee is withholding, a period of exploration is necessary. Assumptions have normally been made already as to what he is withholding: that he is a fabricator, or an RIS agent, or something else he deems it important to conceal. Or the assumption may be that he had knowledge of such activities carried out by someone else. At any rate, the purpose of the reconnaissance is to provide a quick testing of the assumption and, more importantly, to probe the causes, extent, and intensity of resistance.

During the opening phase the interrogator will have charted the probable areas of resistance by noting those topics which caused emotional or physical reactions, speech blocks, or other indicators. He now begins to probe these areas. Every experienced interrogator has noted that if an interrogatee is withholding, his anxiety increases as the questioning nears the mark. The safer the topic, the more voluble the source. But as the questions make him increasingly uncomfortable, the interrogatee becomes less communicative or perhaps even hostile. During the opening phase the interrogator has gone along with this protective mechanism. Now, however, he keeps coming back to each area of sensitivity until he has determined the location of each and the intensity of the defenses. If resistance is slight, mere persistence may overcome it; and detailed questioning may follow immediately. But if resistance is strong, a new topic should be introduced, and detailed questioning reserved for the third stage.

Two dangers are especially likely to appear during the reconnaissance. Up to this point the interrogator has not continued a line of questioning when resistance was encountered. Now, however, he does so, and rapport may be strained. Some interrogatees will take this change personally and tend to personalize the conflict. The interrogator should resist this tendency. If he succumbs to it, and becomes engaged in a battle of wits, he may not be able to accomplish the task at hand. The second temptation to avoid is the natural inclination to resort prematurely to ruses or coercive techniques in order to settle the matter then and there. The basic purpose of the reconnaissance is to determine the kind and degree of pressure that will be needed in the third stage. The interrogator should reserve his fire-power until he knows what he is up against.

3. The Detailed Questioning

a. If rapport is established and if the interrogatee has nothing significant to hide, detailed questioning presents only routine problems. The major routine considerations are the following:

The interrogator must know exactly what he wants to know. He should have on paper or firmly in mind all the questions to which he seeks answers. It usually happens that the source has a relatively large body of information that has little or no intelligence value and only a small collection of nuggets. He will naturally tend to talk about what he knows best. The interrogator should not show quick impatience, but neither should he allow the results to get out of focus. The determinant remains what we need, not what the interrogatee can most readily provide.

At the same time it is necessary to make every effort to keep the subject from learning through the interrogation process precisely where our informational gaps lie. This principle is especially important if the interrogatee is following his normal life, going home each evening and appearing only once or twice a week for questioning, or if his bona fides remains in doubt. Under almost all circumstances, however, a clear revelation of our interests and knowledge should be avoided. It is usually a poor practice to hand to even the most cooperative interrogatee an orderly list of questions and ask him to write the answers. (This stricture does not apply to the writing of autobiographies or on informational matters not a subject of controversy with the source.) Some time is normally spent on matters of little or no intelligence interest for purposes of concealment. The interrogator can abet the process by making occasional notes -- or pretending to do so -- on items that seem important to the interrogatee but are not of intelligence value. From this point of view an interrogation can be deemed successful if a source who is actually a hostile agent can report to the opposition only the general fields of our interest but cannot pinpoint specifics without including misleading information.

It is sound practice to write up each interrogation report on the day of questioning or, at least, before the next session, so that defects can be promptly remedied and gaps or contradictions noted in time.

It is also a good expedient to have the interrogatee make notes of topics that should be covered, which occur to him while discussing the immediate matters at issue. The act of recording the stray item or thought on paper fixes it in the interrogatee's mind. Usually topics popping up in the course of an interrogation are forgotten if not noted; they tend to disrupt the interrogation plan if covered by way of digression on the spot.

Debriefing questions should usually be couched to provoke a positive answer and should be specific. The questioner should not accept a blanket negative without probing. For example, the question "Do you know anything about Plant X?" is likelier to draw a negative answer then "Do you have any friends who work at Plant X?" or "Can you describe its exterior?"

It is important to determine whether the subject's knowledge of any topic was acquired at first hand, learned indirectly, or represents merely an assumption. If the information was obtained indirectly, the identities of sub-sources and related information about the channel are needed. If statements rest on assumptions, the facts upon which the conclusions are based are necessary to evaluation.

As detailed questioning proceeds, addition biographic data will be revealed. Such items should be entered into the record, but it is normally preferable not to diverge from an impersonal topic in order to follow a biographic lead. Such leads can be taken up later unless they raise new doubts about bona fides .

As detailed interrogation continues, and especially at the half-way mark, the interrogator's desire to complete the task may cause him to be increasingly business-like or even brusque. He may tend to curtail or drop the usual inquiries about the subject's well-being with which he opened earlier sessions. He may feel like dealing more and more abruptly with reminiscences or digressions. His interest has shifted from the interrogatee himself, who jut a while ago was an interesting person, to the atsk of getting at what he knows. But if rapport has been established, the interrogatee will be quick to sense and resent this change of attitude. This point is particularly important if the interrogatee is a defector faced with bewildering changes and in a highly emotional state. Any interrogatee has his ups and downs, times when he is tired or half-ill, times when his personal problems have left his nerves frayed. The peculiar intimacy of the interrogation situation and the very fact that the interrogator has deliberately fostered rapport will often lead the subject to talk about his doubts, fears, and other personal reactions. The interrogator should neither cut off this flow abruptly nor show impatience unless it takes up an inordinate amount of time or unless it seems likely that all the talking about personal matters is being used deliberately as a smoke screen to keep the interrogator from doing his job. If the interrogatee is believed cooperative, then from the beginning to the end of the process he should feel that the interrogator's interest in him has remained constant. Unless the interrogation is soon over, the interrogatee's attitude toward his questioner is not likely to remain constant. He will feel more and more drawn to the questioner or increasingly antagonistic. As a rule, the best way for the interrogator to keep the relationship on an even keel is to maintain the same quiet, relaxed, and open-minded attitude from start to finish.

Detailed interrogation ends only when (1) all useful counterintelligence information has been obtained; (2) diminishing returns and more pressing commitments compel a cessation; or (3) the base, station, [one or two words deleted] admits full or partial defeat. Termination for any reason other than the first is only temporary. It is a profound mistake to write off a successfully resistant interrogatee or one whose questioning was ended before his potential was exhausted. KUBARK must keep track of such persons, because people and circumstances change. Until the source dies or tells us everything that he knows that is pertinent to our purposes, his interrogation may be interrupted, perhaps for years -- but it has not been completed.

4. The Conclusion

The end of an interrogation is not the end of the interrogator's responsibilities. From the beginning of planning to the end of questioning it has been necessary to understand and guard against the various troubles that a vengeful ex-source can cause. As was pointed out earlier, KUBARK's lack of executive authority abroad and its operational need for facelessness make it peculiarly vulnerable to attack in the courts or the press. The best defense against such attacks is prevention, through enlistment or enforcement of compliance. However real cooperation is achieved, its existence seems to act as a deterrent to later hostility. The initially resistant subject may become cooperative because of a partial identification with the interrogator and his interests, or the source may make such an identification because of his cooperation. In either event, he is unlikely to cause serious trouble in the future. Real difficulties are more frequently created by interrogatees who have succeeded in withholding.

The following steps are normally a routine part of the conclusion:

a. [approx. 10 lines deleted]

d. [approx. 7 lines deleted]

e. [approx. 7 lines deleted]

f. [approx. 4 lines deleted]

C. Techniques of Non-Coercive Interrogation of Resistant Sources

If source resistance is encountered during screening or during the opening or reconnaissance phases of the interrogation, non-coercive methods of sapping opposition and strengthening the tendency to yield and to cooperate may be applied. Although these methods appear here in an approximate order of increasing pressure, it should not be inferred that each is to be tried until the key fits the lock. On the contrary, a large part of the skill and the success of the experienced interrogator lies in his ability to match method to source. The use of unsuccessful techniques will of itself increase the interrogatee's will and ability to resist.

This principle also affects the decision to employ coercive techniques and governs the choice of these methods. If in the opinion of the interrogator a totally resistant source has the skill and determination to withstand any con-coercive method or combination of methods, it is better to avoid them completely.

The effectiveness of most of the non-coercive techniques depends upon their unsettling effect. The interrogation situation is in itself disturbing to most people encountering it for the first time. The aim is to enhance this effect, to disrupt radically the familiar emotional and psychological associations of the subject. When this aim is achieved, resistance is seriously impaired. There is an interval -- which may be extremely brief -- of suspended animation, a kind of psychological shock or paralysis. It is caused by a traumatic or sub-traumatic experience which explodes, as it were, the world that is familiar to the subject as well as his image of himself within that world. Experienced interrogators recognize this effect when it appears and know that at this moment the source is far more open to suggestion, far likelier to comply, than he was just before he experienced the shock.

Another effect frequently produced by non-coercive (as well as coercive) methods is the evocation within the interrogatee of feelings of guilt. Most persons have areas of guilt in their emotional topographies, and an interrogator can often chart these areas just by noting refusals to follow certain lines of questioning. Whether the sense of guilt has real or imaginary causes does not affect the result of intensification of guilt feelings. Making a person feel more and more guilty normally increases both his anxiety and his urge to cooperate as a means of escape.

In brief, the techniques that follow should match the personality of the individual interrogatee, and their effectiveness is intensified by good timing and rapid exploitation of the moment of shock.

1. Going Next Door

Occasionally the information needed from a recalcitrant interrogatee is obtainable from a willing source. The interrogator should decide whether a confession is essential to his purpose or whether information which may be held by others as well as the unwilling source is really his goal. The labor of extracting the truth from unwilling interrogatees should be undertaken only if the same information is not more easily obtainable elsewhere or if operational considerations require self-incrimination.

2. Nobody Loves You

An interrogatee who is withholding items of no grave consequence to himself may sometimes be persuaded to talk by the simple tactic of pointing out that to date all of the information about his case has come from persons other than himself. The interrogator wants to be fair. He recognizes that some of the denouncers may have been biased or malicious. In any case, there is bound to be some slanting of the facts unless the interrogatee redresses the balance. The source owes it to himself to be sure that the interrogator hears both sides of the story.

3. The All-Seeing Eye (or Confession is Good for the Soul)

The interrogator who already knows part of the story explains to the source that the purpose of the questioning is not to gain information; the interrogator knows everything already. His real purpose is to test the sincerity (reliability, honor, etc.) of the source. The interrogator then asks a few questions to which he knows the answers. If the subject lies, he is informed firmly and dispassionately that he has lied. By skilled manipulation of the known, the questioner can convince a naive subject that all his secrets are out and that further resistance would be not only pointless but dangerous. If this technique does not work very quickly, it must be dropped before the interrogatee learns the true limits of the questioner's knowledge.

4. The Informer

Detention makes a number of tricks possible. One of these, planting an informant as the source's cellmate, is so well-known, especially in Communist countries, that its usefulness is impaired if not destroyed. Less well known is the trick of planting two informants in the cell. One of them, A, tries now and then to pry a little information from the source; B remains quiet. At the proper time, and during A's absence, B warns the source not to tell A anything because B suspects him of being an informant planted by the authorities.

Suspicion against a single cellmate may sometimes be broken down if he shows the source a hidden microphone that he has "found" and suggests that they talk only in whispers at the other end of the room.

5. News from Home

Allowing an interrogatee to receive carefully selected letters from home can contribute to effects desired by the interrogator. Allowing the source to write letters, especially if he can be led to believe that they will be smuggled out without the knowledge of the authorities, may produce information which is difficult to extract by direct questioning.

6. The Witness

If others have accused the interrogatee of spying for a hostile service or of other activity which he denies, there is a temptation to confront the recalcitrant source with his accuser or accusers. But a quick confrontation has two weaknesses: it is likely to intensify the stubbornness of denials, and it spoils the chance to use more subtle methods.

One of these is to place the interrogatee in an outer office and escort past him, and into the inner office, an accuser whom he knows personally or, in fact, any person -- even one who is friendly to the source and uncooperative with the interrogators -- who is believed to know something about whatever the interrogatee is concealing. It is also essential that the interrogatee know or suspect that the witness may be in possession of the incriminating information. The witness is whisked past the interrogatee; the two are not allowed to speak to each other. A guard and a stenographer remain in the outer office with the interrogatee. After about an hour the interrogator who has been questioning the interrogatee in past sessions opens the door and asks the stenographer to come in, with steno pad and pencils. After a time she re-emerges and types material from her pad, making several carbons. She pauses, points at the interrogatee, and asks the guard how his name is spelled. She may also ask the interrogatee directly for the proper spelling of a street, a prison, the name of a Communist intelligence officer, or any other factor closely linked to the activity of which he is accused. She takes her completed work into the inner office, comes back out, and telephones a request that someone come up to act as legal witness. Another man appears and enters the inner office. The person cast in the informer's role may have been let out a back door at the beginning of these proceedings; or if cooperative, he may continue his role. In either event, a couple of interrogators, with or without the "informer", now emerge from the inner office. In contrast to their earlier demeanor, they are now relaxed and smiling. The interrogator in charge says to the guard, "O.K., Tom, take him back. We don't need him any more." Even if the interrogatee now insists on telling his side of the story, he is told to relax, because the interrogator will get around to him tomorrow or the next day.

A session with the witness may be recorded. If the witness denounces the interrogatee there is no problem. If he does not, the interrogator makes an effort to draw him out about a hostile agent recently convicted in court or otherwise known to the witness. During the next interrogation session with the source, a part of the taped denunciation can be played back to him if necessary. Or the witnesses' remarks about the known spy, edited as necessary, can be so played back that the interrogatee is persuaded that he is the subject of the remarks.

Cooperative witnesses may be coached to exaggerate so that if a recording is played for the interrogatee or a confrontation is arranged, the source -- for example, a suspected courier -- finds the witness overstating his importance. The witness claims that the interrogatee is only incidentally a courier, that actually he is the head of an RIS kidnapping gang. The interrogator pretends amazement and says into the recorder, "I thought he was only a courier; and if he had told us the truth, I planned to let him go. But this is much more serious. On the basis of charges like these I'll have to hand him over to the local police for trial." On hearing these remarks, the interrogatee may confess the truth about the lesser guilt in order to avoid heavier punishment. If he continues to withhold, the interrogator may take his side by stating, "You know, I'm not at all convinced that so-and-so told a straight story. I feel, personally, that he was exaggerating a great deal. Wasn't he? What's the true story?"

7. Joint Suspects

If two or more interrogation sources are suspected of joint complicity in acts directed against U.S. security, they should be separated immediately. If time permits, it may be a good idea (depending upon the psychological assessment of both) to postpone interrogation for about a week. Any anxious inquiries from either can be met by a knowing grin and some such reply as, "We'll get to you in due time. There's no hurry now ." If documents, witnesses, or other sources yield information about interrogatee A, such remarks as "B says it was in Smolensk that you denounced so-and-so to the secret police. Is that right? Was it in 1937?" help to establish in A's mind the impression that B is talking.

If the interrogator is quite certain of the facts in the case but cannot secure an admission from either A or B, a written confession may be prepared and A's signature may be reproduced on it. (It is helpful if B can recognize A's signature, but not essential.) The confession contains the salient facts, but they are distorted; the confession shows that A is attempting to throw the entire responsibility upon B. Edited tape recordings which sound as though A had denounced B may also be used for the purpose, separately or in conjunction with the written "confession." If A is feeling a little ill or dispirited, he can also be led past a window or otherwise shown to B without creating a chance for conversation; B is likely to interpret A's hang-dog look as evidence of confession and denunciation. (It is important that in all such gambits, A be the weaker of the two, emotionally and psychologically.) B then reads (or hears) A's "confession." If B persists in withholding, the interrogator should dismiss him promptly, saying that A's signed confession is sufficient for the purpose and that it does not matter whether B corroborates it or not. At the following session with B, the interrogator selects some minor matter, not substantively damaging to B but nevertheless exaggerated, and says, "I'm not sure A was really fair to you here. Would you care to tell me your side of the story?" If B rises to this bait, the interrogator moves on to areas of greater significance.

The outer-and-inner office routine may also be employed. A, the weaker, is brought into the inner office, and the door is left slightly ajar or the transom open. B is later brought into the outer office by a guard and placed where he can hear, though not too clearly. The interrogator begins routine questioning of A, speaking rather softly and inducing A to follow suit. Another person in the inner office, acting by prearrangement, then quietly leads A out through another door. Any noises of departure are covered by the interrogator, who rattles the ash tray or moves a table or large chair. As soon as the second door is closed again and A is out of earshot, the interrogator resumes his questioning. His voice grows louder and angrier. He tells A to speak up, that he can hardly hear him. He grows abusive, reaches a climax, and then says, "Well, that's better. Why didn't you say so in the first place?" The rest of the monologue is designed to give B the impression that A has now started to tell the truth. Suddenly the interrogator pops his head through the doorway and is angry on seeing B and the guard. "You jerk!" he says to the guard, "What are you doing here?" He rides down the guard's mumbled attempt to explain the mistake, shouting, "Get him out of here! I'll take care of you later!"

When, in the judgment of the interrogator, B is fairly well convinced that A has broken down and told his story, the interrogator may elect to say to B, "Now that A has come clean with us, I'd like to let him go. But I hate to release one of you before the other; you ought to get out at the same time. A seems to be pretty angry with you -- feels that you got him into this jam. He might even go back to your Soviet case officer and say that you haven't returned because you agreed to stay here and work for us. Wouldn't it be better for you if I set you both free together? Wouldn't it be better to tell me your side of the story?"

8. Ivan Is a Dope

It may be useful to point out to a hostile agent that the cover story was ill-contrived, that the other service botched the job, that it is typical of the other service to ignore the welfare of its agents. The interrogator may personalize this pitch by explaining that he has been impressed by the agent's courage and intelligence. He sells the agent the idea that the interrogator, not his old service, represents a true friend, who understands him and will look after his welfare.

9. Joint Interrogators

The commonest of the joint interrogator techniques is the Mutt-and-Jeff routine: the brutal, angry, domineering type contrasted with the friendly, quiet type. This routine works best with women, teenagers, and timid men. If the interrogator who has done the bulk of the questioning up to this point has established a measure of rapport, he should play the friendly role. If rapport is absent, and especially if antagonism has developed, the principal interrogator may take the other part. The angry interrogator speaks loudly from the beginning; and unless the interrogatee clearly indicates that he is now ready to tell his story, the angry interrogator shouts down his answers and cuts him off. He thumps the table. The quiet interrogator should not watch the show unmoved but give subtle indications that he too is somewhat afraid of his colleague. The angry interrogator accuses the subject of other offenses, any offenses, especially those that are heinous or demeaning. He makes it plain that he personally considers the interrogatee the vilest person on earth. During the harangue the friendly, quiet interrogator breaks in to say, "Wait a minute, Jim. Take it easy." The angry interrogator shouts back, "Shut up! I'm handling this. I've broken crumb-bums before, and I'll break this one, wide open." He expresses his disgust by spitting on the floor or holding his nose or any gross gesture. Finally, red-faced and furious, he says, "I'm going to take a break, have a couple of stiff drinks. But I'll be back at two -- and you, you bum, you better be ready to talk." When the door slams behind him, the second interrogator tells the subject how sorry he is, how he hates to work with a man like that but has no choice, how if maybe brutes like that would keep quiet and give a man a fair chance to tell his side of the story, etc., etc.

An interrogator working alone can also use the Mutt-and-Jeff technique. After a number of tense and hostile sessions the interrogatee is ushered into a different or refurnished room with comfortable furniture, cigarettes, etc. The interrogator invites him to sit down and explains his regret that the source's former stubbornness forced the interrogator to use such tactics. Now everything will be different. The interrogator talks man-to-man. An American POW, debriefed on his interrogation by a hostile service that used this approach, has described the result: "Well, I went in and there was a man, an officer he was... -- he asked me to sit down and was very friendly.... It was very terrific. I, well, I almost felt like I had a friend sitting there. I had to stop every now and then and realize that this man wasn't a friend of mine.... I also felt as though I couldn't be rude to him.... It was much more difficult for me to -- well, I almost felt I had as much responsibility to talk to him and reason and justification as I have to talk to you right now."(18)

Another joint technique casts both interrogators in friendly roles. But whereas the interrogator in charge is sincere, the second interrogator's manner and voice convey the impression that he is merely pretending sympathy in order to trap the interrogated. He slips in a few trick questions of the "When-did-you-stop-beating-your-wife?" category. The interrogator in charge warns his colleague to desist. When he repeats the tactics, the interrogator in charge says, with a slight show of anger, "We're not here to trap people but to get at the truth. I suggest that you leave now. I'll handle this." It is usually unproductive to cast both interrogators in hostile roles.

Language

If the recalcitrant subject speaks more than one language, it is better to question him in the tongue with which he is least familiar as long as the purpose of interrogation is to obtain a confession. After the interrogatee admits hostile intent or activity, a switch to the better-known language will facilitate follow-up.

An abrupt switch of languages may trick a resistant source. If an interrogatee has withstood a barrage of questions in German or Korean, for example, a sudden shift to "Who is your case officer?" in Russian may trigger the answer before the source can stop himself.

An interrogator quite at home in the language being used may nevertheless elect to use an interpreter if the interrogatee does not know the language to be used between the interrogator and interpreter and also does not know that the interrogator knows his own tongue. The principal advantage here is that hearing everything twice helps the interrogator to note voice, expression, gestures, and other indicators more attentively. This gambit is obviously unsuitable for any form of rapid-fire questioning, and in any case it has the disadvantage of allowing the subject to pull himself together after each query. It should be used only with an interpreter who has been trained in the technique.

It is of basic importance that the interrogator not using an interpreter be adept in the language selected for use. If he is not, if slips of grammar or a strong accent mar his speech, the resistant source will usually feel fortified. Almost all people have been conditioned to relate verbal skill to intelligence, education, social status, etc. Errors or mispronunciations also permit the interrogatee to misunderstand or feign misunderstanding and thus gain time. He may also resort to polysyllabic obfuscations upon realizing the limitations of the interrogator's vocabulary.

Spinoza and Mortimer Snerd

If there is reason to suspect that a withholding source possesses useful counterintelligence information but has not had access to the upper reaches of the target organizations, the policy and command level, continued questioning about lofty topics that the source knows nothing about may pave the way for the extraction of information at lower levels. The interrogatee is asked about KGB policy, for example: the relation of the service to its government, its liaison arrangements, etc., etc. His complaints that he knows nothing of such matters are met by flat insistence that he does know, he would have to know, that even the most stupid men in his position know. Communist interrogators who used this tactic against American POW's coupled it with punishment for "don't know" responses -- typically by forcing the prisoner to stand at attention until he gave some positive response. After the process had been continued long enough, the source was asked a question to which he did know the answer. Numbers of Americans have mentioned "...the tremendous feeling of relief you get when he finally asks you something you can answer." One said, "I know it seems strange now, but I was positively grateful to them when they switched to a topic I knew something about."(3)

The Wolf in Sheep's Clothing

It has been suggested that a successfully withholding source might be tricked into compliance if led to believe that he is dealing with the opposition. The success of the ruse depends upon a successful imitation of the opposition. A case officer previously unknown to the source and skilled in the appropriate language talks with the source under such circumstances that the latter is convinced that he is dealing with the opposition. The source is debriefed on what he has told the Americans and what he has not told them. The trick is likelier to succeed if the interrogatee has not been in confinement but a staged "escape," engineered by a stool-pigeon, might achieve the same end. Usually the trick is so complicated and risky that its employment is not recommended.

Alice in Wonderland

The aim of the Alice in Wonderland or confusion technique is to confound the expectations and conditioned reactions of the interrogatee. He is accustomed to a world that makes some sense, at least to him: a world of continuity and logic, a predictable world. He clings to this world to reinforce his identity and powers of resistance.

The confusion technique is designed not only to obliterate the familiar but to replace it with the weird. Although this method can be employed by a single interrogator, it is better adapted to use by two or three. When the subject enters the room, the first interrogator asks a doubletalk question -- one which seems straightforward but is essentially nonsensical. Whether the interrogatee tries to answer or not, the second interrogator follows up (interrupting any attempted response) with a wholly unrelated and equally illogical query. Sometimes two or more questions are asked simultaneously. Pitch, tone, and volume of the interrogators' voices are unrelated to the import of the questions. No pattern of questions and answers is permitted to

develop, nor do the questions themselves relate logically to each other. In this strange atmosphere the subject finds that the pattern of speech and thought which he has learned to consider normal have been replaced by an eerie meaninglessness. The interrogatee may start laughing or refuse to take the situation seriously. But as the process continues, day after day if necessary, the subject begins to try to make sense of the situation, which becomes mentally intolerable. Now he is likely to make significant admissions, or even to pour out his story, just to stop the flow of babble which assails him. This technique may be especially effective with the orderly, obstinate type.

Regression

There are a number of non-coercive techniques for inducing regression, All depend upon the interrogator's control of the environment and, as always, a proper matching of method to source. Some interrogatees can be repressed by persistent manipulation of time, by retarding and advancing clocks and serving meals at odd times -- ten minutes or ten hours after the last food was given. Day and night are jumbled. Interrogation sessions are similarly unpatterned the subject may be brought back for more questioning just a few minutes after being dismissed for the night. Half-hearted efforts to cooperate can be ignored, and conversely he can be rewarded for non-cooperation. (For example, a successfully resisting source may become distraught if given some reward for the "valuable contribution" that he has made.) The Alice in Wonderland technique can reinforce the effect. Two or more interrogators, questioning as a team and in relays (and thoroughly jumbling the timing of both methods) can ask questions which make it impossible for the interrogatee to give sensible, significant answers. A subject who is cut off from the world he knows seeks to recreate it, in some measure, in the new and strange environment. He may try to keep track of time, to live in the familiar past, to cling to old concepts of loyalty, to establish -- with one or more interrogators -- interpersonal relations resembling those that he has had earlier with other people, and to build other bridges back to the known. Thwarting his attempts to do so is likely to drive him deeper and deeper into himself, until he is no longer able to control his responses in adult fashion.

The placebo technique is also used to induce regression The interrogatee is given a placebo (a harmless sugar pill). Later he is told that he has imbibed a drug, a truth serum, which will make him want to talk and which will also prevent his lying. The subject's desire to find an excuse for the compliance that represents his sole avenue of escape from his distressing predicament may make him want to believe that he has been drugged and that no one could blame him for telling his story now. Gottschelk observes, "Individuals under increased stress are more likely to respond to placebos."(7)

Orne has discussed an extensions of the placebo concept in explaining what he terms the "magic room" technique. "An example... would be... the prisoner who is given a hypnotic suggestion that his hand is growing warm. However, in this instance, the prisoner's hand actually does become warm, a problem easily resolved by the use of a concealed diathermy machine. Or it might be suggested... that... a cigarette will taste bitter. Here again, he could be given a cigarette prepared to have a slight but noticeably bitter taste." In discussing states of heightened suggestibility (which are not, however, states of trance) Orne says, "Both hypnosis and some of the drugs inducing hypnoidal states are popularly viewed as situations where the individual is no longer master of his own fate and therefore not responsible for his actions. It seems possible then that the hypnotic situation, as distinguished from hypnosis itself, might be used to relieve the individual of a feeling of responsibility for his own actions and thus lead him to reveal information."(7)

In other words, a psychologically immature source, or one who has been regressed, could adopt an implication or suggestion that he has been drugged, hypnotized, or otherwise rendered incapable of resistance, even if he recognizes at some level that the suggestion is untrue, because of his strong desire to escape the stress of the situation by capitulating. These techniques provide the source with the rationalization that he needs.

Whether regression occurs spontaneously under detention or interrogation, and whether it is induced by a coercive or non-coercive technique, it should not be allowed to continue past the point necessary to obtain compliance. Severe techniques of regression are best employed in the presence of a psychiatrist, to insure full reversal later. As soon as he can, the interrogator presents the subject with the way out, the face-saving reason for escaping from his painful dilemma by yielding. Now the interrogator becomes fatherly. Whether the excuse is that others have already confessed ("all the other boys are doing it"), that the interrogatee had a chance to redeem himself ("you're really a good boy at heart"), or that he can't help himself ("they made you do it"), the effective rationalization, the one the source will jump at, is likely to be elementary. It is an adult's version of the excuses of childhood.

The Polygraph

The polygraph can be used for purposes other than the evaluation of veracity. For example, it may be used as an adjunct in testing the range of languages spoken by an interrogatee or his sophistication in intelligence matters, for rapid screening to determine broad areas of knowledgeability, and as an aid in the psychological assessment of sources. Its primary function in a counterintelligence interrogation, however, is to provide a further means of testing for deception or withholding.

A resistant source suspected of association with a hostile clandestine organization should be tested polygraphically at least once. Several examinations may be needed. As a general rule, the polygraph should not be employed as a measure of last resort. More reliable readings will be obtained if the instrument is used before the subject has been placed under intense pressure, whether such pressure is coercive or not. Sufficient information for the purpose is normally available after screening and one or two interrogation sessions.

Although the polygraph has been a valuable aid, no interrogator should feel that it can carry his responsibility for him. [approx. 7 lines deleted] (9)

The best results are obtained when the CI interrogator and the polygraph operator work closely together in laying the groundwork for technical examination. The operator needs all available information about the personality of the source, as well as the operational background and reasons for suspicion. The CI interrogator in turn can cooperate more effectively and can fit the results of technical examination more accurately into the totality of his findings if he has a basic comprehension of the instrument and its workings.

The following discussion is based upon R.C. Davis' "Physiological Responses as a Means of Evaluating Information."(7) Although improvements appear to be in the offing, the instrument in widespread use today measures breathing, systolic blood pressure, and galvanic skin response (GSR). "One drawback in the use of respiration as an indicator," according to Davis, "is its susceptibility to voluntary control." Moreover, if the source "knows that changes in breathing will disturb all physiologic variables under control of the autonomic division of the nervous system, and possibly even some others, a certain amount of cooperation or a certain degree of ignorance is required for lie detection by physiologic methods to work." In general, "... breathing during deception is shallower and slower than in truth telling... the inhibition of breathing seems rather characteristic of anticipation of a stimulus."

The measurement of systolic blood pressure provides a reading on a phenomenon not usually subject to voluntary control. The pressure "... will typically rise by a few millimeters of mercury in response to a question, whether it is answered truthfully or not. The evidence is that the rise will generally be greater when (the subject) is lying." However, discrimination between truth-telling and lying on the basis of both breathing and blood pressure "... is poor (almost nil) in the early part of the sitting and improves to a high point later." The galvanic skin response is one of the most easily triggered reactions, but recovery after the reaction is slow, and "... in a routine examination the next question is likely to be introduced before recovery is complete. Partly because of this fact there is an adapting trend in the GSR with stimuli repeated every few minutes the response gets smaller, other things being equal."

Davis examines three theories regarding the polygraph. The conditional response theory holds that the subject reacts to questions that strike sensitive areas, regardless of whether he is telling the truth or not. Experimentation has not substantiated this theory. The theory of conflict presumes that a large physiologic disturbance occurs when the subject is caught between his habitual inclination to tell the truth and his strong desire not to divulge a certain set of facts. Davis suggests that if this concept is valid, it holds only if the conflict is intense. The threat-of-punishment theory maintains that a large physiologic response accompanies lying because the subject fears the consequence of failing to deceive. "In common language it might be said that he fails to deceive the machine operator for the very reason that he fears he will fail. The 'fear' would be the very reaction detected." This third theory is more widely held than the other two. Interrogators should note the inference that a resistant source who does not fear that detection of lying will result in a punishment of which he is afraid would not, according to this theory, produce significant responses.

Graphology

The validity of graphological techniques for the analysis of the personalities of resistant interrogatees has not been established. There is some evidence that graphology is a useful aid in the early detection of cancer and of certain mental illnesses. If the interrogator or his unit decides to have a source's handwriting analyzed, the samples should be submitted to Headquarters as soon as possible, because the analysis is more useful in the preliminary assessment of the source than in the later interrogation. Graphology does have the advantage of being one of the very few techniques not requiring the assistance or even the awareness of the interrogatee. As with any other aid, the interrogator is free to determine for himself whether the analysis provides him with new and valid insights, confirms other observations, is not helpful, or is misleading.

CIA - Human Resource Exploitation Training Manual - 1983

The following excerpts have been taken from the Central Intelligence Agency manual entitled "Human Resource Exploitation Training Manual-1983." It's a handbook written by the CIA. It was use during the early 1980s to teach Latin American security forces to extract information from prisoners. Its proof that we still "Write the Book" on techniques and know how to access corners deep inside the mind.

CHARLES SHERWOOD

The theory of coercion

The purpose of all coercive techniques is to induce psychological regression in the subject by bringing a superior outside force to bear on his will to resist. Regression is basically a loss of autonomy, a reversion to an earlier behavioral level. As the subject regresses, his learned personality traits fall away in reverse chronological order. He begins to lose that capacity to carry out the highest creative activities, to deal with complex situations, or to cope with stressful into personal relationships or repeated frustrations. Coercive techniques Arrest The manner and timing of the subject's arrest should be planned to achieve a surprise and the maximum amount of mental discomfort. He should therefore be arrested at a moment when the least expects it and when his mental and physical resistances are at their lowest - ideally, in the earliest hours of the morning. When arrested at this time, most subjects experience intense feelings of shock, insecurity, and psychological stress, and have great difficulty adjusting to the situation. Detention A person's sense of identity depends upon the continuity in his surroundings, habits, appearance, relations with others, etc. Detention permits the questioner to cut through these links and throw the subject back upon his own unaided internal resources. Detention should be planned to enhance that subjects feelings of being cut off from anything known and reassuring. Deprivation of sensory stimuli Solitary confinement acts on most persons as a powerful stressor. Those symptoms most commonly produced by solitary confinement are superstition, intense love of any other living been, perceiving in inanimate objects as alive, hallucinations, and delusions. Threats and fear The threat of coercion usually weakens or destroys resistance more effectively than coercion itself. For example, the threat to inflict pain can trigger fears more damaging than the immediate sensation of pain. The threat of death has been found to be worse than useless. The principal reason is that it often induces sheer hopelessness; the subject feels that he is as likely to be condemned after compliance as before. Some subjects recognize that the threat is a bluff and that silencing them would forever defeat though questioner's purpose. If the subject refuses to comply once a threat has been made, it must be carried out. Otherwise subsequent threats will also prove ineffective.

Pain

The torture situation is a contest between the subject and his tormentor. Pain that is being inflicted upon the subject from outside himself may actually intensify his will to resist. On the other hand, pain that he feels he is inflicting upon himself is more likely to stop his resistance. For example, if he is required to maintain and rigid position such a standing at attention or sitting on a stool for long periods of time, the immediate source of discomfort is not the questioner but the subject himself. After awhile the subject is likely to exhaust his internal motivational strength. Intense pain is quite likely to produce false confession, fabricated to avoid additional punishment. This results in a time-consuming delay while an investigation is conducted and the admissions are proven untrue. During this respite, the subject can pull himself together and may even use the time to devise a more complex confession that takes still longer to disprove.

Hypnosis and heightened suggestibility

Answers obtained from subject under the influence of hypnotism are highly suspect, as they are often based upon the suggestions of the questioner and are distorted or fabricated. However, the subject's strong desire to escape the stress of the situation can create a state of mind called "heightened suggestibility". The questioner can take advantage of the state of mind by creating a situation in which the subject will cooperate because he believes he has been hypnotized. This hypnotic situation can be created using the "Magic room" technique. For example, the subject is given a hypnotic suggestion that his hand is growing warm. However, his hand actually does become warmer with the aid of a concealed diathermy machine. He may be given a suggestion that a cigarette will taste better and could be given a cigarette prepared to have a slight but noticeably better taste.

Narcosis

There is no drug that can force every subject to divulge all the information he has, but it is possible to create the mistaken belief that the subject has been dropped by using the placebo technique. The subject is given a placebo-a harmless sugar pill-and later told that he was given the truths are of that will make you want to talk and that will prevent him from lying. His desire to find an excuse for compliance, which is his only avenue of escape from his depressing situation, they make you want to believe that he is contrived and that no one could blame him for retailers historians now. This provides him with a rationalization that he needs for cooperating.

Regression

As mentioned earlier, the purpose of all coercive techniques is to induce regression. A few non-coercive techniques can also be used to induce regression, but to a lesser degree than can be obtained with coercive techniques:

Persistent manipulation of time
Returning and advancing clocks
Serving meals at odd times
Disrupting sleep schedules
Disorientation regarding day and night
Odd patterns of questioning such as
Non-sensible questioning
Ignoring half hearted attempts to cooperate
Rewarding non cooperation

Whether regression occur spontaneously under detention or isn't used by the questioner, they should not be allowed to continue beyond the point necessary to obtain compliance. A psychiatrist should be present if severe techniques are being employed, to insure full reversal later. This illness possible, the questioner should provide the subject with the rationalization that he needs for giving in to and cooperating. This rationalization is likely to be elementary, and adult version of a child with excuse such as:

They make you do that
All of the other boys are doing it
You're really a good boy at heart.

Defenses

Repression/suppression

One way to deal with emotional pain is to not think about what has happened. We put it out of our mind. We forget it. With practice, this becomes an automatic process, we really don't remember what we did or what happened. This is repression.

Displacement

Displacement is simply taking an emotion that belongs in one situation and displaying it in another. The commonest emotions which are displaced are anger and/or hostility. Imagine, for a moment, that you have had a rough day at work. Your boss has chewed you out, and you are angry about it. It's not safe to take out your anger on your boss. You might be fired. So, when you get home, you yell at the kids and have a fight with your wife. That's displacement.

Projection

Projection is the process of taking feelings we have about ourselves, usually painful feelings, and focusing them on other people. A person who fears he is drinking too much may point out another person who is drinking and put him down for being a drunk. A man or woman who has been cheating on his/her spouse may accuse the spouse of being unfaithful. Blame is a form of projection. An individual, concerned about his drinking, may blame his parents for the way they raised him, or his wife for the way she treats him. Eventually the alcoholic comes to hate himself, but he finds this emotional state too much to bear so he expresses this as hatred for those closest to him, usually his wife and children.

Denial

Denial is the refusal to believe or accept the reality that certain events have happened, are happening, or will happen. To accept the reality would bring emotional pain, so the events are denied. This is the single most common psychological symptom of chemical dependency. Related to denial is the defense called minimizing. Events are accepted, but only in a watered down version. Sure I drink once in a while. Everybody does. It's no big deal. Once in a while I might get carried away, but it really isn't a problem."

Withdrawal

Withdrawal is usually used when a person is afraid of rejection or afraid to fail. By with drawing the person is attempting to avoid psychological pain. The problem is it inevitably leads to strong feelings of loneliness, and it does nothing for the original fears. Withdrawal takes several forms. Silence and running away are the most common, but the use of drugs and excessive sleeping also occur. Closely related to withdrawal are avoidance and deflection. Many co-alcoholics use avoidance extensively, i.e., they won't talk about the problems at home and they stay away from others to avoid feelings of embarrassment, shame, etc.. Deflection is a method of changing a subject that is or might be painful. Humor and anger are the two commonest methods of deflecting people away from difficult subjects. Alcoholics frequently combine deflection and projection through the use of anger and hostility.

Rationalization

Rationalization is to justify your behavior or to make excuses for your behavior. The alcoholic, arrested for impaired driving, may tell himself, and everybody else, that the RCMP are out to get him. Or a person may fail to get a job he has applied for, and then tells people it was really a crummy job anyway and he didn't really want it.

Fantasy

When the world of everyday life becomes too painful or difficult too bear, some people turn to the inner world of fantasy. Day dreaming and wishful thinking replace action. Combined with avoidance you get retreats into fiction via books and/or TV. Alcoholics often combine rationalizing and fantasy. The result is the "if only..." Syndrome:

If only I had money...

If only I were not an Indian...

If only I didn't have a wife and children...

If only I could do what I want...

If only people understood me...

If only I were younger (older)...

Intellectualization

In order to avoid experiencing his real feelings a person may discuss his problem(s) in an analytical, rational, intellectual way. This is common among college educated people and alcoholism counselors who have fallen off the wagon. This defense often frightens or repels other people leading to isolation and a strong sense of loneliness.

Procrastination

Procrastination is another way to avoid painful feelings by convincing yourself that a problem can be dealt with later. "I'll look for work tomorrow."

"I'll stop drinking tomorrow."

"I'll get the car fixed after I get a job."

Reaction-formation

This defense is simply faking your feelings or expressing the opposite of what you really feel. This process can become so automatic that you actually do not know what your true feelings are.

Summary

The major function of these psychological defenses is to prevent the experiencing of painful emotions. There are several major problems with there use, however. First, many of these defenses create new problems that are as bad, or worse, than the emotional problems they mask. Some are just plain destructive. rejection, for example, literally destroys the relationships we care most about. Second, these defenses distort our ability to perceive reality as it is, and this prevents us from dealing with our problems in a constructive way. Third, these defenses do not rid us of the painful feelings we have. In fact, by masking them so that we do not feel them, we effectively store them up within ourselves. Emotions are discharged through expression, so by denying ourselves the chance to feel them, we also deny ourselves the ability to get rid of them. Fourth, these defenses do not just screen out painful emotions. They are, in fact, defenses against all emotion. So the more effective our defenses become in protecting us from our painful feelings, the less able we are to experience the joyful and happy feelings that make life worth living. Finally, these defenses are not perfect. As more and more hurt is stored away, a tension is developed. We become increasingly anxious, nervous, and irritable. We become emotionally unpredictable. And when our defenses weaken, as they will from time to time, we experience emotional explosions. Ultimately these defenses prevent us from knowing what is wrong, but they do not prevent us from feeling bad.

Diary - "School of the Americas" *Fort Benning, Georgia*

The School of Dictators or the Coup-Assassination School - *author unknown*

The trainer of "death squads" "United States Battalion 3-16" used electroschock and rubber suffocation devices on prisoners. They include the various technical advisors, counter intelligence and low intensity conflict strategists, paramilitary, intelligence and internal security police training officers and the merchants who actually supply the equipment, as well as the "white collar mercenaries" who act as key technical operators in the bureaucracy of any repressive system that uses systematic torture as an instructional tool of the administration. This includes all the people conditioned by fear or training to put into practice the torture policy of the state -- torture is exported to being a slave state of the united states. This technology gets exported around the world to any nation that can buy it and who remains an ally of the united states.

Since 1961 a 1600 acre secret terrorist torture and cremation installation known as "Harvey Point Defense Testing Activity" just outside Hertford, North Carolina. The C.I.A. trains terrorist courses for thousands of its C.I.A. and military officers and also the secret police and military personnel from other nations as they do in Panama and Taiwan. Example: Palistinean security forces. This school for C.I.A. and military spies is shielded from the public eye. It has black helicopters (radar resistant) blacked out windows on buses. Old limousines are hauled in for assassination training and bullet riddled burnt out limousines are hauled out. Bomb training for assassins is carried out so buildings can be bombed in other nations. They teach theft from safes using explosives. This C.I.A. and military base has trained more than 18,000 foreign intelligence officers from 50 nations to be terrorists including Russia, Isreal, Egypt, etc. all local employed service people employed as cooks and guards are sworn to secrecy. Source information-New York Times March 20, 1998.

The following is a report of the torture training in this military C.I.A. facility, being one of many run by the United states that are even more sophisticated than this one. This course in torture took place in 1969 and the courses continue to be taught and prisoners continue to be tortured, assassinated and then cremated to get rid of the evidence and their ashes vacuumed out of the crematorium in the basement and thrown down the toilet as you read this. The Americans you will see are very thorough teachers. This facility alone has taught 14,500 torturers at an average of 20 military personnel per class from various states since 1969.

"School of the Americas"

The Diary of a C.I.A. Torture Student

Day 1

First classes in mental torture. Sleep deprivation. Control of minds through drugs. Saw 2 movies on mental torture. Ate. Had night lecture on day class.

Day 2

Saw actual drug administration on Panamanian prisoner. We saw how to mix and inject the drugs. Everyone was listening intently. I requested permission to inject the prisoner. I was told each of us could have a prisoner later on. We were being taught reactions to certain drugs. We took notes. We learned how to interrogate the prisoner while he was under drugs. At 12 we ate. At 1 we saw another prisoner injected with sodium pentethal. He was then interrogated and answered truthfully. This lasted till 2. At 2 a volunteer was requested. A woman prisoner volunteered. All prisoners were naked. This is to humiliate them as well so they want to get the interrogation over with and will tell the truth, in some women's cases only. Some women were tough. One spit in our faces. We each did a woman. All 24 students. We did not finish till 3 a.m.. We all volunteered to stay up till all had a turn. These prisoners were kept downstaires in a cage.

Day 3

Today electric shock. We saw various positions to put subjects in. Sitting on a bar. Lying on a table, bed, legs spread open. Hooked down. Over a chair. In a bathtub. Electric shock all day till 10 p.m., except for lunch and supper. Then electric shock treatment men only.

Day 4

Today the same shock treatments using women only. Everyone laughted when the women pissed during shock treatment. All prisoners are given enamas before sessions begin. Finished at 10. 2 breaks to eat.

Day 5

Today children were brought in. It finally dawned on me. we were being taught to be great torturers without conscience or guilt feelings. To torture anyone as a 9 to 5 job. Amazing we began on boy kids. 2 peruvians in the course objected and were taken out of the course. I was told they would be sent home. By 10 3 more dropped out. An Ecuadorian student and 2 columbian students. We were down to 19 in the course. 3 kids died. 2 girls about 14 and a 15 year old boy. I was told they would be cremated and ashes scattered in the toilet.

Day 6

Thumb screw lessons from 9 to 11. We all did it to some prisoners. 11 to 12 needles under nails. Then we ate. 1 to 3 prisoners were tortured by bastivia, whipps, chains, leather straps, we tortured 6 men, 6 women, we tortured 3 to 6 prisoners with fists. Feet. It was gory. We were watched all the time to see who was squeamish.

Day 7

Today we were taught execution methods. Pistol. Knife. Garrat. Injection. Axe. This course used dummies. We were told tomorrow real subjects would be used. I yelled "now your talking" observer smiled, made a note in his book.

Day 8

9 a.m. we were given pistols. 19 subjects were brought in. All men. We all shot them. By 10 we were through. At 10 the bodies were removed. At 10:15 19 women were brought in. We shot them all. 15 to 11 all bodies were removed. At 11, 19 kids were brought in. The guns all held 1 bullet at a time in case of freak out only 1 instructor would be killed at a time. Apparently 1 student freaked out a few months back and shot all 3 instructors. Nice eh? Anyway. I got a 12 year old boy. Bang. One Colombian could not kill a 12 year old boy. He was sent home. 18 left. This was getting better. 12 noon we broke to eat. At 1 we were given a question and answer period for 3 hours till 4. How we felt. Our reactions. Feelings etc. I passed I was told. We then saw 4 to 6 various execution techniques on film. Every weapon known to man. They did not have enough prisoners for us to kill. Most amazing day of my life.

Day 9

Between 9 and 10 they taught us acid torture. In eyes. In ears. Down throat. Only 3 prisoners used today. Between 10 and 11. Needle was used on a prisoner to put him to sleep. Etc he was killed by a Bolivian accidently. A new prisoner was brought in. He died at 5 to 11. We had a 5 minute break. Between 11 to 12 a rape movie was shown. Reactions of men and women being raped.

Ate till 1.

Movies of torture by Viet Cong on Americans. Bamboo. Water. Thumb hanging. This lasted 2 hours.

3 an american who had been tortured by the viet cong gave a 2 hour lecture. It was fascinating. He was hung by his thumbs. Kicked in the balls. Pins under nails. Kept in hole with insects and snakes. Pissed on and shit on and finally an empty gun to the head.

5 We broke to see another movie. The tet uprising and the execution of a viet cong leader by a police chief.

6 Ate

7 We learned teeth pulling till nine on three prisoners, 2 men and a woman.

At 9 watched tv till 10 went to bed .At 11:30 had three cakes. Had lost a lot of sweat

Day 10

Today we cut off limbs, thumbs, fingers, ears, on dummies. I guess they felt live people were not needed. At 1 we saw a 3 hour movie on Red aggression in Korea, Vietnam, Laos, Cambodia.

At 4 p.m. we were given a new test on our views of Red aggression the tortures to date. We lost 2 more guys. A Costa Rican. 17 of us now. Wonder what happened to them. They seemed happy in the course. We knocked off at 6 p.m.. had supper. Saw a bit of t.v.

At 8 a.m. I fell asleep.

Woke at 4 a.m. went back to sleep at 5.

Day 11

Today lectures all day till 6. Supper. Time off.

Day12

Today we learned stalking. We had to stalk a man through the jungle. 9 to 5 p.m. in a one square mile area. We never found him. He was a green beret jungle expert.

Day 13

Out again to stalk him. No go.

Day 14

Third day. This time a real prisoner was set loose. I thought they were crazy. He may escape. They had army teams paired all over outside the square mile. Fenced all around inside. Signs with live electricity all over the fences. We found him about noon. We had begun at 10. We gave him an hour to hide. He saw us and ran. We all had sniper rifles. We all took aim and fired at once. 17 shots in the head and back. We headed back. Ate. At 2 p.m. we saw Communist aggression films on South America, Brazil, Argentina, Colombia. At 6 we ate at 7 one last lecture, on how great we were etc. We were given certificates of graduation. I found it ironic. They were only given to army officers from Latin America. I liked mine. Put it with my others. Finally we could go home to Fort Bragg. Okefenokee facilities near the Florida-Georgia border off Interstate 97

May peace and harmony attend the souls of the tortured.

Peace

Studies in Intelligence

CIA Study: Hypnosis in Interrogation

by Edward F. Deshere – 1960

This study, written by Edward F. Deshere, appeared in the CIA journal *Studies in Intelligence* in 1960. This document explores some of the possible applications of hypnosis during interrogations. This article sheds some light on the CIA's interest in hypnosis, but tells only a tiny, incomplete part of the story. Given the potential power of hypnosis to unlock the secrets of the mind, Deshere found it "surprising that nobody... seems to have used it in this way." He searched the literature and consulted top experts, but found no intelligence agency that "admits to familiarity with applications of the process [of hypnosis] to interrogation."

In fact, such applications had already been tested by the CIA and others, but it appears that Deshere -- like most CIA officers at the time -- was not privy to information about MKULTRA, the agency's super-secret program of mind and behavior control research. The program, launched in 1953 to expand on previous CIA investigations of related topics, would last until 1963.

FOR OFFICIAL USE ONLY

A priori considerations
prejudicing successful interrogation
by trance induction suggest a
possible variant technique.

HYPNOSIS IN INTERROGATION

The control over a person's behavior ostensibly achieved in hypnosis obviously nominates it for use in the difficult process of interrogation. It is therefore surprising that nobody, as the induction of "Mesmeric trance" has moved from halls of magic into clinics and laboratories, seems to have used it in this way. A search of the professional literature shows at least that no one has chosen to discuss such a use in print, and a fairly extensive inquiry among hypnosis experts from a variety of countries has not turned up anyone who admits to familiarity with applications of the process to interrogation. There is therefore no experimental evidence that can be cited, but it should be possible to reach tentative conclusions about its effectiveness in this field on the basis of theoretical considerations.

The Nature of Hypnosis

Experimental analysis has gradually given us a better understanding of hypnosis since the days of Mesmer (6) and his followers, who held that it results from the flow of a force called animal magnetism from hypnotist to subject. Nevertheless, although no present-day investigator shares the lingering lay opinion that hypnosis is in some way an overpowering of a weak mind by a superior intellect, there are still many divergent theories propounded to account for the accumulating clinical observations. Some of these have significantly different implications with respect to the susceptibility of a hypnotized person to purposeful influence.

The view that hypnosis is a state of artificially induced sleep has been widely held since Braid (7) invented the term in mid-nineteenth-century. Currently Pavlov (20) takes a similar position in maintaining that cortical inhibition, sleep, and hypnosis are essentially identical. This view is now held throughout those parts of the world where Pavlovian theory is accepted as creed, but to the American investigator the experimental evidence against it appears overwhelming. Bass, (3) for example, has shown that the patellar -- kneecap -- reflex, which disappears in sleep, is not diminished in hypnosis. Wells (27) and others have demonstrated that all hypnotic phenomena can be elicited in a state bearing no resemblance to sleep, a performance which suggests the hypothesis that sleep-like aspects of hypnosis are not intrinsic to the hypnotic state but result from the hypnotist's suggestion that his subject go to sleep. Barker and Burgwin (2) have shown that the electroencephalographic changes characteristic of sleep do not occur in hypnosis except when true sleep is hypnotically induced. The findings of two Russian papers (16) which dispute this conclusion, affirming that the EEG rhythm characteristic of hypnosis resembles that of drowsiness and light sleep, have not been verified by replicating their experiments.

The concepts of suggestion and suggestibility as applied to hypnosis, introduced about 1880 by the Nancy school of hypnosis investigators, have been developed and refined in modern times. In a major monograph Hull (10) concluded that hypnosis is primarily a state of heightened suggestibility and has the characteristics of habit in that it becomes increasingly easy for a subject to enter the state of hypnosis after he has once done it. Welch, (26) in an ingenious application of the conditioning theory, pointed out that trance induction begins with suggestions which are almost certain to take effect and proceeds to more difficult ones. While the concept of suggestion does provide a bridge between the hypnotic and the normal waking state, it does not explain the peculiarity of the hypnotic process or the causes of the state of trance.

Several more recent approaches, which might be called *motivational* theories of hypnosis, hold that achievement of trance is related to the subject's desire to enter such a state. Experimentalists and clinicians who take the motivational view -- including the present writer, whose conclusions on the subject of this paper are undoubtedly colored by it -- believe that it accounts best for the major portion of the clinical data. Trance is commonly induced in situations where the subject is motivated a priori to cooperate with the hypnotist, usually to obtain relief from suffering, to contribute to a scientific study, or (as in a stage performance) to become a center of attraction. Almost all information currently available about hypnosis has been derived from such situations, and this fact must be kept in mind when one attempts to apply the data theoretically to situations different from these.

Hypnosis of Interrogees

The question of the utility of hypnosis in the interrogation of persons unwilling to divulge the information sought involves three issues: First, can hypnosis be induced under conditions of interrogation? If so, can the subject be compelled to reveal information? And finally, if information can be so obtained, how reliable will it be? The initial problem is then to induce trance either against the subject's wishes or without his being aware of it.

The Subject Unaware. Hypnosis has reportedly been effected without the subject's awareness in three situations -- in sleep, in patients undergoing psychiatric consultation, and spontaneously in persons observing another subject being hypnotized.

The older literature is replete with references to somnambulistic hypnosis induced by giving suggestions to sleeping subjects in a low but insistent voice. No case records are cited to support these statements, however; and they appear, like many others in hypnosis literature, to have been carried over from one textbook to another without critical evaluation. In a recent study Theodore X. Barber (1) found considerable similarity between subjects' compliance with suggestions given during sleep and their reactions to ordinary hypnotic techniques. Since Barber had asked them for permission to enter their rooms at night and talk to them in their sleep, however, it is reasonable to assume that most if not all of them perceived that trance induction was his purpose. They cannot therefore be regarded as truly naive sleeping subjects. Casual experimentation by the present writer has failed to demonstrate the feasibility of hypnotizing naive sleepers. The sample consisted of only four subjects, three of whom awakened to ask belligerently what was going on. The fourth just continued to sleep.

It is frequently possible for a therapist to perform hypnosis with the patient unaware. Advising the patient to relax, suggesting that he would be more comfortable with his eyes closed, and so on, the practitioner may induce a deep level of trance in a relatively brief time without ever using the term hypnosis. Even though the subject has not explicitly consented to be hypnotized, however, his relationship to the hypnotist, here a man of reputation and prestige, is one of trust and confidence of justifiably anticipated help.

Observers of hypnotic demonstrations may spontaneously enter trance. One of my own psychotherapy patients has reported that she went into a trance while watching me demonstrate hypnotic phenomena on television. This spontaneous hypnosis occurred despite the fact that the patient was in the company of friends and it was therefore a source of embarrassment to her. But here again we are dealing with a subject in sympathy with the purposes of the hypnotist and one who feels himself to be in a safe situation. It has been noted clinically that persons with negative attitudes about hypnosis are not susceptible to spontaneous trance.

The Subject Antagonistic. In experiments conducted by Wells, (29) Brenman, (8) and Watkins, (25) subjects making an effort to resist trance induction were unable to fight it off. Space does not permit a full review of these experiments here, but in all three the subject had had previous trance experiences with the hypnotist, which, we may assume, initiated a positive relationship between subject and hypnotist. The subject was instructed to resist hypnosis, but in the context of participating in an experiment to test the issue. It seems possible that his response was one of compliance with a supposed implicit desire on the part of the experimenter that he collaborate in demonstrating that trance can be induced in the face of resistance. The demand characteristics of the situation -- those influencing the subject to partake of the experimenter's purposes -- may have been such that his prescribed attitude of overt resistance was unable to prevail over the more fundamental attitude of cooperation in an experiment to show that trance can be brought on against a subject's will. Orne (18) has shown that the demand characteristics of an experimental situation may greatly influence a subject's hypnotic behavior. It is clear that at some level any cooperative subject wishes an experiment to "work out," wishes to help fulfill the experimenter's expectations. If he grasps the purpose of the experiment or the bias of the experimenter, he is disposed toward producing behavior which will confirm the experimenter's hypothesis. This is particularly true in a hypnotic relationship.

We are led to the conclusion that the many apparent cases of hypnosis without the subject's awareness or consent all seem to have depended upon a positive relationship between subject and hypnotist. The most favorable situation is one in which the subject expects to derive benefit from his association with the hypnotist and trusts in the hypnotist and his ability to help. This would not be the situation in an interrogation wherein the hypnotist is seeking to extract information which the subject wants to withhold. The possibility of using hypnosis would therefore seem to depend on success in the slow process of nurturing a positive relationship with the interrogee or in perpetrating some kind of trickery.

Obedience in Trance

Assuming that an interrogator has circumvented these problems and hypnotized a subject who wants to withhold information, to what extent might the subject retain control of his secrets even in deep trance? This is an area where wide disagreements prevail among authorities and where experimental evidence is highly contradictory. Young, (30) for example, reports that subjects resist

specific hypnotic suggestions if they have decided in advance to do so, while Wells (28) reports that none of his subjects were able to resist a prearranged unacceptable command or indeed any other.

Most work on this problem has focused on the more specific question of whether a person can be induced under hypnosis to commit some antisocial or self-destructive act. Supporting this negative view is the classic experiment by Janet, (11) who asked a deeply hypnotized female to commit several murders before a distinguished group of judges and magistrates, stabbing some victims with rubber daggers and poisoning others with sugar tablets. She did all this without hesitation. As the company dispersed, however, she was left in the charge of some young assistants, who took a notion to end the experiments on a lighter note. When they told her that she was now alone and would undress she promptly awakened. The murders were play-acted, the undressing would have been real; and the subject had no difficulty discerning the difference.

Wells, (29) on the other hand, caused a subject to commit the post-hypnotic theft of a dollar bill from the hypnotist's coat. The subject was unaware of his action and denied vehemently that he had stolen the money. Wells argues that other failures to compel such acts did not disprove the possibility of doing it, whereas even one success demonstrates that it can be done. Schneck and Watkins, also, cite evidence that behavior ordinarily constituting a crime can be produced by hypnosis. Schneck (22) inadvertently caused a soldier to desert his duty in order to carry out a suggestion for post-hypnotic action. Watkins (24) induced a soldier to strike a superior officer by suggesting that the officer was a Japanese soldier, and he obtained from a hypnotized WAC some information classified "secret" which she had previously told him she would not reveal.

Although these demonstrations appear convincing, there are deficiencies in their experimental conditions. Since both Schneck and Watkins were Army officers, the offenses committed could not possibly result in any serious damage. At some level, the subjects must have been aware of this. This same reasoning applies in experiments requiring a subject to hurl acid at a research assistant or pick up a poisonous snake: the participants are protected by invisible glass, a harmless snake is substituted for a poisonous one, and so forth. The situations are clearly experimental and the hypnotist who requests the homicidal or self-destructive behavior is known to the subject as a reputable man.

From real life there are a fair number of cases on record dating before 1900, particularly among the German-speaking peoples, claiming hypnotically induced criminal behavior, mostly sex offenses. It is hard to evaluate these cases scientifically at this late date; frequently it was relatives of the subject, rather than the offender himself, that charged hypnotic influence. Within recent years, however, three documented cases in which hypnosis is said to have played a role in criminal behavior have been reported -- by Kroener, (13) Mayer, (14) and Reiter. (21) These three cases have a common element: in each a dissatisfied person found gratification through the individual who later became his seducing hypnotist. It will be sufficient to examine one of them.

In the case reported by Kroener a young and sensitive unmarried male schoolteacher came under the hypnotic influence of a neighbor. Beginning with neighborly hospitality, the neighbor built up the relationship to the point where he was able by hypnotic suggestion to get the schoolteacher to give or lend him small sums of money and goods. As a test of his power he then implanted the post-hypnotic suggestion that the schoolteacher would shoot himself in the left hand. The schoolteacher actually did shoot himself in the left elbow, subjectively perceiving the event as an accident. Finally the hypnotist caused his victim to confess to crimes that he himself had committed. Throughout the entire affair, lasting five years, the schoolteacher had no recollection of the hypnotic sessions. He was convicted on the basis of his post-hypnotic confession, but through a chance remark began to suspect the nature of his relationship with his neighbor. After many appeals, he was recommended for examination to Kroener, who eventually uncovered the true course of events by re-hypnotizing him and causing him to remember the hypnotic experiences with his neighbor.

It is evident that a case like this offers little encouragement to the interrogator hoping to extract secrets by hypnosis. When the relationship between two individuals is marked by intense feelings and a strong tendency in one to comply with whatever requests are made of him by the other, it is in fact hardly necessary to invoke hypnosis to explain the resultant behavior. In the interrogation setting this emotional relationship of subject to hypnotist is not likely to exist.

Accuracy and Veracity

Supposing, however, that an interrogee has been hypnotized and induced to divulge information: how correct is this information likely to be?

Accuracy in Recall. A great deal has been written, especially in the press, about the perfect memory and unfailing accuracy of recall people display in hypnosis. Statements have frequently been made about their ability to recall anything that has happened to them even while infants, and according to some even prior to birth. (12) Hypnotic age-regression is a mechanism frequently used for this purpose. The subject is "taken back" to, say, the age of six. He begins to act, talk, and to some extent think in the manner of a six-year-old. He hallucinates the appropriate environment and gives details about people sitting next to him in school, his teacher's name, the color of the walls, and so on. His actions are exceedingly convincing, and it has frequently been assumed that an actual regression in many psychologic and physiologic age components to the suggested year takes place.

There is little evidence for the genuineness of hypnotic age-regression, even though there have been a number of studies mostly based on single cases. Young (31) demonstrated that performance on intelligence tests was not appropriate to the suggested age. Unhypnotized control subjects were more successful than subjects under deep hypnosis in simulating their age. Using the Rorschach test and drawings in a study of hypnotic age-regression in ten subjects, Orne (17) demonstrated that while some regressive changes appeared, non-regressive elements were also present, and changes toward regression showed no consistency from subject to subject. The drawings did not resemble the work of six-year-olds, being characterized by Karen Machover as "sophisticated oversimplification." Drawings actually done at the age of six by one subject were available for comparison, and there was not even a superficial resemblance. Subjects often gave with great conviction the name of the wrong teacher, one they had had at a later age. Studies by True and Stephenson, (23) and McCranie, Crasilneck, and Teter (15) failed to find in electroencephalograms taken during hypnotic age-regression any change in the direction of a childhood EEG. Similarly they report no increased heart rate, as characteristic of infants, or other changes in electrocardiograph tracings.

Hypnotic Veracity. Considerably less data is available on the veracity of information furnished in trance. I have been able to find in the professional literature only one author -- Beigel (4,5) -- who deals with prevarication under hypnosis. He writes in a personal communication that people may lie, refuse to answer, or wake up when asked direct questions on sensitive matters. Our own clinical work has amply convinced us that hypnotized subjects are capable of lying when they have reason to do so. It is therefore possible that information obtained from an interrogee by hypnosis would be either deliberate prevarication or an unintentional confusion of fantasy and reality. The correctness of any information so obtained would thus have to be established by independent criteria.

Hypnosis

Three suggestions have been made by Estabrooks (9) for what might be called defensive uses of hypnosis. He proposed that it might be used to make personnel hypnosis-proof on capture by the enemy, to induce in them amnesia for sensitive material in the event of capture, or to help them resist stress, particularly pain, in captivity.

As we have seen, there is little or no evidence that trance can be induced against a person's wishes. Proofing personnel against hypnosis attempts which they could successfully resist without this conditioning would seem a practice of doubtful utility. The hypnosis undertaken in order to suggest that they resist trance induction upon capture might in fact possibly precondition them to susceptibility. It might be better simply to warn them of the techniques of trance induction and inform them that they can prevent it.

Providing by hypnotic suggestion for amnesia upon capture is an intriguing idea, but here again we encounter technical problems. It is well known that the effectiveness and permanence of hypnotic suggestion is directly related to the concrete definition of a specific task. General suggestions such as blanket amnesia have unpredictable effects even on very good subjects. Moreover, even if it would work to suggest that a soldier remember only his name, rank, and serial number, there is the serious question whether this might deprive him of information vital to him during captivity. It would artificially induce a state of severe psychopathology, which if adaptive to his situation in some respects might be extremely disturbing in others. The impoverishment of his knowledge and his loss of ego-control would give his interrogator a very effective means of controlling him, possibly leading to a quasi-therapeutic relationship in which the captive would turn to the interrogator for "treatment" to relieve his distress. This method has other serious drawbacks: offensive action, such as attempts to escape or schemes for cooperation among prisoners to obstruct interrogation, would be severely handicapped. It could be far safer to rely on the soldier's own ego-control to decide what information ought not to be revealed to an enemy than to make this decision for him in advance by hypnotic means.

Conditioning individuals not to feel stress, particularly pain, would seem to hold promise of protecting them as captives subject to interrogation. Laboratory experiments have demonstrated that although subjects under hypnotic analgesia continue to respond physiologically much as they do in the waking state, they do not report experiencing pain. It appears that hypnosis works best in situations of high anxiety and probably has its major effect on the anxiety component of pain.

Such a procedure might be undertaken in particular instances, but probably is not feasible as general practice. Only a relatively small number of individuals will enter a sufficiently deep somnambulistic state to produce profound analgesia. Furthermore, though major surgery has been performed under hypnosis proper, I am unaware that major surgical procedure has ever been undertaken during post-hypnotically induced analgesia. In some individuals, I am sure, this would be possible, but clinicians working with hypnosis generally believe that the hypnotic state itself is more effective than post-hypnotic inductions.

If this should be tried, what type of suggestion should the subject be given? The post-hypnotic suppression of *all* pain might be dangerous to the individual, since pain serves as a physiological warning signal; and it is doubtful that such a blanket suggestion would be effective anyway. It would be better to focus the suggestion on inability to feel pain at the hands of captors. Even this suggestion, however, would rapidly break down if the captured subject felt any pain at all, as is likely in all but a very few instances. The soldier who had been taught to rely on hypnosis as an analgesic and found it ineffective in certain situations might be considerably worse off than if he had not trusted this device in the first place.

Pseudo-Hypnosis as Interrogation Aid

People do undergo physical and mental suffering to withhold information from an interrogator. Without attempting to discuss the psychodynamics of capture and interrogation -- which obviously will vary widely from captive to captive -- we would hazard the suggestion that at the core of their resistance is the sense of extreme guilt which would be activated by collaboration with the enemy while still in control of one's faculties. The alleviation of this sense of guilt, therefore, might be extremely useful to the interrogator. Both the hypnotic and the hypnoidal states induced by certain drugs are popularly viewed as ones in which a person is no longer master of his fate. This fact suggests the possibility that the *hypnotic situation,* rather than hypnosis itself, could be used to relieve a person of any sense of guilt for his behavior, giving him the notion that he is helpless to prevent his manipulation by the interrogator.

A captive's anxiety could be heightened, for example, by rumors that the interrogator possesses semi-magical techniques of extracting information. A group of collaborating captives could verify that interrogees lose all control over their actions, and so on. After such preliminary conditioning, a "trance" could be induced with drugs in a setting described by Orne (19) as the "magic room," where a number of devices would be used to convince the subject that he is responding to suggestions. For instance, a concealed diathermy machine could warm up his hand just as he receives the suggestion that his hand is growing warmer. Or it might be suggested to him that when he wakes up a cigarette will taste bitter, it having been arranged that any cigarettes available to him would indeed have a slight but noticeably bitter taste. With ingenuity a large variety of suggestions can be made to come true by means unknown to the subject. Occasionally these manipulations would probably elicit some form of trance phenomenon, but the crucial thing would be the situation, not the incidental hypnotic state. The individual could legitimately renounce responsibility for divulging information, much as if he had done it in delirium. The correctness of information so obtained, however, would be no surer than that of information obtained from hypnosis itself. Further, the interrogator would have to act in his relationship with the captive as though he were confident that it was all correct, except as he could detect falsehoods with certainty. Any doubt he betrayed would increase the subject's feeling of control and so decrease the effectiveness of the hypnotic situation. Cross-examination, upon which much of his success in deriving accurate information ordinarily depends, would be denied him. Once the prisoner loses his feeling of responsibility for his behavior, he also is relieved of responsibility for giving accurate and pertinent information. As an effective defense against this hypnotic situation, as against hypnosis, could be provided by raising the level of sophistication of those who might be exposed to it. Even one or two lectures warning them of possible devices to trick them into believing themselves hypnotized could show them that people cannot be hypnotized against their will and cannot be compelled even under hypnosis to tell the truth or to follow suggestions really contrary to their beliefs.

Findings

In summary, it appears extremely doubtful that trance can be induced in resistant subjects. It may be possible to hypnotize a person without his being aware of it, but this would require a positive relationship between hypnotist and subject not likely to be found in the interrogation setting. Disregarding these difficulties, it is doubtful that proscribed behavior can be induced against the subject's wishes, though we must admit that crucial experiments to resolve this question have not yet been performed. The evidence also indicates that information obtained during hypnosis need not be accurate and may in fact contain untruths, despite hypnotic suggestions to the contrary.

Hypnosis as a prophylaxis against interrogation, whether to prevent hypnosis by captors, to condition against stress and pain, or to create amnesia for sensitive information, would
function as an artificial repressive mechanism with the serious disadvantage of diminishing the captive's mastery of the situation. Finally, the hypnotic situation, rather than hypnosis itself, seems likely to be a more effective instrument in interrogation.

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Effects of GHz Radiation on the Human Nervous System:

Recent developments in the technology of political control

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Abstract: The United States has developed communications equipment which can make the blind see, the deaf hear and the lame walk. It can relieve the terminally ill of all pain, without the use of any drugs. A man might retain the use of all his faculties up until the day of his death.

This communication equipment depends on a new way of looking at the human brain and neuromuscular system, and gigahertz radiation pulsed at ultra-low frequencies. Some of this equipment is now operational within the Central Intelligence Agency and the Federal Bureau of Investigation. It will never be used to make the blind see and the deaf hear and the lame walk because its use is central to the domestic political agenda and foreign policy of James A. Baker and George Herbert Walker Bush. Domestically, the new communications equipment is being used to torture and murder persons who match profiles imagined to be able to screen a given population for terrorists, to torture and murder citizens who belong to organizations which promote peace and development in Central America, to torture and murder citizens who belong to organizations opposed to the deployment and use of nuclear weapons, and to create a race of slaves called Automatons or what is popularly called the Manchurian Candidate.

Overseas, experimentation is taking place on hostages held by the United States in Canada, Great Britain, Australia, Germany, Finland and France. In addition, there has been a long series of bizarre suicides among British computer scientists, all of whom had some connection to the United States Navy. Considering how recklessly, wantonly and indiscriminately America's new weapons have been used, physicians attending the dead and dying should consider the patients known political views and associations before making a diagnosis or conducting an autopsy.

INTRODUCTION

In 1988 the Office of Technology Assessment of the Congress of the United States published a special report titled. Criminal Justice: New Technologies and the Constitution. The report surveys the new technologies used in the investigation, apprehension, and confinement of criminals and addresses that delicate balance to be maintained between the national interest and individual rights.

As welcome as this report is to those of us who are interested in a government of law rather than of men, it manages to omit any discussion of the use of directed energy weapons from the section on less than lethal weapons. For instance, a weapon has been developed to paralyze a person at a distance, through a brick wall, if necessary. This weapon was developed during 1983-4 for use in situations where hostages are being held. A variation of this weapon has been purchased by the Marine Corps, for confusing and disorienting the enemy.

American weapons research has centered on pulsed radiation in the gigahertz frequency band for a very interesting reason. In 1972, the Department of the Army researched Soviet and other foreign literature sources and discovered over 500 studies devoted to the biological effects of SHF - super-high frequency electromagnetic oscillations.

(1) SHF may have potential use as a technique for altering human behavior. ...Lethal and non-lethal aspects have been shown to exist. In certain non-lethal exposures, definite behavioral changes have occurred. There also appears to be a change in mammals, when exposed to SHF, in sensitivity to sound, light, and olfactory stimuli.

The significance of this intelligence document in terms of the medical experiments commissioned by the Central Intelligence Agency since 1976 is that emphasis in this report is placed on influencing individuals as opposed to groups.
Secondly, this report is a trend study and therefore contains statements predicting Soviet knowledge and capabilities for influencing human behavior up to fifteen years ahead, or 1987. It foreshadows the enormous effort put into behavior control experiments employing the use of masers and microwave beam weapons on involuntary human subjects during the Reagan-Bush regime.

Thirdly, despite the reports title “Controlled Offensive Behavior - USSR.” it opens with a chapter describing the use of torture on Catholic prisoners in British jails in Northern Ireland. The inclusion of this chapter at all and its position at the front of the report. clearly is intended to suggest that it is permissible for the United States to torture its own citizens because these methods are being used by our very civilized cousins in Britain, and not only barbarians in the Soviet Union.

Fourthly, the report states that, The purpose of mind altering techniques is to create one or more of several different possible states in the conscious or unconscious area of the brain. The ultimate goal of controlled offensive behavior might well be the total submission of one's will to some outside force.

After discussing some of the possible states short of complete submission which may be the goal of Soviet research in behavior control, the author states, since the desired end product of this type of research is some change in the human mind, only the non-lethal aspects are discussed in this report. It should be remembered, however, that some techniques have lethal thresholds.

In the current round of American behavior control experiments, no allowance is made for lethal thresholds. The use of involuntary human subjects provided by the Central Intelligence Agency precludes the necessity for researchers to consider lethal thresholds and legal consequences.

A curious situation has emerged in which torturers and murderers attend our meetings, address us on the failings of our own research, and misdirect us with papers on the benign effects of incubating eggs in 60-herz magnetic fields, in order to buy time for their own well paid and frequently lethal experiments on involuntary human subjects.

Another document which will be of interest to those wishing background information concerning the technology of political control is The Search for the Manchurian Candidate: The CIA and Mind Control by John Marks. It was published in 1977 but has recently 1,1988) been reprinted by Dell Publishing, with an introduction by Thomas Powers.

Of special interest are the chapters concerning experiments with electrodes in the brain, which were the true forerunner of current experimentation involving invading the human brain and nervous system with gigahertz frequency masers and microwave beam weapons.

Of particular interest in the light of current developments are two paragraphs in the very last chapter which concern a Boston-based CIA front organization, the Scientific Engineering Institute, which still exists, not so incidentally. The SEI was initially established to do research on radar! In the 1960's the SEI added a wing devoted to life sciences, and hired a group of behavioral and medical scientists.

Marks reports, One veteran recalls a colleague joking, If you could find the natural radio frequency of a person's sphincter, you could make him run out of the room real fast. Turning serious, the veteran states the technique was plausible. and he notes that many of The crazy ideas bandied about at lunch developed into concrete projects. Just how concrete that proposal to find the natural radio frequency of the human anal (and penile) sphincter became, Marks had no way of knowing at the lime he wrote his book.

Lastly, I would like to cite another Defense Intelligence Agency report also prepared by the US Army. It is titled. Biological Effects of Electromagnetic Radiation (Radio waves and Microwaves) Eurasian Communist Countries It was published by the Defense Intelligence Agency in March, 1976.

The importance of this report rests not on its content, much of which seems to remains classified, but in its acknowledgement of a shift in focus, in less than four years from a wide range of behavior control interests to just one, electromagnetic radiation.
The date of this report is also significant; it was published Just as George Herbert Walker Bush became Director of Central Intelligence. Experiments on involuntary human subjects were rapidly authorized by the new Director, but outside of the United States because of the wrath of Congress at that time.

An experiment was begun in Edmomon. Alberta. Canada, under the aegis of an American oil company with which the DCI was on friendly terms. It consisted initially of blasting a man s brain with the microwave analog of sound waves for 2-3 hours a day. This has the effect of producing auditory hallucinations.

For an explanation of how audible voices are broadcast directly into the brain, see _Microwave Auditory Effects and Applications_, James C. Lin, Ph.D., Thomas Springfield, ll, 1978. For audible voices and their uses in intelligence operations also see _The Body Electric; Electromagnetism and the Foundation of Life_, Robert D. Becker, M.D. and Gary Selden, Morrow, N.Y., 1985, particularly pages 317 et seq.

TECHNOLOGY & METHODS

A further discussion of events leading up the present series of mind control experiments will have to await another occasion, in favor of a discussion of the technology of which the United States is now possessed.

As I have already indicated, one of the principal features of the weapon system is its ability to produce auditory effects, or hallucinations. Using these effects to broadcast defeat into the minds of the enemy was a particular dream of Lt. Gen. Leonard Perroots, U.SA.F. He hired droves of consultants to tell him how to use a microwave beam to implant ideas in the mind of the enemy, and to be perfectly fair, to urge on his own troops to superhuman deeds of valor.

One consultant I have spoken with advised Perroots that it is no more possible to implant ideas in the brain with microwaves than it is possible to implant ideas in a computer with microwaves. He pointed out the impossibility of knowing where any particular bit of information is stored. The effect this had on Perroots was really quite predictable, considering the hubris of the man, and his access to unlimited amounts of money through the bloated, American defense budget. He kept on hiring consultants until he found one who promised him results, knowing thai he, Perroots, would be long retired before anyone could safely say his fair- haired boy was a charlatan.

The smug complacency of the former consultant I spoke with was equally predictable. When I confronted him with the fact that medical atrocities are being committed on innocent human beings, he refused to discuss the subject with me until I could describe the process to him. Subsequently, I stumbled across Lin's book on microwave auditory effects. I called the former consultant back again, and again implored him to step forward and be counted. This time, confronted with the process being used, he told me that I had to explain to him the mechanism by which microwaves produce auditory effects! Changing tack, I told him that the mechanism is irrelevant; the process is being used on slave labor in efforts to create the Manchurian Candidate.

His reaction was just as predictable as Perroots', given the isolation and arrogance of academia. He assured me that such experiments couldn't be going on because HE had Forestalled that happening. HE had told Lt. Gen. Perroois that it couldn't be done, so Perroots had gone out to fly a kite and forgotten about it. Actually, that is what should have happened Instead, Perroots turned to a man who promised him results. This man remembered the microwave analog audiograms used by Dr. Joseph Sharp to beam auditory hallucinations into his own head at the Walter Reed Army Institute of Research in 1973. He promised Perroots that he would talk a human being to death if he was furnished with the equipment Sharp had used at Walter Reed, a slave, and personal security.

This was the origin of the medical atrocities which begin in Edmonton, Alberta in 1976, under the protection of the Central Intelligence Agency, and continue to this day.

By the fall of 1983, experiments had produced some communications equipment which far exceeded the simple dream of broadcasting defeat into the minds of the enemy. It is not only capable of producing auditory hallucinations, but visual hallucinations as well. The visual hallucinations have been described to me by a German artist, on whom t6his equipment is being used involuntarily, as having the quality of 35mm color slides.

Besides these sensory hallucinations, the same equipment can be used to block all sensation. It is being used to distort and even completely block all senses. With it the ultimate in sensory deprivation experiments can be performed. There's no peaking under the electromagnetic blindfold this equipment creates.

I should mention in this context, that the Central Intelligence Agency now has at its disposal the most evil, the most cunning torture devised by any government in all of human history. It is truly satanic in its moral and ethical implications. It is a torture which is commensurate with the degeneracy of a nation which is prepared and well on its way to polluting all life on earth into extinction.

The torture I am writing of I can only describe as thought deprivation. It is used in conjunction with sensory deprivation but it is in fact sensory deprivation times 10^(10).

We are all familiar with the sensation of being exposed to very loud noises. They are irritating, and we try to remove ourselves from them. We might say, It's so noisy in here, I can't hear myself think.

Human beings perceive thought as audible sound. It is something which we hear. We listen to ourselves think. This quality of listening to ourselves think, of hearing our own thoughts, can be extinguished by this device, so that it is _not_ possible to hear oneself think.

I have no idea how this effect is produced. It may be accomplished by playing a signal into the auditory nerve at such a high power that it does in fact drown out the sound of all thought, but I do not believe that is how it is being done. I do not know enough about the physiology of the brain to explain how it might be done, but the Central Intelligence Agency can do it with the mind control technology at its disposal.

That is the bad news. The good news is that one continues to think even if one cannot hear oneself think. Do not panic. There is nothing to fear. On the other hand, our thought process is what distinguishes man from other forms of life. Cogito ergo sum. But cogito is no longer necessarily possible. Where does this leave sum?

Furthermore, this communications equipment is able to produce pain, enormous amounts of pain. Pain is only another nerve signal, and pain is applied in great quantities in the torture regimen.

Sometimes the pain is specific and describable, more often it is general and indescribable. It is very much like being immersed in water, only it isn't water it is pain.

I have also described this pain as being very much like having an electric current passing through one's body. It is like having one's finger held in an electric socket and being unable to turn the current off. Except, this torture is used for years on end.
A skeptic might well ask why. If the United States has such equipment, it is being used to torture innocents and not Saddam Hussein. The answer is the cowardice factor.

It is quite one thing to torture innocents for a few hours a day, a few days a week, and then retire to a nearby hotel to soak your liver in beer served from frosty mugs. It is quite another to spend your afternoons and evenings in Baghdad, confined to a room commensurate with your cover story, because you don't speak Arabic, wondering how soon you will be betrayed.

This is the cowardice factor. What good is it to earn big bucks if your life is put at risk? Patriotism? Forget about it. Torturing a man through a cinder block wall is the ultimate act of cowardice. The mere invention is a reflection of the complete moral and physical corruption of American society.

But America is also an intellectually corrupt country. Once the Central Intelligence Agency had discovered the Fountain of Death, it didn't know how to use it. The best idea they could come up with was to resurrect the protocols of the infamous Dr. Ewen Cameron, sustaining the new technology for the low tech equipment he had employed.

Readers who are interested in the protocols of the deranged Dr. Cameron may consult John Marks' book, cited earlier. There have recently been several books published on the subject of Cameron, as well. This new interest resulted from survivors of his medical atrocities suing the CIA for compensation.

Among the books recently published, I would recommend Journey Into Madness by Clordon Thomas. The American edition came out in May, 1990.

A skeptic might also ask how it is possible to apply the Cameron brainwashing technique, called de-patterning, to an American citizen in the privacy of his own home. This is in fact the $64 dollar question, with no obvious answer to rational men and women.

Firstly, every effort is made to incarcerate the victim in a friendly hospital where his or her mind can be crushed at the leisure of the CIA- Failing this it is usually possible to at least get a false diagnosis from a corrupt physician that the victim has a potential psychiatric problem which may require institutionalization at some future date.

The effort to incarcerate the victim requires the cooperation of someone in the victim's family or work environment. The Central Intelligence Agency uses the term authority figure to describe this player, because he or she is an authority on the victim, and will step forward at the appropriate moment and demand that the victim be incarcerated or agree with the physician that the victim should be incarnated. Failing the presence of an authority, the victim may simply be kidnapped and placed in confinement, or the CIA may use unlawfu1 restraint to hold the victim in confinement temporarily. It's not a pretty picture. If all attempts at incarceration fail. or when the victim must be released, then the victim is tortured m the privacy of his own home- This is possible because the effects are produced by electromagnetic radiation, which passes freely through seemingly solid walls

The brainwashing begins by picking victims who are isolated in the first place, preferably living alone, by soliciting the cooperation of the victim's friends and acquaintances. In other societies these people wouldn't be called friends, they would be called informers.

The Central Intelligence Agency then attempts to isolate the individual from people whom they plan to corrupt -- the victim's support network. This is done by making the victim difficult to be with. At the same tune, every effort is made to make the victim suspicious of his friends and colleagues so he will avoid them of his own, free will.

To augment this process, members of the victims support network may simply be purchased to spread rumors concerning the victim, with the intention of further isolating him or her. This aspect of the process may be and is, carried to the extreme of simply murdering members of the victims support network. The process of discrediting the victim, isolating the victim, is a continuous one, and isolating the victim from members of the opposite sex, particularly potential sex partners, is a central feature of this process.

This is the background. The foreground is the adaptation of the Cameron de-patterning technique. The central feature of this is to use microwave auditory effects in place of the tape player and headset which Cameron used in a part of the process called psychic driving.

The microwave auditory effects are used to humiliate and ridicule the victim, and to express the torturers contempt for the victim, which is also expressed through the application of copious amounts of pain.

Contempt is also expressed by breaking and entering the victims home and burglarizing it on a daily basis. The victim is allowed no privacy whatsoever His every action is commented on disparagingly. This is accomplished by bugging the victim's home with an array of devices, including video and sound sensors.

The quality of the bugging equipment available to the CIA today is beyond the imagination of the average man. These sensors have been miniaturized to the point where no visual inspection will every discover them. And they are sensitive beyond belief The bugging devices themselves could be the subject of a separate paper.

CONCLUSION

The Manchurian Candidate 1990 is quite a different fellow than his 1956 counterpart. He is no longer an hypnotically preprogrammed assassin; his behavior is programmed and fed into a computer, which bio-mechanically drives him to his predetermined and destructive destiny, just like the cruise missiles manufactured by General Electric Aerospace

When I pick up a copy of Blomedica1 Engineering I am struck by the fact that all of the research in it is unnecessary, duplicates research accomplished five to 15 years ago by the Central Intelligence Agency. The difference between our research and theirs is that scientists employed by the CIA work on involuntary human subjects, slaves if you will, furnished to them by their employer. They do not have to be concerned with lethal thresholds.

The process which the microwave weapon employs is described in a paper titled, The Electromagnetic Spectrum in Low-Intensity Conflict, by Cap. Paul E. Tyler, Medical Command, United States Navy. His paper, presented at least a year after the murder which leaves no traces had already been perfected, sets forth the conceptual basis from which the development of the microwave beam weaponry began. It is worth reading.

Captain Tyler's paper was presented at a workshop conducted by Air University Center for Aerospace Doctrine, Research, and Education in March, 1984. His paper is included in a collection titled, Low-Intensity Conflict and Modern Technology, edited by Lt. Col. David J. Dean, United States Air Force, and published by Air University Press, Maxwell Air Force Base, Alabama in June, 1986. The book is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

If there are skeptics among you, and I hope that there are, the benign results of the Central Intelligence Agency's research can be seen on television nearly every night. Take a film clip of George Herbert Walker Bush at the end of the Malta summit with President Gorbachev and compare it with a film clip of George Bush campaigning for the Republican nomination in 1988. The pitch of his voice has been significantly lowered, he speaks in complete sentences and no longer in sentence fragments, and his gestures are appropriate to the oratorical point he is making rather than empty and fluttery gesticulations.

I have no problem with the CIA's enhancing George Bush's public image. After all, he is former Director of Central Intelligence, and authorized experiments on involuntary human subjects with maser and microwave beam weapons in February, 1976.

I have more trouble with the use of this equipment to neutralize Michael Dukakis' campaign for President in 1988, by making his public image wooden and plodding.

I have even more trouble with the use of this equipment to bring Kitty Dukakis to the brink of suicide, in order to enhance the prospects of George Bush's choice of political opponent in 1992 Jesse Jackson. Now that the Supreme Court has been neutralized as an instrument for social justice, neutralizing the Congress has become the Central Intelligence Agencies principal objective. A Jackson nomination is most likely to divide and crush the Democratic Party.

Think about what I have written. Perhaps it will help to explain classified work which is going on in a laboratory near you. Perhaps it will even help to explain work which you have been asked to do.

What do you know about research aimed at the computer control of human beings through masers aimed at acupuncture points, or muscle groups? What do you know about the torture and rape and murder of persons of both sexes using masers and microwave beam weapons designed to be used in combat training and simulation systems?

What do you know about a magnetic beam weapon, meant to temporarily disable any device employing an electric motor, or transistors, without permanently damaging it?

What do you know about the development of a tactile intelligence exploitation system designed to maintain control of political activists as they travel, anywhere in the world?

If you have such information, have a few words with me before the end of the of Workshop, or speak out on this subject in a forum of your own choosing. The more who speak out, the less likely it is that any one of us will be victimized for what we say.

In any case, only the illusion of Constitutional government remains in the United States. Do not be afraid. The worst is yet to come.

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2. For a discussion of a similar weapon, see An X-Band Microwave Life-Detection System in IEEE Transactions on Biomedical Engineering, Vol 33, No. 7; July, 1986.
3. This information was leaked by a British scientist to a British investigator, and appears in City limits, London, Aug 9 - Aug 16, 1990. This weapon is described as a microwave pulse radar, and is believed to work by rapidly heating the brain.
4. Super-high frequency radiation is a term applied to wave lengths between a decimeter and centimeter long. It corresponds roughly with a frequency range of 1-100 gigahertz.
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Harlan E. Girard was born in Cleveland, OH in 1936. He studied for the B. Chem. E. degree at Cornell University, and received the B.A. degree in economics from The University of Michigan, Ann Arbor, from which he graduated in 1957.
From 1957 to 1984, Mr. Girard was employed and self-employed in a number of businesses, all of them centered on real estate development. In 1984, he returned to school to study urban design and landscape architecture at the University of Pennsylvania, from which he received the Master of Landscape Architecture degree in 1988.
Since 1988, Mr. Girard has been pursuing independent research into the harmful effects ot radiation on biological systems. He is a member of the Bio-electro-magnetics Society and IEEE Engineering in Medicine and Biology Society.
In 1989, the Federal Bureau of Investigation refused Mr. Girard access to his own file on the grounds that it is 93exempt from mandatory release on the basis of 5 U.S.C. a7522 (b) (1)94. This section of the United States Code is applicable to documents 93to be kept secret in the interest of national defense or foreign policy.
Mr. Girard is flattered to have been made a peer of J. Robert Oppenheimer et al., despite the fact that he has never applied for a security clearance from the Department of Defense or held a job which required one. On the other hand, since 1983, he has been an involuntary human subject in medical experiments commissioned by the Central Intelligence Agency, which has of course made him privy to a great deal of highly classified and extremely sensitive information.
Mr. Girard used to be a moderate Republican, and received an Honorable Discharge from the United States Air Force in 1963.

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- "Planned operations to convey selected information and indicators to foreign audiences to influence their emotions, motives, objective reasoning, and ultimately the behavior of foreign governments, organizations, groups, and individuals. The purpose of psychological operations is to induce or reinforce foreign attitudes and behavior favorable to the originator's objectives." (*DOD Dictionary of Military Terms*)

- "Psychological operations (PSYOP) include psychological warfare and encompass those political, military, economic, and ideological actions planned and conducted to create in neutral, friendly, and nonhostile foreign groups the emotions, attitudes, or behavior to support the achievement of national objectives." (*US Army Field Manual 33-1 'Psychological Operations'*)

- (NATO-specific usage)
  "Planned psychological activities in peace and war directed to enemy, friendly, and neutral audiences in order to influence attitudes and behavior affecting the achievement of political and military objectives. They include strategic psychological activities, consolidation psychological operations and battlefield psychological activities." (*Joint Chiefs of Staff publication JCS1*, 1987)

- (Inter-American Defense Board-specific usage)
  "These operations include psychological warfare and, in addition, encompass those political, military, economic, and ideological actions planned and conducted to create in neutral or friendly foreign groups the emotions, attitudes, or behavior to support the achievement of national objectives." (*Joint Chiefs of Staff publication JCS1*, 1987)

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Subliminal Messages and Commercial Uses-Information Warfare-

Harlan Girard is head of the International Committee on Offensive Microwave Weapons; his collection of documents is quite significant. The most recent is his lawsuit against the US Government to stop nonconsensual testing on human subjects! This reviews domestic and international laws against this. Related is the document by and about Harlan Girard on the Human Research Subject Protections Act of 1997, US Senator John Glenn's bill, S193.Finally, his testimony about S193 before the Human Subjects Subcommittee National Bioethics Advisory Commission, Washington DC, October 19, 1997. Harlan Girard has called a **national meeting July 29-August 4, 1999**, in Philadelphia, PA, USA "so that survivors can develop group strategies and campaigns." Years later, information warfare has permeated everything.

CHARLES SHERWOOD

Examples:

US 3951134: Apparatus and method for remotely monitoring and altering brain waves
US5644363 Apparatus for superimposing visual subliminal instructional materials on a video signal
US6017302 Subliminal acoustic manipulation of nervous systems
US6052336 Apparatus and method of broadcasting audible sound using ultrasonic sound as a carrier

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"Information warfare has tended to ignore the role of the human body as an information - or data-processor, in this quest for dominance except in those cases where an individual's logic or rational thought may be upset via disinformation or deception...Yet, the body is capable not only of being deceived, manipulated, or misinformed but also shut down or destroyed - just as any other data-processing system. The "Data" the body receives from external sources - such as electromagnetic, vortex, or acoustic energy waves -or creates through its own electrical or chemical stimuli can be manipulated or changed just as the data (information) in any hardware system can be altered. If the ultimate target of information warfare is the information-dependent process, "whether human or automated," then the definition implies that human data-processing of internal and external signals can clearly be considered an aspect of information warfare."

Thomas, Timotny L. "The Mind Has No Firewall." Parameters. Vol. XXVIII, No. 1, Spring 1998

On a much grander scale, the use of mind control was contemplated as far back as 1969 by a former science advisor to President Johnson. "Gordon J.F. Macdonald, a geophysicist specializing in problems of warfare, has written that accurately timed, artificially excited strokes, 'could lead to a pattern of oscillations that produce relatively high power levels over certain regions of the earth...In this way, one could develop a system that would seriously impair the brain performance of very large populations **Brzezinski, Zbigniew. Between Two Ages: America's Role in the Technetronic Era. Viking Press, New York. 1970.** This capability exists today through the use of systems which can stimulate the ionosphere to return a pulsed (modulated) signal which at the right frequency can override normal brain functions. By overriding the natural pulsations of the brain chemical reactions are triggered which alter the emotional state of targeted populations.

One of the areas where this new technology is being used is in systems to dissuade shoplifters using sound below the range of hearing. "Japanese shopkeepers are playing CDs with subliminal messages to curb the impulses of the growing band of shoplifters. The Mind Control CDs have sound-tracks of popular music or ocean waves, with encoded voices in seven languages...warning that anyone caught stealing will be reported to the police. **McGill, Peter. "'Mind Control Music' Stops Shoplifters." The Sydney Morning Herald, Feb. 4, 1995.** A number of patents have been developed to influence behavior in this way. The following summations are taken from some of these patents dealing with both audio and video programming only this time we are the program:

"An auditory subliminal programming system includes a subliminal message encoder that generates fixed frequency security tones and combines them with a subliminal message signal to produce an encoded subliminal message signal which is recorded on audio tape or the like. A corresponding subliminal decoder/mixer is connected as part of a user's conventional stereo system and receives as inputs an audio program selected by the user and the encoded subliminal message." u**s Patent #4,777,529, Oct. 11, 1988. Auditory Subliminal Programming System. Inventors: Schultz et al. Assignee: Richard M. Schultz and Associates, Inc.**

"Ambient audio signals from the customer shopping area within a store are sensed and fed to a signal processing circuit that produces a control signal which varies with variations in the amplitude of the sensed audio signals. A control circuit adjusts the amplitude of an auditory subliminal anti-shoplifting message to increase with increasing amplitudes of sensed audio signals and decrease with decreasing amplitudes of sensed audio signals. This amplitude controlled subliminal message may be mixed with background music and transmitted to the shopping area. **US Patent # 4,395,600, July 26, 1983. Auditory Subliminal Message System and Method. Inventors: Lundy et al.**

"Data to be displayed is combined with a composite video signal. The data is stored in memory in digital form. Each byte of data is read out in sequential fashion to determine: the recurrence display rate of the data according to the frame sync pulses of the video signal; the location of the data within the video image according to the line sync pulses of the video signal; and the location of the data display within the video image according to the position information. **US Patent # 5,134,484, July 28, 1992. Superimposing Method and Apparatus Useful for Subliminal Messages. Inventor: Willson, Joseph. Assignee: MindsEye Educational Systems Inc.**

"This invention is a combination of a subliminal message generator that is 100% user programmable for use with a television receiver. The subliminal message generator periodically displays user specified messages for the normal television signal for specific period of time. This permits an individual to employ a combination of subliminal and supra-liminal therapy while watching television. **US Patent #5,270,800, Dec. 14, 1993. Subliminal Message Generator. Inventor: Sweet, Robert L.**

Carrier Waves

author unknown

A carrier wave is needed to transport the brainwave frequencies. Because the carrier wave is what you hear through the headphones directly, you do not need to buy super high-end headphones (5 Hz - 25 KHz) to reproduce the effects. In other words, your headphones do not need to be able to reproduce a 5Hz signal if you are generating a 5Hz theta-frequency brainwave file. The brain does however respond better to the lower frequencies, so the better the headphones you buy, the more dramatic the results will be. The best headphones are the kind that covers the entire ear, so outside noise does not get in. Plus, these headphones have much higher response to low frequencies.

Carrier waves must have some correlation between the left and right channels, no matter how slight. That is why mono (total correlation), inverse (total negative correlation), and spatial (natural recordings have some of the same sounds coming in both channels) will work OK.

The best sounds to use as carriers are sounds that are spread across the entire frequency range, or at least most of the lower frequency range. Good examples are ocean, waterfall (most any recordings from nature), and noise generated by this program. Experiment with mono (both left and right channels the same), inverted (like mono, but the left channel is the inverse of the right, obtained by using the Channel Mixer), and spatial stereo (spatially encoded sounds in nature, recorded with microphones about 9 inches apart to simulate separation between the ears). But don't let this stop you from digitizing your favorite music, and using it as a carrier, or converting your favorite to a mono or inverted wave.

To generate a carrier wave, you can do three things:

Record a sample. Once recorded, use the channel mixer to create a mono, or inversed wave. You can also just leave it the way it was recorded. You may find changes in effectiveness of the brainwave files depending on how you use the Channel Mixer.

Generate Tones: Use the Generate Tones function to find a pleasing, relaxing tone for the background. The way tones work the best is if the left channel's tone frequency is 5-6 Hz different from the right channel's tone. To do this, generate one tone with left volume at 40, and right volume at zero. Then generate the second tone with the left and right volumes reversed. Finally, paste special (with overlap) one tone on top of the other. Use low frequency tones, like 50Hz to 120Hz for best results. These tones, by themselves, will help coerce the mind into the state associated with the difference between the frequencies. For example, for a theta state of 6Hz, use a 70Hz and a 76Hz tone. Combining this tones sample with an existing brainwave file, by overlap pasting at a quiet volume (20%) is even more effective.

Generate Noise: Use the generate noise function (pink and brown work best) in any of the modes: mono, inverse, or spatial stereo (independent channels noise will not work as a carrier for brainwave frequencies at all, since there is no correlation between the left and right channels). I find that using pink noise in spatial stereo, and running it through the Quick Filter to get rid off some of the "edge" if any works the best. I have also found Inverse to work quite well too, but the brainwave "effect" is more pronounced, and can be distracting, and some sound boards have trouble reproducing sound that is inversed between channels.

Once you have found a pleasing sound, about 10 seconds or so of a monotonous sound (tones, river, waterfall, noise...) you're ready to start. If a monotonous sound is used, more disk space can be saved because we will use the play list to repeat portions. If a music sample were used, it is quite noticeable that the same 10-second piece is being played over and over and over again.

If you're curious you can also spatially locate a mono sound to the left or right?. Do this if you wish to have the illusion that a particular sound is coming from one side or the other. The function works by pasting a mono sound sample into a stereo waveform, and using the digital delay function. Having a quiet "ping" (generated by using the sine wave generator, and fading out over the wave) play spatially on the left, then on the right at about 5 second intervals is very relaxing

Psychotronic Weapons

author unknown

New energy weapons have been described as being capable of creating symptoms of sea sickness can be used to resonate the inner organs to cause pain and spasms, induce epileptic-like seizures or cause cardiac arrest. Other weapons include, according to our research, those which cause or prevent sleep, override voluntary muscle movements or otherwise affect the brain. For example, 100,000 units of the "Black Widow," which overrides muscle movement, were added to the Russian government's arsenal in recent years.

The term 'psycho-terrorism' was created by Russian writer N. Anisimov of the Moscow Anti-Psychotronic Center. He indicates that Psychotronic weapons can be used to take away part of the information which is stored in a person's brain and send it to a computer which reworks it to the level needed to control the person. The modified information is then reinserted into the person's brain and thought by them to be their own information. These systems are then able to induce hallucinations, sickness, mutations in human cells, zombification or even death. These technologies include VHP generators, X-rays, ultrasound and radio waves. Russian army Major I. Chernishev described in the military journal Orienteer (February 1997), how "psy" weapons are under development all over the globe.

Specific types of weapons he noted were:

A Psychotronic generator produces a powerful electromagnetic emanation capable of being sent through telephone lines, TV, radio networks, supply pipes and incandescent lamps. This signal would manipulate behavior of those in contact with the signal.

A signal generator that operates in the 10-150 Hertz band which when operating in the 10-20 Hertz range creates an infrasonic oscillation that is destructive to all living organisms.

A nervous system generator is designed to paralyze the central nervous systems of insects. This same system is being refined to have the same effect on humans. See US Patent # *US 6,506,148 Nervous System Manipulation by EM Fields from Monitors (TV and Computer) (Heartbeat).*

Ultrasonic signals of very specific design have been created. These devices are supposedly capable of carrying out bloodless internal operations without leaving a mark on the skin. They can also be used to kill.

Noiseless cassettes have been developed by the Japanese which has given them the ability to place infra-low frequency voice patterns over music, patterns that are detected by the subconscious. The Russians claim to be using similar "bombardments" with computer programming to treat alcoholism and smoking.

The 25th-frame effect discussed above is a technique where every 25th frame of a movie reel or video footage contains a message that is picked up by the subconscious so as to alter the conscious mind.

Psychotropics are defined as medical preparations used to induce a trance, euphoria, or depression. These are referred to as "slow-acting mines." Symptoms could include headaches, noises, voices or commands in the brain, dizziness, pain in the abdominal cavities, cardiac arrhythmia, or even the destruction of the cardiovascular system.

What is written here is the tip of a very large iceberg. These bits of information are intended to draw your attention to the state of the technology and **where its going. These conclusions are not based on speculation but, rather, on the facts presented by military and academic researchers from the United States and around the world.** .

"Mystery high frequency radio impulses have been bombarding the Eugene-Springfield area for as long as six years and may be affecting people's health...The paper said the source of the signals is unknown...They say it is being broadcast at 4.75 megahertz and is pulsating about 1.100 times per second." **DPI. "Mysterious Radio Signals May Be Harming Health." The Columbia Record (South Carolina). March 27, 1978.** The mechanism for understanding the effects of these energies is being recorded in several diverse laboratories with the mounting evidence of the proofs open science requires. One of observations shows that, "At the core of observed sensitivities to low-level EMF fields are a series of cooperative processes. One such series involves calcium ion binding and release. Available evidence points to their occurrence at cell membranes and on cell surfaces in the essential first steps of detecting EM fields. Also, attention is now directed to newly defined roles for free radicals, that may also participate in highly cooperative detection of weak magnetic fields, 'even at levels below thermal (kT) noise.'" **Adey, W. Ross. "Whispering Between Cells: Electromagnetic Fields and Regulatory Mechanisms in Tissue." Frontier Perspectives, Vol. 3, No. 3. Fall 1993.**

One of the other effects which has been observed shows that interaction of specific fields with chemicals present in the environment or body can also contribute to significant changes. "This 'increase in genomic instability,' they suggested, could mean that chronic exposure to very strong EMFs 'may result in an increased incidence of congenital malformations and cancer. We propose that [EMF] exposure can affect both DNA damage and repair processes...and that it can act in concert with chemical agents to potentiate the damaging effects of those agents.'" **Microwave News. "Four Labs Link 50/60 Hz Fields to DNA Breaks; Two Reproduce Effect at Occupational Exposure Levels." November/December 1998.**

Nature's pulse can also have a significant effect if we can just clear the electromagnetic smog long enough to sense its reality. Certain behaviors have been associated with the polarized light of the sun as it reflects off of a full moon, increased sun spot activity, auroras and other natural energy sources. Increases in Very Low Frequencies (VLF) can have a significant impact. "More specifically, this atmospheric parameter has been considered a possible trigger for changes in the somatic and emotional well-being of humans, sometimes referred to as weather sensitivity symptoms or meteoropathy. The following review attempts to summarize present knowledge of biological significance of VLF- effects in humans." **168. Schienle, H. and Vaitl, D. "Biological effects of Very low Frequency (VLF) Atmospherics in Humans: A review." Journal of Scientific Exploration, Vol. 12, No. 3, 1998, pp. 455-468.**

These are frequencies utilized in various forms of communications and other military applications. Their potential effect either by lack of operator understanding or the intentional design of the system could have significant impacts on humans, plants and animals. The body is always compensating for the impacts of energy on the body. If a person thinks about the feel of his body during a power failure - when all of the energy fields of significance are switched off in an instant - it is as if a weight were being lifted from us. The first thing noticed is usually the silence, followed by a release of tension as the body no longer has to attempt to create compensating energy fields for the constant bombardment of modern life and the internal stress it generates.

The Weapon Revolution

A number of new weapons are being developed or are already in operation. The Russians are reported to be ahead in many respects but this is only because the collapse of the old regime has allowed information to flow out of the country from leading scientists. The idea of creating specific brain interference, nervous system complications or heart failure are all targets of the new science of death. "Russia's psychotronic weapons include a psychotronic generator, which produces electromagnetic emanations that can be sent through telephone lines, TV, radio, or even light bulbs; an 'infrasonic sound' generator that destroys all life forms; a 'nervous system generator' known, so far, to paralyze insects; 'ultrasound emanations,' which kill by attacking internal organs without leaving a mark on the skin; and 'noiseless cassettes' featuring voices too low to be heard, which are nevertheless detected by the subconscious." **Bulletin of the Atomic Scientists. "All in the (Russian) mind?" July/August 1998.**

Radio Frequency Weapons

author unknown

The United States Air Force has been interested in radio frequency (RF) weapons ever since it was first noticed that certain radio frequency energy could have significant effects on humans and hardware alike. "Public discussion of RF/MW weapons has focused on disrupting technology. But a recent article in the Airpower Journal revealed for the first time that the military is developing high-powered microwave weapons for use against human beings...RF/MW and EMF-based weapons are also being studied for civilian law enforcement." Microwave News. "RF Weapons: Disabling People and Electronics." January/February 1996. The direction of the research begins to take more open form during the 1980s. The Air Force points out several areas of interest in developing RF weapons as follows:

"Radiofrequency (RFR) Radiation"

Introduction: Biotechnology requirements in the next three decades must consider significant advances in electronic (electromagnetic radiation) warfare, since both offensive and defensive systems will add significant radiation stress to humans in a wide range of military operations. We can expect increases in available on-board power; development of sophisticated methodologies for detecting, tracking, identifying and attacking; and ultimately the development of systems to inflict intense pulses of electromagnetic energy on an adversary.

As the technological race continues, knowledge of mechanisms of action of RFR with living systems and the assessment of pulse RFR effects will demonstrate the vulnerability of humans to complex pulsed electromagnetic radiation fields in combination with other stresses...

Assessment and Development of Pulsed Radiofrequency Radiation Effects

Objectives:

(1) Develop techniques to deposit radiofrequency radiation (RFR) at selected organ sites.
(2) Develop mathematical models and physical measurement capabilities (microdosimetry) to track the real-time RFR energy distribution within organ sites as a function of physiological responses such as diffusion and blood flow.
(3) Establish thresholds and other response rates for selected biological effects as a function of RFR wave parameters (shape, width, repetition rate, resource groups and intensity).
(4) Develop laboratory tools to simulate likely real-time RFR encounters in Air Force operations (from VLF to millimeter wave frequencies).

RFR Forced Disruptive Phenomena

a. Objectives
(1) Define the ability of RFR to interrupt, degrade or direct human central nervous system functioning.
(2) Define the ability of RFR to interrupt or degrade physiological functions such as cardiac output and respiration.
(3) Define the ability of RFR to interact with chemical and other physical agents, and to assess their combined impact on humans.

A rapidly scanning RFR system could provide an effective stun or kill capability over a large area. System effectiveness will be a function of waveform, field intensity, pulse widths, repetition frequency and carrier frequency. The system can be developed using tissue and whole animal experimental studies, coupled with mechanisms and waveform effects research.

Microresonance and receptor site mechanisms research will suggest specific frequencies which may interfere with or enhance drug or chemical agent effects. Confirmatory experiments in animals will be necessary. Using relatively low level RFR, it may be possible to sensitize large military groups to extremely dispersed amounts of biological or chemical agents to which the un-irradiated population would be immune." Southwest Research Institute- Final Report On Biotechnology Research Requirements For Aeronautical Systems Through The Year 2000. Prepared for: *The Air Force Office of Scientific Research- July 30, 1982.*

The use of radio frequency energy as a carrier for a silent death has reached varying degrees of completion. It is now possible to disrupt the entire living system with weapons growing out of this research. The heating and more dramatic effects were first discovered and applied to the first generation of these new instruments. "A thermal gun would have the effect of heating the body to 105 to 107 degrees F, thereby incapacitating any threat, based on the fact that even a slight fever can affect the ability of a person to perform even simple tasks.

This approach is built on four decades of research relating radio frequency exposure to body heating. A seizure gun would use electromagnetic energy to induce epileptic-like seizures in persons within a range of a particular electromagnetic field. The magnetophosphene gun is designed around a biophysical mechanism which evokes a visual response and is thought to be centered in the retina, known as magnetophosphenes. This effect is experienced when a person receives a blow and sees 'stars.' This same effect can be produced with electromagnetic energy." 223. oak Ridge National Laboratory. Physiological Responses Applicable to development of Less-Than-lethal Weapons. As far back as the early 1990s this new tool was under development. "Low frequency infrasound systems were considered for use in Somalia but rejected, as were radio frequency systems. The latter focus a beam of radio frequency energy on the targeted individual. This causes a rise in body temperature to between 105 to 107 degrees Fahrenheit, producing fever-like disabling symptoms... Oak Ridge National Laboratory is developing a thermal gun of this type..." Richardson, Doug. "Non-lethal options." Defence & Security Review.

"Bioeffects research now being conducted by the Radiofrequency Radiation Branch examines effects at the subcellular, cellular, and whole organism levels. The research is conducted through the Tri-Service Electromagnetic Radiation Panel, which is chartered through the Deputy Undersecretary of Defense for Environmental Security. In order to examine carcinogenicity potential, some studies expose small laboratory animals to RFR over virtually their entire life span. Other research focuses on basic mechanisms of RFR bioeffects. Also emphasized are studies on the effects of millimeter wave frequency and high power microwave radiation on ocular and nervous system function. Some new directed energy weapons systems use short, intense pulses of microwave energy to incapacitate opponent electronic systems. A major research effort is focused on determining the biological effects of these novel pulses in order to establish protection criteria necessary before these systems can be tested and fielded. Bioeffects issues are critical to the success of new non-lethal weapons. Because of our core bioeffects expertise, we have become a major test facility for the bioeffects of non-lethal weapons... Air Force Research Laboratory, Brooks AFB. Radio Frequency Radiation Bioeffects Research at the United States Air Force Research Laboratory.

The new "Technologies could include: radio frequency and microwaves, lasers, supercaustics, polymers, smoke, and electromagnetic pulse generators, to name a few...The US Army has even looked into infrasound - very low frequency sound - as a riot-or crowd-control agent. Infrasound generators could be turned against humans, causing disorientation, nausea and vomiting." Starr, Barbara. "Non-Lethal Weapon Puzzle For US Army." International Defense Review, April 1993

The new systems have already been built and are available. Even "backyard inventors" are creating these new systems with a handful of off-the-shelf parts and easily obtainable materials. "Fancy building your own Klingon disrupter? An ex-US navy engineer has done just that for the bargain basement price of $500. The gadget fiend has built a 'gun,' using readily available hardware, that can disable almost any piece of electronic equipment from 20 feet away. Sfierritt, Lucy. "Build your own Klingon disrupter." The Register, Sept. 9, 1999 This same system if tuned to the right frequency could also be used against a person by inducing a heart attack or creating other effects. "Portable microwave weapons being field-tested by the U.S. Special Forces can quietly cut enemy communications but also can cook internal organs. 'I don't know that nonlethality is all that humane,' concludes Myron L. Wolbarsht, a Duke University ophthalmologist and expert on laser weapons." Ricks, Thomas E. "Nonlethal Arms: New Class of Weapons Could Incapacitate Foe Yet Limit Casualties." Wall Street Journal, Jan 4, 1993. These advances just begin with hand held devices. "A 1996 Air Force Scientific Advisory Board report on future weapons, for instance, includes a classified section on a radio frequency or 'RF Gunship.' Other military documents confirm that radio-frequency antipersonnel weapons programs are underway." Pasternak, Douglas. "Wonder Weapons." U.S. News & World Report, July 7,1997.

One of the other areas where RF is being exploited is in creating artificial electromagnetic pulses (EMPs). These energy surges override and cripple sophisticated and simple electronic circuits. These technologies are being developed under dual-use programs for both military and police use:

"Jaycor has recently extended the pulse-power testing technology developed under Department of Defense programs for electromagnetic pulse and high-power microwave simulation to civilian applications with substantive success. Jaycor has developed a technology demonstration system for law enforcement, anti-terrorist operations, and military operations other than war (OOTW) to safely stop fleeing vehicles. The system is a potential answer to the prevention of the tragic endings to numerous high-speed chases that occur every year.

Jaycor has a variety of nonlethal weapons in development for both military and law enforcement applications. One of those devices, dubbed Sticky Shocker™ for its ability to both stick to a human target and electrically stun the person, is nearing completion of engineering development. This project is being sponsored by the Defense Advanced Research Projects Agency and the National Institute of Justice through the Joint Program Steering Group.

Jaycor is using its expertise in electromagnetics to develop innovative and cost-effective methods for protecting new and existing systems from hostile exposures to intense radio frequency (RF) radiation. Advanced computer codes and models, which are verified using Jaycor's high-power microwave laboratories, are used to characterize the system's response to RF radiation. These response models are integrated into computer programs to support design engineers. The program leads users through a step-by-step RF protection design process." Jaycor. Less-Than-lethal Technologies, Products

Jaycor is one of the companies actively developing these technologies for the Justice Department. "The National Institute of Justice (NIJ) and the Department of Defense have been developing new non-lethal weapons, including laser flashlights, nets, and projectiles. LE Systems developed the LaserDazzler in a project sponsored by the NIJ and the Defense Advanced Research Project Agency. Laser flashlights like the Laser Dissuader and the Laser Dazzler disorient a subject without causing lasting damage to the eyes. These devices look just like a regular flashlight, which also offers officers the advantage of surprise. The LaserDissuader uses an adjustable red 650 nanometer laser diode, supported by a complex electronics package, and top-of-the-line optics, which can be operated in continuous or flicker mode.

In addition, the LaserDazzler flashes a series of random green bursts of light of up to 50 meters even in daylight, to distract a subject. LE Systems is looking for ways to reduce the dazzler's size, weight, and cost, while also searching for a means to commercially market the product. Other new nonlethal weapons include ring airfoil and electric stun projectiles. The Sticky Shocker, for example, clings to the target and administers pulses near 50 kV every few microseconds at a rate of 10 to 15 pulses per second. The maker, Jaycor, has also created a wireless stun gun with a range of 25 feet, without resorting to cables. Finally, the NIJ has provided funds to Delta Defense to create a pepper spray projectile, with the intention of having a 100-foot launch range able to penetrate a household windowpane of glass."-*Siuru, Bill. "Developments for the Military and Law Enforcement Now Apply to Corrections." Correction Technology & Management, March/April 1999. Vol. 3, No. 2. Source: NLECTC Law Enforcement S Technology News Summary, May 13, 1999.*

As with all new weapons, counter-measures also need to be developed. Defensive systems are being created to protect the developers of this technology from the fruits of their labors when the enemy chooses to test their new systems on us, such as new telepathic electronic two-way communications, where ELF [Extra Low Frequency], VLF [Low Frequency] waves will reach the people of the Earth through the insides of their brain. Such rays, from satellites, are fed from the memory of computers that store much data about the human being and his languages. These rays will then interlace and interweave with the natural thinking processes to form what we call the ARTIFICIAL TALK.

RNM requires decoding the resonance frequency of each specific brain area. That frequency is then modulated in order to impose information in that specific brain area. The frequency to which the various brain areas respond varies from 3 Hz to 50 HZ. Only NSA Signals Intelligence modulates signals in this frequency band. *Example of EMF Brain Stimulation Bioelectric Resonance Information induced Brain area Frequency Through Modulation Motor Control Cortex 10 Hz Motor impulse coordination Auditory Cortex 15 Hz Sound which bypasses the ears Visual Cortex 25 Hz Images in the brain bypassing the eyes Somatosensory 9 Hz Phantom touch sense Thought Center 20 Hz Imposed subconscious thoughts*

US 5,973,999 *- Acoustic Cannon*

United States Patent ***5,973,999***
Naff , et al. **October 26, 1999**

Acoustic cannon

Abstract

An acoustic cannon has a plurality of acoustic sources with output ends symmetrically arranged in a planar array about a central point. Pressure pulses are generated in each acoustic source at substantially the same time. The pressure pulses exit the output ends as sonic pulses. Interaction of the sonic pulses generates a Mach disk, a non-linear shock wave that travels along an axis perpendicular to the planar array with limited radial diffusion. The Mach disk retains the intensity of the sonic pulses for a time and a distance significantly longer than that achievable from a single sonic source. The acoustic cannon is useful as a non-lethal weapon to disperse crowds or disable a hostile target.

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Claims

We claim:

1. An acoustic cannon, comprising:

a plurality of acoustic sources each having an input end and an output end with an interior bore disposed there between, each said input end receiving a plurality of discrete sonic pulses and each said output end emitting a sonic output in the form of discrete sonic pulses;

a sonic pulse generator coupled to each said input end; and

a timing mechanism coupled to said sonic pulse generator such that each one of said discrete sonic pulses is received by each one of said input ends at substantially the same time and is of substantially the same frequency and duration when emitted from each one of said output ends whereby a plurality of said sonic outputs interact to generate a shock-driven output pulse.

2. The acoustic cannon of claim 1 wherein said plurality of output ends form a planar array about a central point and there are a minimum of three said output ends.

3. The acoustic cannon of claim 2 wherein there are from about 10 to about 40 of said output ends arrange symmetrically about said central point.

4. The acoustic cannon of claim 3 wherein there are from about 20 to about 30 of said output ends arranged as an ellipse about said central point.

5. The acoustic cannon of claim 3 wherein said sonic pulse generator includes a source of an explosive fluid, a spark gap disposed within said interior bore, a power supply coupled to said spark gap and a fluid control valve to deliver a desired amount of said explosive fluid to said interior bore.

6. The acoustic cannon of claim 5 wherein said explosive fluid is a mixture selected from the group consisting of hydrogen/oxygen, oxygen/propane, air/propane, air/acetylene, oxygen/acetylene, oxygen/gasoline, and air/gasoline.

7. The acoustic cannon of claim 6 wherein said explosive fluid is a mixture of hydrogen and oxygen and said power supply is capable of delivering a pulse of from about 30 kilovolts to about 50 kilovolts to said spark gap.

8. The acoustic cannon of claim 3 wherein said sonic pulse generator includes a solid explosive mix, an explosive squib coupled to said explosive mix and a power supply coupled to said explosive squib.

9. An acoustic cannon, comprising:

a plurality of acoustic sources each having an input end and an output end with an interior bore disposed therebetween, each said input end receiving a plurality of discrete sonic pulses and each said output end emitting a sonic output in the form of discrete sonic pulses; and

a sonic pulse generator coupled to each said input end, said sonic pulse generator including a shock tube having a high pressure region and a low pressure region whereby a differential between said high pressure region and said low pressure region is effective to generate a shock wave; and

a timing mechanism coupled to said sonic pulse generator controlling interaction of said high pressure region with said low pressure region and the generation of said sonic pulses such that each one of said discrete sonic pulses is received by each one of said input ends at substantially the same time and is of substantially the same frequency and duration when emitted from each of said output ends whereby a plurality of said sonic outputs interact to generate a shock-driven output pulse.

10. The acoustic cannon of claim 9 wherein a first electrode having a front end extends through said high pressure portion, a dielectric layer coats said first electrode except for said front end, and a second electrode extends into said high pressure portion and is spaced from said front end by a distance, L.

11. The acoustic cannon of claim 10 wherein L is from about 6 inches to about 36 inches.

12. The acoustic cannon of claim 11 wherein a power supply capable of generating a voltage pulse of at least 100 kilovolts between said first electrode and said second electrode once every 0.5 seconds to every 2 seconds is coupled to said timing mechanism.

13. A method for incapacitating a biological target, comprising the steps of;
generating multiple, discrete, sonic pulses in the form of a Mach disk with a dominant frequency of between about 2 kHz and about 5 kHz and an intensity from about 150 decibels to about 200 decibels by substantially simultaneously emitting sonic pulses from a plurality of output sources that are arranged in a planar array, wherein said sonic pulses are generated by rapid heating of a gas contained within a high pressure region of a shock tube; and directing said multiple, discrete sonic pulses in the form of a Mach disk at said biological targets.

14. The method of claim 13 including the steps of filling said high pressure region and said low pressure region with air at ambient pressure and then rapidly heating the air in the high pressure region thereby expanding the air contained therein.

15. The method of claim 14 wherein said air is rapidly heated by exposure to an electric spark for a required length of time.

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an acoustic device that emits repetitive sonic pulses capable of dispersing or incapacitating a biological target. More particularly, a planar array of multiple acoustic pulse sources cooperates to generate highly focused pulses of high intensity sonic energy over a small area.

2. Description of the Related Art

Military and law enforcement personnel have a need for non-lethal weapons. Such weapons are useful in riot control to disperse a hostile crowd. In sniper and hostage situation, a non-lethal weapon provides a means to neutralize a hostile target without collateral damage to hostages, bystanders or property. In combat, a non-lethal weapon is useful to neutralize sentries and warning devices. Since the weapon produces casualties, rather than fatalities, each hit removes three opponents, the injured and a two-person rescue squad, from the combat zone instead of the one person removed by a fatality.

High intensity sound pulses have a debilitating effect on biological targets. Humans become disoriented by exposure to sonic pulses exceeding a threshold of pain of about 150 decibels (dB). Eardrum rupture occurs at about 190 dB, the threshold for pulmonary injury is about 200 dB and the onset of lethality is about 220 dB.

U.S. Pat. No. 3,557,899 to Longinette et al. discloses a parabolic reflector that focuses and transmits a continuous sound at a frequency of between 8 kilohertz (kHz) and 13 kHz. Within this frequency range, sound attenuates rapidly and the disclosed device is believed effective only at close ranges. The U.S. Pat. No. 3,557,889 patent discloses utilizing the device in close proximity to a riot or in enclosed areas, such as a bank vault.

U.S. Pat. No. 4,349,898 to Drewes et al. discloses a sonic weapon to destroy buildings and disable personnel. A plurality of tubes each conduct a continuous sound generated by a jet engine. Rotating fans at the ends of the tubes create pulsed sound of a desired frequency. The fan speeds are set such that each tube has a pulse sound frequency two times the frequency of a preceding tube leading to an additive effect of sound waves referred to as a parametric pump. The disclosed device appears heavy and requires careful alignment of a number of large apparatus for operation.

There remains, therefore, a need for a portable acoustic weapon capable of dispersing or disabling biological targets at distances of up to 100 meters that does not suffer from the disadvantages of the prior art discussed above.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide an acoustic device capable of dispersing or incapacitating a biological target. One feature of the invention is that the device has a planar array of simultaneously actuated acoustic pulse sources. Interaction between the sonic pulses forms a Mach disk. A second feature of the invention is that the device is actuated by either a shock tube or detonation of an explosive chemical mix.

Among the advantages of the invention are that the Mach disk is a compact packet of sound that may be accurately fired to minimize harm to hostages, bystanders and property. The Mach disk effectively incapacitates or disperses a biological target with a minimal threat of lethality. The acoustic device is relatively lightweight and is readily transported by an infantry vehicle and operated by a single person.

In accordance with the invention, there is provided an acoustic cannon that has a plurality of acoustic sources arranged in a planar array about a central point. Each of the plurality of acoustic sources has an input end and an output end. The input end receives a sonic pulse and the output end transmits a sonic output. A sonic pulse generator is coupled to each of the input ends and a timing mechanism is coupled to the sonic pulse generator such that the sonic pulse is received by each of the input ends at substantially the same time and is of substantially the same frequency and duration. The combination of the planar array and the parameters of the sonic output effectively generates a Mach disk.

The above stated objects, features and advantages will become more apparent from the specification and drawings that follows.

IN THE DRAWINGS

FIG. 1 shows in cross-sectional representation a single sonic source as known from the prior art.

FIGS. 2A and 2B illustrate the acoustic cannon of the invention.

FIG. 3 illustrates in cross-sectional representation an acoustic cannon in accordance with a first embodiment of the invention

FIGS. 4A through 4E graphically illustrate the generation of a sonic pulse through the use of a shock tube.

FIG. 5 illustrates in cross-sectional representation an acoustic cannon in accordance with a second embodiment of the invention.

FIG. 6 graphically illustrates the relationship between frequency content of the sonic pulse and directivity.

FIG. 7 graphically illustrates the relationship between frequency contained in the sonic pulse and attenuation.

FIG. 8 graphically illustrates the relationship between pulse range and peak pressure measured in decibels.

DETAILED DESCRIPTION

FIG. 1 illustrates in cross-sectional representation a muzzle portion 12 of an acoustic device 10 as known from the prior art. A sonic source (not shown) generates a pressure wave 16 that is transmitted along an interior bore 14 and emitted from an output end 18 as spherically expanding sound waves 20. The spherically expanding sound waves 20 diffuse rapidly. The prior art acoustic device has limited value as a weapon. The strength of the pressure wave 16 drops to below useful values within a very short distance and time. Additionally, the spherically expanding sound waves 20 diffuse over a broad area rendering target selectivity difficult or impossible.

The disadvantages of the prior art are resolved by an acoustic cannon in accordance with the present invention. FIG. 2 schematically illustrates a portion of the acoustic cannon of the invention in Front (FIG. 2A) and Side (FIG. 2B) Views. Acoustic sources 22 terminate at an output end 24. Interior bores 26 extend from output ends 24 to input ends 28 that are adjacent to a sonic pulse generator 30. A timing mechanism 32 controls the rate and duration of generated sonic pulses. In a first embodiment of the invention, the sonic pulses are generated by detonation of an explosive mix and a fuel storage chamber 34 is provided to house required quantities of the additional explosive mix, or explosive mix precursors.

The Front View (FIG. 2A) illustrates the output ends 24 arranged in a generally planar array having symmetry about a central point 36. The planar array may be configured as any shape, with symmetric shapes preferred to optimize the sonic output. A most preferred configuration is elliptical, including circular, arrays. The number of output ends 24 in the planar array is at least two to provide directivity and at least three to provide a symmetric array. Preferably, there are at least four output ends 24 in the planar array. More preferably, there are from about 10 to about 40 output ends and most preferably, from about 20 to about 30 output ends.

As illustrated in the Side View (FIG. 2B), when sonic pulses of substantially the same amplitude and duration are emitted from each of the output ends 24 at essentially the same time, the shock waves 37 interact along a longitudinal axis 38, running parallel to the longitudinal axis of the interior bore 26 and extending outwardly from the central point 36. Interaction of the shock waves 37 from the plurality of output ends 24 generates a Mach disk 39. The output has some of the characteristics of an acoustic soliton, although while a soliton does not change shape with propagation, the shock-driven output pulses of the invention are expected to undergo relatively slow and predicable changes in shape.

The Mach disk is a non-linear shock wave that travels rapidly along the longitudinal axis 38 with limited radial diffusion over distances of up to 100 meters. The intensity of the shock wave 37 contained within the Mach disk 39 decreases more slowly over distance and time than the 1/(range).sup.2 behavior of a single spherical expanding pulse.

If the same energy is used in a multiple tube source having a planar array of outputs as in a single output source, the on-axis peak pressure for the multiple tube source, in the direction of maximum directivity, is n.sup.2/3 times that of the single tube. The n.sup.2/3 factor is derived from a linear superposition of the predicted pressure pulses from individual sources, which will all be of shorter duration than a single pulse derived from a single source using the same total energy. With multiple sources, energy from each individual source is concentrated in a shorter on-axis pulse. At the same range from the array, the resulting peak pressure is greater by this factor compared to the peak pressure associated with a single source of equivalent total energy. The attenuation rates of the peaks with distance will be essentially the same for single and multiple sources.

For a 10 tube array having the same output energy as a single tube, the sound pressure, along the longitudinal axis, is 4.6 times higher than for the single tube at similar times and distances.

FIG. 3 illustrates in cross-sectional representation an acoustic source 40 for use with the acoustic cannon of the invention in accordance with one embodiment. The acoustic source 40 has an input end 42 and an output end 44. The input end 42 receives sonic pulses and the output end 44 transmits the sonic output as a portion of a planar array of outputs to generate a Mach disk.

Coupled to the input end 42 is a sonic pulse generator 46. The sonic pulse generator 46 detonates an explosive mix of gases or vaporized liquids. A first fluid component, that could be a gas, a liquid, or a mixture thereof, is delivered to a mixing chamber 48 through a first conduit 50. A second fluid component is delivered to the mixing chamber 48 through a second conduit 52. A first fluid

control valve 54 and a second fluid control 56 determine the ratio of first fluid to second fluid in the mixing chamber 48. While stoichiometric ratios of the fluids are preferred, a stoichiometric ratio is not required. Any fluid mix ratio that generates an explosive shock wave on ignition is suitable. A third fluid control valve 58 introduces a desired volume of mixed fluid into the barrel 60 of the acoustic source 40. The desired volume of fluid substantially fills the barrel 60.

The fluid control valves 54,56,58 are any suitable type of fluid metering system. Since the first fluid control valve 54 and the second fluid control valve 56 control fluid ratios, adjustable manual valves are suitable. The third fluid control valve 58 accurately and repeatedly delivers the mixed fluid to barrel 60. Rapid repetition rate is frequently required and the third fluid control valve 58 is preferably an electrically actuated solenoid valve.

A power supply 62 generates a voltage potential between electrodes 64 that exceeds the breakdown voltage of the mixed fluid contained within the barrel 60 thereby generating a spark at gap 66. An effective voltage potential is from about 10 kilovolts to about 100 kilovolts. To optimize generation of the Mach disk, the interior bore of the barrel 60 is preferably symmetric about a longitudinal barrel axis 68. More preferably, the interior bore is circular in cross-section and the spark gap 66 aligned along the longitudinal axis 68.

A timing mechanism 70 is coupled to the sonic pulse generator and controls power source 62, third fluid control valve 58, or preferably, both devices. The timing mechanism 70 ensures that each of the plurality of acoustic sources is fired at substantially the same time for effective generation of the Mach disk.

A number of different fluid combinations produce effective shock waves that exit the acoustic source 40 as a strong sonic pulse. Preferred fluids are combinations of gases and include hydrogen/oxygen, oxygen/propane, air/propane, air/acetylene, oxygen/acetylene and the like. A preferred explosive fluid mixture is hydrogen and oxygen in approximately stoichiometric quantities (atomic ratio of H:O of 2:1). For this mixture, a voltage pulse in the range of from about 30 kilovolts to about 50 kilovolts, and typically about 40 kilovolts, for a duration of 1 microsecond is effective. Atomized or vaporized liquid fuels such as gasoline, can also be mixed with oxygen or air as an effective mixed fluid.

Rather than mixed fluids to generate the sonic pulse on detonation, solids fuels can be used. The solid fuels would be packaged in a manner similar to blank shells, but would be larger and have more energy per package than the usual gun blanks. An electronic squib or a percussive primer is used to detonate the solid fuel. Automatic reloading of the solid fuel shells could be accomplished in a manner that is conventional for guns or cannons to accomplish a desired repetition rate.

A most preferred acoustic source is an electrically triggered shock tube. Shock tubes are disclosed in U.S. Pat. No. 3,410,142 to Daiber et al. that is incorporated by reference in its entirety herein. With reference to FIG. 4A, the shock tube 72 is tubular with an interior bore centrally running therethrough. A frangible diaphragm 74 separates the shock tube 72 into a high pressure region 76 and a low pressure region 78. When frangible diaphragm 74 is ruptured, the pressure differential between the high pressure region 76 and the low pressure region 78 generates a shock wave that travels the length of the low pressure region 78 and is emitted from the shock tube 72 at output end 80 as a sonic pulse.

FIGS. 4B through 4E illustrate the generation of the sonic pulse. In FIG. 4B, the initial pressure distribution of the shock tube prior to rupture of the frangible diaphragm 74 is illustrated showing the high pressure region 76 and low pressure region 78. Shortly after rupture of the frangible diaphragm 74, a shock wave 82 begins to traverse the low pressure region 78. Trailing the shock wave 82, but traveling at a higher velocity is a rarefaction wave 84. As indicated in FIG. 4E, adjacent to the output end 80, the rarefaction wave 84 catches up with the shock wave 82, generating a high energy sonic pulse.

FIG. 5 illustrates the incorporation of a shock tube 72 into the acoustic cannon of the invention. The shock tube 72 has a high pressure region 76 and low pressure region 78 separated by a frangible diaphragm 74. Prior to actuation, both the high pressure region 76 and low pressure region 78 are at substantially the same pressure. Preferably, prior to actuation, both regions are filled with air at ambient pressure. Frangible diaphragm 74, typically a thin sheet of plastic or other brittle material, is inserted into a notch formed through the housing 86 of shock tube 72 and separates the high pressure region 76 from the low pressure region 78.

To actuate the acoustic cannon, the gas pressure in the high pressure region 76 is increased by any suitable means. A preferred means is electric arc heating. A first electrode 88 extends longitudinally through a portion of the high pressure region 76 centered about a longitudinal axis 90 of the shock tube 72. A front end 92 is proximate to the frangible diaphragm 74, but preferably the front end 92 does not contact the frangible diaphragm 74. A rear end 94 extends through a rear wall 96 of the high pressure region 76 terminating in a reservoir 98 containing a high dielectric fluid 100 having a resistivity in excess of about 10.sup.6 ohm-cm. One suitable dielectric is conventional transformer oils. The oil is for insulation only, other methods of high voltage insulation are equally suitable.

Encasing a substantial portion of the first electrode 88 is a dielectric insulator 102. The dielectric insulator 102 covers an entire mid-portion of the first electrode 88, exposing only a desired small amount of the front end 92 and the rear end 94. Disposed about a portion of the dielectric insulator 102 is a second electrode 104. The second electrode 104 has a front end 106 disposed within the high pressure region 76 and a rear end 108 disposed within the high dielectric fluid 100 of reservoir 98. The dielectric insulator 102 defines a longitudinal length, L, between the second electrode 104 and the front end 92, that regulates heating of the gas contained within the high pressure region 76. When the shock tube 72 is actuated, an electric spark 110 is emitted and traverses along the surface of the dielectric insulator 102 from the second electrode 104 to the front end 92 of the first electrode 88. Increasing the length, L, increases the time that the gases are exposed to the electric spark increasing heating of the gases. As the gases are heated, they expand, generating a pressure differential between the high pressure region 76 and low pressure region 78. Increasing the length of L, increases the heating of the gases, increasing the expansion thereof, thereby increasing the pressure differential and intensity of the shock wave ultimately emitted from the shock tube.

To actuate the shock tube 72, a power supply 112 charges a capacitor 114. The voltage difference between the first electrode 88 and second electrode 104 must exceed the breakdown voltage of the gas contained within the high pressure region 76. For air, a voltage differential of in excess of 100 kilovolts, and preferably on the order of 150 kilovolts is utilized. A timing mechanism (not shown) actuates all shock tubes 72 of the acoustic cannon at substantially the same time by electronically closing a switch 116, thereby completing the circuit. Preferably the length L is from about 6 inches to about 36 inches. The spark will traverse a distance in excess of one foot in less than 2 microseconds.

After each burst of the shock tube, the frangible diaphragm 74 must be replaced. The pulse repetition rate is from about 0.1 to about 5 seconds and preferably from about 0.5 to about 2 seconds.

Rapid replacement of the frangible diaphragm is achieved by mechanical means. An advantage with the electric heated shock tube of the invention is that the frangible diaphragm 74 may be omitted. The gas in the high pressure region 76 is heated faster than the pressure can be relieved. The result is a pressured region that expands as a shock wave from the end of the barrel.

The frequency content of the sonic pulses is controlled by the barrel length. The output of the pulsed acoustic source is a single pulse that has Fourier components that range over a range of frequencies. The principal, or dominant, frequency will primarily be dependent on the duration of the high-pressure portion of the pulse, that can be controlled to a first order by the energy in the individual shock sources and by the barrel length.

As illustrated in FIG. 6, to maintain high directivity, the minimum dominant frequency of the sonic pulses is in excess of about 1 kHz, and preferably in excess of about 2 kHz.

As illustrated in FIG. 7, attenuation increases as the frequency increases such that the maximum dominant frequency of the sonic pulses is preferably less than about 7 kHz, and more preferably, less than about 5 kHz.

The sound intensity is selected to provide a desired effect to the biological target, dependent on the application. While the effect of sound is subjective and dependent on an individual's physiology, the Table 1 guidelines are illustrative.

TABLE 1

Effect	Sonic Intensity	Shock Wave Pressure
Threshold of Pain	145 dB	
Eardrum Rupture	185 dB	
		5-6 psi
Pulmonary Injury	200 dB	
		30 psi
Lethality		100 psi

As graphically illustrated in FIG. 8, a sonic generator having a mass equivalent to the "total charge mass" equivalency of trinitrotoluene (TNT) is capable of producing a shock pulse effective to cause disorientation and debilitation, without permanent injury, over distances of from less than 10 meters to in excess of 100 meters. The FIG. 8 distances were computed based on a single sonic source and do not include the n.sup.2/3 factor that is obtained using multiple sources. As such, FIG. 8 illustrates the minimum over-pressure values at a given range for different values of the source strength (energy). Incorporation of the n.sup.2/3 factor for multiple sources substantially increases the effective range for a given over-pressure level.

It is anticipated that the acoustic cannon of the invention will weigh less than 50 kilograms and occupy a net volume of about 1 cubic meter, compatible with current light infantry vehicles. The discrete nature of the individual pulses comprising the acoustic radiation field essentially eliminates the presence of high-amplitude side lobes, but there will also be no null positions. Off-axis locations will experience peak pressures comparable to those characteristic of the peaks for individual sources at the same distance, but possibly for somewhat longer duration. Consequentially, ear protection for the operators is recommended.

The advantage of the acoustic cannon of the invention is illustrated by the Example that follows.
EXAMPLE

Four acoustic tubes each having an inside diameter of 6 inches and a length of 12 inches were placed at the corners of a 36 inch square. Each tube was charged with a mixture of hydrogen and oxygen in approximate stoichiometric ratio. The gaseous mixture of each tube was simultaneously ignited by an electric spark, generating four shock waves that cooperated in the formation of a Mach disk. The acoustic pressure at a distance of 50 feet from the output ends of the acoustic tubes, was measured to be in excess of 165 dB (greater than 0.7 psi over-pressure) effective to provide deterrence and debilitation.

It is apparent that there has been provided in accordance with the present invention an acoustic cannon that fully satisfies the objects, means and advantages set forth hereinabove. While the invention has been described in combination with embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the appended claims.

EMDR: *What does it mean?-* Go look it up!

author unknown

The American Journal of Hypnosis published a special issue on the use of EMDR and hypnosis. An introductory article by the editor and past president of the American Association of Clinical Hypnosis directly addressed the issue: "While it has been argued against categorizing hypnosis as a specific type of treatment method (e.g., Fischolz, 1995; 1997a; 1997b; 2000; Fischholz & Spiegel, 1983), this is not the case for EMDR. Like psychoanalysis, EMDR is both an evolving theory about how information is perceived, stored and retrieved in the human brain and a specific treatment method based on this theory (Shapiro, 1995, 2001). In fact, EMDR is a very unique treatment method, which like other types of treatment/methods/techniques (e.g. psychoanalytic/psychodynamic therapy, behavior, cognitive-behavioral therapy, ego-state therapy) can also be incorporated with hypnosis (Hammond, 1990).

We note there are some distinctive differences between hypnosis and EMDR, which we would like to briefly highlight. First, one of the major uses of hypnosis among clinical practitioners is to deliberately begin by inducing in the patient an altered state of mental relaxation. In contrast, when beginning EMDR mental relaxation is not typically attempted. In fact, deliberate attempts are often actually made to connect with an anxious (i.e. an emotionally disturbing as opposed to relaxed) mental state.

Second, therapists often use hypnosis to help a patient develop a single, highly focused state of aroused receptivity (Spiegel & Spiegel, 1978). In contrast, with EMDR attempts are made to maintain a duality of focus on both positive and negative currently held self-referencing beliefs, as well as the emotional arousal brought about by imaging the worst part of a disturbing memory. However, in this sense, EMDR does have a similarity to Spiegel's (Spiegel & Spiegel, 1978) split-screen cognitive restructuring technique.

Third, one of the proposed effects of hypnotizing a person is that they will have a decrease in their generalized reality orientation (GRO: Shor, 1979). This induced decrease in a person's GRO is often utilized in order to promote an increase in fantasy and imagination, perhaps by capitalizing on an increase in trance logic (Orne, 1977). In contrast, in EMDR attempts are made towards repeatedly grounding the patient by referencing current feelings and body sensations to prevent the patient from drifting away from reality. Specific encouragement/inducement is made towards rejecting previously irrational/self-blaming beliefs in favor of a newly, reframed positive belief with an increase in subjective conviction about that belief. Shapiro and Forrest (1997) and Nicosia (1995) have also noted additional differences between hypnosis and EMDR.

What is EMDR? Go look it up!

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The Telephone "*Works*"

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When a person speaks into a telephone, the sound waves created by his voice enter the mouthpiece. An electric current carries the sound to the telephone of the person he is talking to. A telephone has two main parts: (1) the transmitter and (2) the receiver.

The Transmitter of a telephone serves as a sensitive "electric ear." It lies behind the mouthpiece of the phone. Like the human ear, the transmitter has an 14 eardrum." The eardrum of the telephone is a thin, round metal disk called a diaphragm. When a person talks into the telephone, the sound waves strike the diaphragm and make it vibrate. The diaphragm vibrates at various speeds, depending on the variations in air pressure caused by the varying tones of the speaker's voice.

Behind the diaphragm lies a small cup filled with tiny grains of carbon. The diaphragm presses against these carbon grains. Low voltage electric current travels through the grains. This current comes from batteries at the telephone company. The pressure on the carbon grains varies as sound waves make the diaphragm vibrate. A loud sound causes the sound waves to push hard on the diaphragm. In turn, the diaphragm presses the grains tightly together. This action makes it easier for the electric current to travel through, and a large amount of electricity flows through the grains. When the sound is soft, the sound waves push lightly on the diaphragm. In turn, the diaphragm puts only a light pressure on the carbon grains. The grains are pressed together loosely. This makes it harder for the electric current to pass through them, and less current flows through the grains.

Thus, the pattern of the sound waves determines the pressure on the diaphragm. This pressure, in turn, regulates the pressure on the carbon grains. The crowded or loose grains cause the electric current to become stronger or weaker. The current copies the pattern of the sound waves and travels over a telephone wire to the receiver of another telephone.

The Receiver serves as an "electric mouth." Like a human voice, it has "vocal cords." The vocal cords of the receiver are a diaphragm. Two magnets located at the edge of the diaphragm cause it to vibrate. One of the magnets is a permanent magnet that constantly holds the diaphragm close to it. The other magnet is an electromagnet. It consists of a piece of iron with a coil of wire wound around it. When an electric current passes through the coil, the iron core becomes magnetized. The diaphragm is pulled toward the iron core and away from the permanent magnet. The pull of the electromagnet varies between strong and weak, depending on the variations in the current. Thus, the electromagnet controls the vibrations of the diaphragm in the receiver.

The electric current passing through the electromagnet becomes stronger or weaker according to the loud or soft sounds. This action causes the diaphragm to vibrate according to the speaker's speech pattern. As the diaphragm moves in and out, it pulls and pushes the air in front of it. The pressure on the air sets up sound waves that are the same as the ones sent into the transmitter. The sound waves strike the ear of the listener and he hears the words of the speaker. Sound is heard, it can also be felt and it can affect us even when we can't hear it. Research patents from Bell Labs – very interesting…

United States Patent **6,358,201**
Childre , et al. **March 19, 2002**

Method and apparatus for facilitating physiological coherence and autonomic balance

Abstract

Method and apparatus for determining the state of entrainment between biological systems which exhibit oscillatory behavior such as heart rhythms, respiration, blood pressure waves and low frequency brain waves based on a determination of heart rate variability (HRV). Entrainment reflects a harmonious balance between the two branches of the autonomic nervous system within the body. This internal state of heightened physiological efficiency enhances health and promotes optimal performance. According to one embodiment a method is used to determine the entrainment level based on an entrainment parameter related to HRV. The method first determines the power distribution spectrum (PSD) and then calculates an entrainment parameter (EP), which is a measure of the power distribution in the HRV spectrum. High EP values occur when this power is concentrated within a relatively narrow range of frequencies, and lower values when the power is distributed over a broader range of frequencies. In one embodiment, an apparatus is provided for monitoring the heart beat and presenting this information via a personal computer, handheld device, or other processing means.

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Claims

What we claim is:

1. A method, comprising:

sampling a plurality of heart beats of a subject;

determining a variability of the plurality of heart beats;

expressing the variability as a function of frequency;

determining a distribution of frequencies of the variability expressed as a function of frequency;

selecting a peak frequency of the distribution of frequencies;

determining a value of energy of the variability corresponding to said peak frequency (E.sub.peak);

determining a value of energy of the variability below said peak frequency (E.sub.below) and a value of energy of the variability above said peak frequency (E.sub.above);

determining a ratio of E.sub.peak to E.sub.below and E.sub.above ; and

providing to the subject, in a first presentation format, a representation of a first parameter corresponding to said ratio.

2. The method of claim 1, wherein determining the ratio of E.sub.peak to E.sub.below and E.sub.above comprises calculating the ratio as: ##EQU1##

3. The method of claim 2, wherein selecting the peak frequency comprises:

selecting a peak frequency of the variability expressed as a function of frequency within a predetermined range of frequencies.

4. The method of claim 2, wherein determining the distribution of frequencies further comprises:

determining a power spectrum distribution of frequencies in the variability expressed as a function of frequency.

5. The method of claim 4, further comprising: normalizing the power spectrum distribution.

6. The method of claim 4, wherein determining the value of energy in said peak frequency comprises:

determining the value of energy in a predetermined range of frequencies around said peak frequency (E.sub.peak).

7. The method of claim 6, wherein determining the value of energy in the predetermined range of frequencies comprises:

selecting the predetermined range of frequencies; and

summing the power corresponding to each of the frequencies in said predetermined range of frequencies.

8. The method of claim 1, wherein the first parameter comprises an entrainment parameter (EP).

9. The method claim 8, further comprising:

demeaning and de-trending the variability of the plurality of heart beats over a time period.

10. The method of claim 8, further comprising:

weighting the variability of the plurality of heart beats over the time period to compensate for sampling noise.

11. The method claim 10, wherein weighting variability of the plurality of heart beats over the time period further comprises applying a Hanning window.

12. The method of claim 1, wherein the method is practiced in a digital data processing system.

13. The method of claim 12, wherein the data processing system comprises a personal computer.

14. The method of claim 12, wherein the data processing system comprises a handheld digital computing device.

15. The method of claim 12, wherein the data processing system comprises a mainframe computer.

16. The method of claim 12, wherein the data processing system includes a digital signal processing unit.

17. The method of claim 12:

wherein the processing system includes a display; and

wherein the method further comprises:

determining an entrainment parameter corresponding to the ratio, said entrainment parameter to provide a plurality of entrainment parameter values;

providing a first image on the display in response to a first entrainment parameter value; and

altering the first image on the display in response to a second entrainment parameter value if said second entrainment parameter value is different from said first entrainment parameter value.

18. The method claim 17:
wherein the first image includes a graphic element in a first position;

the graphic element transitions toward a goal if the second entrainment parameter value is greater than the first entrainment parameter value; and

the graphic element transitions away from the goal if the second entrainment parameter value is less than the first entrainment parameter value.

19. The method of claim 18, wherein the graphic element is a balloon.

20. The method of claim 18, wherein the image includes an obstacle.

21. The method of claim 18, wherein the graphic element is a rainbow.

22. The method of claim 1, further comprising:

processing the variability of the plurality of heart beats over a time period, to provide a plurality of bins corresponding to a plurality of frequencies;

selecting the peak frequency within a predetermined range of the plurality of frequencies;

calculating the power in the bins corresponding to the peak frequency;

calculating the power in the bins below those corresponding to the peak frequency; and

calculating the power in the bins above those corresponding to the peak frequency.

23. The method of claim 1, wherein sampling the plurality of heart beats comprises:

sampling the plurality of heart beats using a pressure sensitive apparatus.

24. The method of claim 1, wherein sampling the plurality of heart beats comprises:

sampling the plurality of heart beats using a blood pressure monitor.

25. The method of claim 1, wherein sampling the plurality of heart beats comprises:

sampling the plurality of heart beats using a heart rate monitor.

26. The method of claim 1, wherein sampling the plurality of heart beats comprises:

sampling the plurality of heart beats using an electrocardiograph.

27. The method of claim 1, wherein the first parameter relates to an emotional state of the subject.

28. The method of claim 1, wherein the first parameter relates to a mental state of the subject.

29. The method of claim 1:

wherein sampling comprises sampling the plurality of heart beats for a first and a second consecutive time periods;

the method further comprising: calculating a second parameter representative of a history of the parameter over the first and the second consecutive time periods.

30. The method of claim 1, wherein sampling the plurality of heart beats comprises:
sampling the plurality of heart beats using a plethysmographic sensor.

31. The method of claim 1, further comprising:

providing to the subject, in a second presentation format, a representation of a second parameter corresponding to said ratio.

32. A software program performing the method of claim 1.

33. The software program of claim 32, wherein the software program is stored in a computer readable medium.

34. An apparatus, comprising:

sampling circuit to sample a plurality of heart beats of a subject for a predetermined time period;

a display unit;

a processing unit coupled to the sampling circuit and the display unit, the processing unit to:

determine a variability of the plurality of heart beats by measuring an interval between each beat during the predetermined time period;

determine a frequency distribution of the variability, the frequency distribution having at least one peak frequency, the at least one peak including a range of frequencies;

calculate a parameter of the frequency distribution of the variability, wherein the parameter is a ratio of the area under the at least one peak frequency to the area under the remaining portions of the frequency distribution; and

outputting the parameter to the display unit for presentation to the subject.

35. The apparatus of claim 34, wherein the display and processing units comprise a personal digital assistant.

36. The apparatus of claim 34, wherein the display unit comprises a computer display.

37. The apparatus of claim 34, wherein the display unit comprises a liquid crystal display and a controller.

38. The method as in claim 34, wherein the parameter comprises an entrainment parameter.

39. The apparatus of claim 38, wherein the presentation includes at least one graphic display of said entrainment parameter.

40. The apparatus of claim 38, wherein the presentation includes at least one graphical element; and wherein the graphical element transitions toward a goal in response to an increasing entrainment parameter value, and transitions away from the goal in response to a decreasing entrainment parameter value.

41. The apparatus of claim 38, wherein the sampling circuit comprises a pressure sensitive device.

42. The apparatus of claim 38, wherein the sampling circuit comprises a receiver unit to sense the blood pressure of the subject at a selected pressure point.

43. The apparatus of claim 38, wherein the sampling circuit comprises a plethysmographic sensor.

44. The apparatus of claim 38, wherein the sampling circuit comprises a blood pressure monitor.

45. The apparatus of claim 38, wherein the sampling circuit comprises a heart rate monitor.

46. The apparatus of claim 38, wherein the sampling circuit comprises an electrocardiograph.

47. A method, comprising:

receiving heart rate variability information, the heart rate variability information comprising the time intervals between each heart beat of a plurality of heart beats of a subject during a predetermined time period;

expressing the heart rate variability as a function of frequency;

determining the power of said heart rate variability over a first range of frequencies;

selecting a power peak of said heart rate variability corresponding to said first range of frequencies;

calculating a parameter relating the power in said selected power peak to the power in said heart rate variability over a second range of frequencies; and

presenting the parameter to the subject.

48. A computer program product, comprising:

a computer usable medium having computer program code embodied therein, the computer program product having:

computer readable program code to sample a plurality of heart beats of a subject;

computer readable program code to obtain a heart rate variability of the plurality of heart beats;

computer readable program code to determine a distribution of frequencies in the heart rate variability and to select a peak frequency;

computer readable program code to determine: a value of energy of said heart rate variability corresponding to said peak frequency (E.sub.peak), a value of energy of said heart rate variability below said peak frequency (E.sub.below), and a value of energy of said heart rate variability above said peak frequency (E.sub.above);

computer readable program code to determine a ratio of E.sub.peak to E.sub.below and E.sub.above ; and

computer readable program code to provide to the subject, in a first presentation format, a representation of a first parameter corresponding to said ratio.

49. An apparatus, comprising:

a first circuit to sample a plurality of heart beats of a subject;

a second circuit to determine a heart rate variability of the plurality of heart beats and to determine the time interval between each heart beat in the plurality of heart beats;

a third circuit to determine a frequency distribution of the heart rate variability, the frequency distribution having at least one peak frequency representative of a range of frequencies;

a fourth circuit to calculate a first parameter of the frequency distribution based on a ratio of the area under the at least one peak to the area under the remaining portions of the frequency distribution; and

an output circuit to display the first parameter in a first presentation format.

50. The apparatus of claim 49, wherein the first circuit is a pressure sensitive apparatus.

51. The apparatus of claim 45, wherein the first circuit is a plethysmographic sensor.

52. A method to evaluate heart rate variability, comprising:

(a) sampling a plurality of heart rate beats of a subject;

(b) determining a heart rate variability of said subject;

(c) repeating (a) and (b) to provide a parameter that is based on a ratio of a variable peak of a distribution to the remaining portions of the distribution.

(d) providing said parameter corresponding to said heart rate variability to said subject;

(e) reinforcing a positive emotional state in said subject using said parameter;

53. The method of claim 52, wherein reinforcing the positive emotional state comprises approaching the positive emotional state by updating said parameter, where said updating causes said parameter to approach a value associated with a positive emotional state.

54. The method of claim 53, wherein reinforcing the positive emotional state further comprises maintaining the positive emotional state by maintaining the value of said parameter for a predetermined period of time.

55. The method of claim 52, wherein determining the heart rate variability of said subject comprises:

expressing the variability as a function of frequencies;

determining a distribution of frequencies of the variability;

selecting a peak frequency of the distribution of frequencies;

determining a value of energy of the variability corresponding to said peak frequency;

determining a value of energy of the variability below said peak frequency and a value of energy of the variability above said peak frequency;

determining a ratio of said value of energy corresponding to said peak frequency, to the product of: the value of the energy below said peak frequency and the value of the energy above said peak frequency.

56. The method of claim 55, wherein the parameter corresponding to said heart rate variability is based on said ratio.

Description

FIELD OF THE INVENTION

The present invention relates generally to the evaluation of heart rate variability, and specifically to the analysis of the power spectrum distribution thereof.

BACKGROUND OF THE INVENTION

With the growing complexity of life, the relation between physiological conditions and emotional health becomes of increasing interest. Many studies have shown that stress and other emotional factors increase the risk of disease, reduce performance and productivity and severely restrict the quality of life. To this end, the medical communities around the world continually seek remedies and preventive plans. Recently a focus on the self-regulation of systems within the body has led to research in the areas of biofeedback, etc.

In the last 25 years, a variety of new techniques have been introduced as alternatives to more traditional psychotherapies or pharmaceutical interventions for improving mental and/or emotional imbalances. In addition to the more psychological approaches like cognitive re-structuring and neuro-linguistic programming, psychologists have employed several techniques from Eastern cultures to "still the mind" during focused meditation. In yoga, for example, one generally focuses on the breath or parts of the brain, whereas in qigong one focuses on the "dan tien" point (below the navel). In a Freeze Frame R.T.M. (FF) technique, developed by the Institute of Heart Math in Boulder Creek, Calif., one focuses attention on the area around the heart. All these techniques focus attention upon areas of the body which are known to contain separate but interacting groups of neuronal processing centers, and biological oscillators with which they interact. The heart, brain, and the intestines contain biological oscillators known as pacemaker cells. By intentionally focusing attention on any one of these oscillator systems, one can alter its rhythms. This is at least true for the brain (meditation), yogic breathing (respiration), the heart (FF), and most likely the gut (qigong), since it is also regulated by the autonomic nervous system (ANS). The body also contains other oscillating systems such as the smooth muscles of the vascular system. We have previously shown that this system, measured by recording pulse transit time (PTT), as well as the brain, measured by an electroencephalograph (EEG), the heart, measured by heart rate variability (HRV), and the respiration system, measured by the respiration rate, can all entrain. Furthermore, they all synchronize to a frequency varying around 0.1 Hertz (Hz). Thus, one can intentionally bring these systems, acting as coupled biological oscillators, into synchronize with each other.

The FF technique is a self-management technique by which one focuses on the heart to disengage from moment-to-moment mental and emotional reactions. A study utilizing the FF technique in a psychological intervention program with HIV-positive subjects resulted in significant reductions in life-stress, state and trait anxiety levels, and self-assessed physical symptoms. Two other studies with healthy individuals using the FF technique to enhance positive emotional states showed increased salivary IgA and increased sympathovagal balance. Increased sympathovagal balance is known to protect against detrimental

physiological effects associated with overactive sympathetic outflow from the brain. Other studies have shown the techniques to be effective in improving autonomic balance and decreasing the stress hormone cortisol and increasing DHEA, improving glycemic regulation in diabetics, reducing blood pressure in hypertensive individuals and significantly reducing psychological stressors such as anxiety, depression and fatigue which overwhelm in many diverse populations.

Sympathovagal balance has been measured using various techniques. For example, individuals can be trained to consciously control their heart rate using biofeedback techniques. However, the enhanced parasympathetic activity is probably mediated through control of respiration. Neutral ***hypnosis*** and operant conditioning of heart rate have been demonstrated to decrease in the sympathetic/parasympathetic ratio by increasing parasympathetic activity independent of controlled breathing techniques. The FF technique does not require biofeedback equipment nor does it require conscious control of respiration although a short breathing protocol is used this technique. Our results suggest that emotional experiences play a role in determining sympathovagal balance independent of heart rate and respiration. The shifts in sympathovagal balance toward increased low-frequency (LF) and high frequency (HF) power (measures of heart rate variability) were physiological manifestations of experiencing the emotional state of appreciation. The FF technique focuses on genuinely experiencing the feelings of sincere appreciation or love, in contrast to visualizing or recalling a previous positive emotional experience.

The results of our studies indicate that relatively short periods of practice of the FF technique and other tools developed by the Institute of Heart Math leads to either an "entrainment" or "internal coherence" mode of heart function (described in greater detail below). Most subjects who are able to maintain these states report that the intrusion of random thoughts is greatly reduced and that it is accompanied by feelings of deep inner peace and heightened intuitive awareness.

We also observed that positive emotional states, which lead to the entrainment mode, generated marked changes in the dynamic beating patterns of the heart. A method for quantifying and analyzing and quantifying these heart rhythms is called analysis of heart rate variability (HRV). The normal resting heart rate in healthy individuals varies dynamically from moment to moment. Heart rate variability, which is derived from the electrocardiogram (ECG) or pulse, is a measure of these naturally occurring beat-to-beat changes in heart rate and is an important indicator of health and fitness. HRV is influenced by a variety of factors, including physical movement, sleep and mental and activity, and is particularly responsive to stress and changes in emotional state. The analysis of HRV can provide important information relative to the function and balance of the autonomic nervous system, as it can distinguish sympathetic from parasympathetic regulation of heart rate. Decreased HRV is also a powerful predictor of future heart disease, increased risk of sudden death, as well as all-cause mortality.

Frequency domain analysis decomposes the heart rate tachogram or waveform into its individual frequency components and quantifies them in terms of their relative intensity, in terms of power spectral density (PSD). By applying spectral analysis techniques to the HRV waveform, its different frequency components, which represent the activity of the sympathetic or parasympathetic branches of the autonomic nervous system, can be discerned. The HRV power spectrum is divided into three frequency ranges or bands: very low frequency (VLF), 0.033 to 0.04 Hz; low frequency (LF), 0.04 to 0.15 Hz; and high frequency (HF), 0.15 to 0.4 Hz. The high frequency (HF) band is widely accepted as a measure of parasympathetic or vagal activity. The peak in this band corresponds to the heart rate variations related to the respiratory cycle, commonly referred to as respiratory sinus arrhythmia. Reduced parasympathetic activity has been found in individuals under mental or emotional stress, suffering from panic, anxiety or worry and depression.

The low frequency (LF) region can reflect both sympathetic and parasympathetic activity, especially in short-term recordings. Parasympathetic influences are particularly present when respiration rates are below 7 breaths per minute or when an individual takes a deep breath. This region is also called the "baroreceptor range" as it also reflects baroreceptor activity and at times blood pressure wave activity and resonance.

When an individual's HRV pattern and respiration are synchronized or entrained, as can happen spontaneously in states of deep relaxation, sleep or when using techniques to facilitate autonomic balance

such as Freeze-Frame and the Heart Lock-In, the frequency at which the entrainment occurs is often near 0.1 Hertz. This falls in the center of the LF band and could be misinterpreted as a large increase in sympathetic activity, when in reality it is primarily due to an increase in parasympathetic activity and vascular resonance. Sophisticated modeling techniques have shown that in normal states, about 50% of the total power in the LF band is explained by neural signals impinging on the sinus node which are generated at a central level, and the majority of the remaining power is due to resonance in the arterial pressure regulation feedback loop. The sympathetic system does not appear to produce rhythms that appear much above frequencies of 0.1 Hz, while the parasympathetic can be observed to operate down to frequencies of 0.05 Hz. Thus, in individuals who have periods of slow respiration rate, parasympathetic activity is modulating the heart rhythms at a frequency that is in the LF band. Therefore, in order to discriminate which of the ANS branches is pumping power into the LF region, both respiration and PTT should be simultaneously recorded and considered.

The increase in LF power while in the entrainment mode may represent increased baroreceptor afferent activity. It has been shown that the LF band reflects increased afferent activity of baroreceptors. The LF band has indeed been shown to reflect baroreceptor reflex sensitivity and is affected by physiological states. Increased baroreceptor activity is known to inhibit sympathetic outflow from the brain to peripheral vascular beds, whereas stress increases sympathetic outflow and inhibits baroreflex activity. The increase in LF power seen during the state of deep sustained appreciation may have important implications for the control of hypertension, since baroreflex sensitivity is reduced in these individuals. There is a noticeable and obvious transition after the FF intervention to the entrainment mode which can be seen in the HRV waveforms and PSD data. In addition, many subjects report that they are able to use the FF technique while they were in a "tense" conversation with someone and starting to react. Even in these conditions, the HRV waveforms indicate that they were able to shift to and maintain the entrainment state.

From tachogram data, it can be seen that, as one moves from a state of frustration to one of sincere appreciation a transition occurs in the waveforms from a noisy wave of large amplitude to a non-harmonic wave form of similar amplitude (entrainment). We have also identified an additional state we call "amplified peace" to indicate this special emotional state of very deep peace and inner harmony. In this state, the HRV waveform becomes a smaller amplitude wave (internal coherence). In general, the transition in the frequency domain (PSD) is from a wide-band spectrum of moderate amplitude to a narrow-band spectrum around 0.1 Hz of very large amplitude (entrainment) and then to a wide-band spectrum of very small amplitude (internal coherence). In most individuals, small to near-zero HRV, as just described, is an indicator of a potentially pathological condition or aging because it connotes loss of flexibility of the heart to change in rate or a decreased flow of information in the ANS. However, in trained subjects, it is an indication of exceptional self-management of their emotions and autonomic nervous system because their HRV is normally large and the shift into the internal coherence mode is a result of intentionally entering the amplified peace state. This is very different from a pathological condition underlying lowered HRV (in such cases the HRV is always low). The connection between emotional states and HRV could possibly account for the occasional observation of low HRV in otherwise healthy individuals which has detracted from the clinical utility of HRV analysis for unequivocally predicting disease.

During the condition of internal coherence, the electromagnetic energy field produced by the heart, as seen in a fast Fourier transform (FFT) analysis of an electrocardiogram (ECG) signal, is a clear example of a coherent electromagnetic field. Recent advances in the understanding of the interaction between coherent signals and noise in nonlinear systems has resulted in the prediction that these nonthermal, coherent electromagnetic signals may be detected by cells. Further evidence suggests that coherent electromagnetic fields may have important implications for cellular function. For example, it has been recently demonstrated that nonthermal, extremely low frequency electromagnetic signals may affect intracellular calcium signaling. In addition, coherent electromagnetic fields have been shown to produce substantially greater cellular effects on enzymatic pathways, such as ornithine decarboxylase activity, than incoherent signals. This fact suggests that the state of internal coherence may also affect cellular function and provides a potential link between emotional states, autonomic function, HRV and cellular processes.

Conscious focus of attention and/or positive emotions has been shown to significantly influence HRV and PSD. The results of our research support previous work and suggest that psychological interventions which minimize negative and enhance positive emotional states may significantly impact cardiovascular function.

The results of work in this area demonstrate that sincere feelings of appreciation produce a power spectral shift toward LF and HF activity and imply that 1) the major centers of the body containing biological oscillators can act as coupled electrical oscillators, 2) these oscillators can be brought into synchronized modes of operation via mental and emotional self-control, and 3) the effects on the body of such synchronization are correlated with significant shifts in perception and cardiovascular function. It is suggested that positive emotions lead to alterations in sympathovagal balance which may be beneficial in the treatment of hypertension and reduce the likelihood of sudden death in patients with congestive heart failure and coronary artery disease. There is a need to provide quantified information regarding the balance of the ANS which is easily used and does not require extensive biofeedback equipment. There is further a need for a mobile method of monitoring this balance for use in everyday life.

BRIEF DESCRIPTION OF THE DRAWINGS

The file of this patent contains at least one drawing executed in color. Copies of this patent with color drawing(s) will be provided by the Patent & Trademark Office upon request and payment of the necessary fee. The present invention may be more fully understood by a description of certain preferred embodiments in conjunction with the attached drawings in which:

FIG. 1 illustrates in highly diagrammatic form the way in which the sympathetic and parasympathetic subsystems of the autonomic nervous system (ANS) of a higher organism are believed to mutually affect heart rate variability (HRV);

FIG. 2 illustrates a power spectrum distribution (PSD) of the HRV determined in accordance with one embodiment of the present invention;

FIG. 3 illustrates, for each of four distinct ANS states, the characteristic time domain HRV and the corresponding PSD;

FIGS. 4A to 4C illustrate a subject's time domain HRV, pulse transit time, and respiration rates, and the corresponding PSDs, before and after the subject consciously performs an emotional self-regulation protocol specifically designed to improve the balance of the ANS;

FIG. 5 illustrates an apparatus for measuring HRV and calculating the degree of entrainment, which as previously described is also an indicator of increased autonomic balance (AB) according to one embodiment of the present invention;

FIG. 6 illustrates one format for simultaneously displaying HRV, and the entrainment ratio, as determined in accordance with the present invention;

FIGS. 7A-7E illustrate in flow chart form a process for calculating AB in accordance with the present invention;

FIGS. 8A-8F illustrate the steps of the process of FIGS. 7A-7E;

FIG. 9 illustrates a hand-held apparatus for calculating AB; and

FIGS. 10-12 illustrate three different sequences of graphic displays which provide animated visual representations of the achieved level of entrainment, as determined according to one embodiment of the present invention.

DEFINITIONS AND METHODOLOGY

In the following description of the invention and its various aspects and embodiments, we will be using certain terms. For convenience of reference, our preferred definitions thereof are as follows:

As noted above, Freeze-Frame.RTM. is one of the tools used in the Heart Math system of self-management. It consists of consciously disengaging the mental and emotional reactions to either external or internal events and then shifting the center of attention from the mind and emotions to the physical area around the heart while focusing on a positive emotion such as love or appreciation. This tool thus allows the individual to shift focus of attention from the mind to the heart. Such a shift results in a wider and more objective perception in the moment.

As used hereafter, the term "appreciation" shall mean the state in which the subject has clear perception or recognition of the feelings of sincere or active appreciation for someone or something. It is the heart-felt feeling of appreciation that is associated with the HRV changes, as contrasted with the mental concept of appreciation which does not appear to produce such HRV changes. The term "amplified peace" shall mean an inner state in which a much deeper state of peace and centeredness is felt than is normally experienced. One also has a sense of standing on the threshold of a new dimension of awareness in this state. There is a sense of inner equilibrium and an awareness that one has accessed a new domain of intuition. As with any experiential state, it is difficult to find words that adequately describe it. This is not a state that one normally walks around in but rather enters for relativity short time periods. However, with practice at staying focused in the heart, the ratios of time in this state can be increased. It can also be described as similar to those moments that one sometimes has when at the beach or in the forest when one feels an especially deep contact with nature or with oneself that is beyond one's normal experience. It is often in these moments that we find the answers to the deeper issues or problems that we experience.

By the term "biological oscillators" we mean cells or groups of cells that produce rhythmic oscillation. When the instantaneous systemic arterial pressure is continuously recorded, fluctuations with each heart beat and with each breath are seen. This rhythmic activity in the autonomic nervous system appears to be supported by at least three biological oscillator systems: 1) centrogenic rhythms in brainstem networks with facultative coupling (entrainment) with the respiratory oscillator, 2) the baroreceptor feedback network, and 3) the autorhythmicity of the vascular smooth muscle. The fact that each of the oscillators can develop different frequencies and that the phase-lags between the oscillations may vary easily explains the general experience that blood pressure waves are quite variable and unpredictable. The existence of several oscillators with similar basic frequencies enables synchronization and entrainment between oscillators. Thus, we can assume that states of regular and steady blood pressure waves are the expression of the entrained action of the complex multi-oscillatory system.

Arterial pulse transit time (PTT) is a measure of the speed of travel of the arterial pulse wave from the heart to some peripheral recording site. It is used as a non-invasive method to monitor the elasticity of the artery walls and to indicate changes in blood pressure on a beat-to-beat basis. The arterial pressure pulse is a wave of pressure which passes rapidly along the arterial system. The pulse wave velocity (4 to 5 m/sec) is much faster than the velocity of blood flow (<0.5 m/sec). The pulse wave velocity varies directly with pressure-related changes in the elasticity of the arterial wall. The more rigid or contracted the arterial wall, the faster the wave velocity. From this, it follows that PTT should vary inversely with blood pressure. Common estimates of the magnitude of this effect indicate that PTT varies by about 1 ms per mm Hg change in pressure.

We will also be describing the results of certain studies conducted in our laboratories. In order to more fully appreciate the nature and conditions of such studies, we wish to describe our key procedures:

For in-the-lab studies, preselected individuals trained in the FF technique are seated in straight, high backed chairs to minimize postural changes, fitted with ECG electrodes, and then given a 10-minute rest period. ECG measurements are recorded during the rest period and the last 5 minutes are used as a baseline period.

Recordings are continued while the subjects are asked to utilize the FF technique and consciously focus on a loving state for the next 5 minutes. A selected number of subjects are assessed at each session. After informed consent is obtained, and prior to each session, subjects are asked to refrain from talking, falling asleep, exaggerated body movements or intentionally altering their respiration. Subjects are carefully monitored to ensure there are no exaggerated respiratory or postural changes during the session.

The same subjects are asked to wear ambulatory ECG recorders for a 24-hour period which includes a normal business day in their work place. They are asked to use the FF technique on at least three separate occasions, when they are feeling stress or out of balance. They are instructed to press the recorder's marker button each time they use the FF technique. This portion of a study is designed to assess ANS balance in a real-life stressful environment and to determine the efficacy of the FF technique to consciously improve sympathovagal balance. In general, Ag/AgCl disposable electrodes are used for all bipolar ECG measurements. The positive electrode is located on the left side at the 6th rib, and the reference are placed in the right supraclavicular fossa. Grass model 7P4 amplifiers are used for ECG amplification. Respiration is monitored with a Resp-EZ piezoelectric belt around the chest. A Grass model 80 cardiac microphone is used when the blood pressure wave is recorded for calculation of pulse transit time (PTT). The PTT interval is the time between the peak of the R-wave of the ECG and the appearance of the pulse wave associated with that same cardiac contraction at the index finger on the left hand. In the out-of-lab studies, ambulatory ECG recording is accomplished with a Del Mar Holter recording system model 363.

During the data analysis phase, the HRV waveform is in the form of an R--R interval tachogram. The spectral analysis of this signal is obtained from the successive discrete series of R--R duration values taken from the ECG signal sampled at 256 Hz and FFTed. All data from an in-the-lab study is digitized by a Bio Pac 16 bit digitizer and software system. All post analysis, including FFTs, PSD and time domain measurements are done with the DADiSP/32 digital signal processing software. All FF responses from the Holter tape data which are artifact-free are used for analysis.

For an in-lab study, HRV data is analyzed for 5 minutes before and for 5 minutes during the practice of FF. The time domain traces are analyzed by obtaining the overall mean heart rate for both 5-minute periods and calculating the standard deviation around that mean. FFTs of the time domain data are analyzed by dividing the power spectra into three frequency regions: VLF (0.01 to 0.05 Hz), LF (0.05 to 0.15 Hz) and HF (0.15 to 0.5 Hz). The integral of the total power in each of these regions, the total power over all regions (VLF+LF+HF), the VLF/HF ratio and the LF/(VLF+HF) ratio are calculated for each individual in the baseline and FF periods. The following criteria are used to classify the subjects into two subgroups:

Entrainment mode, characterized by a very narrow band high amplitude signal in the LF region of the HRV power spectrum, with no other significant peaks in the VLF or HF region, and a relatively harmonic signal (sine wave-like), in the time domain trace of the HRV data; and

Internal coherence mode, characterized by an intentionally produced very low amplitude signal across the entire HRV power spectrum as compared to the baseline. The final discriminator of this mode is the ECG amplitude spectrum, where the first seven or so harmonics of the fundamental frequency are clearly displayed, with very few intermediate frequencies having a significant amplitude.

In general, the raw data baseline values to emotional expression values are analyzed for significance by using the Wilcoxon Signed Rank Test (T) utilizing the sum of the ranks for positive and negative differences for each group. Wilcoxon p values were taken from the table of critical values for the Wilcoxon Signed Rank Test (T). Typically, when a group is analyzed as a whole there will be no change in heart rate or heart rate standard deviation during the FF period. However, the power spectral analysis usually shows a significant decrease in the VLF/HF ratio and significant increases in LF power ($p<0.01$), HF power ($p<0.01$) and in the LF/(VLF+HF) ratio ($p<0.01$), where p is probability.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides a method of measuring certain body rhythms, and then analyzing this information to indirectly determine the entrainment state which is also reflective of balance between the sympathetic and parasympathetic portions of the autonomic nervous system.

According to one embodiment of the present invention, a method includes the steps of sampling a heart beat of a subject, determining a heart rate variability (HRV) of the heart beat as a function of time (HRV(t)), expressing HRV(t) as a function of frequency (HRV(f)), determining a distribution of frequencies in HRV(f), selecting a peak frequency of HRV(f), determining the energy in said peak frequency (E.sub.peak), determining the energy in frequencies below said peak frequency (E.sub.below) and above said peak frequency (E.sub.above), determining a ratio of E.sub.peak to E.sub.below and E.sub.above, and providing to the subject, in a first presentation format, a representation of a first parameter related to said ratio.

According to one aspect of the present invention, an apparatus includes sampling means adapted to sample a heart beat of a subject for a first predetermined time period, a display unit, a processing unit coupled to the sampling means and the display unit, wherein the processing unit is adapted to determine a heart rate variability (HRV) of the heart rate by measuring the interval between each beat during the first predetermined time period, wherein the HRV is a function of time, determine a frequency distribution of the HRV, the frequency distribution having at least one peak, the at least one peak including a first number of frequencies, calculate a first parameter of the frequency distribution of the HRV, wherein the first parameter is a ratio of the area under the at least one peak to the area under the rest of the frequency distribution, and outputting the first parameter to the display unit for presentation to the subject.

According to one aspect of the present invention, a method includes the steps of receiving heart rate variability (HRV) information, the HRV information comprising the time intervals between each heart beat of a subject during a first predetermined time period, expressing the HRV as a function of frequency, determining the power in said HRV over a first range of frequencies, selecting a power peak in said first range of frequencies, calculating a first parameter relating the power in said selected power peak to the power in said HRV over a second range of frequencies, presenting the first parameter to the subject.

A greatly simplified overview of some of the signals and functions of the human body are illustrated in FIG. 1. This figure is not intended to be inclusive of all of the functions of the autonomic nervous system of a human, but rather provides an exemplar of those signals and functions which are currently believed to be directly related to the operation of the heart. As illustrated in FIG. 1, the brainstem 5 receives various input signals, consisting of control and status information, from throughout the body. Thus, for example, the brainstem 5 receives information relating to respiration, blood pressure, cardiac output, thermoregulation, and reninangiotensin, as well as numerous other system inputs. Functioning as the control center of the central nervous system (CNS), the brainstem 5 continuously summarizes (.SIGMA.) all of this afferent information and synthesizes appropriate outputs to the heart 7 via either the sympathetic or parasympathetic subsystems. Research has demonstrated that the output control signals of the sympathetic system, which is responsible for increased heart rate and blood pressure, such as in response to perceived danger, tend to be relatively low frequency (LF) rhythms. In contrast, the parasympathetic system, which operates to limit or suppress the effects of the sympathetic system, tend to be relatively high frequency (HF) signals. In general, the parasympathetic system tends to produce a quite, relaxed state whereas the sympathetic a more active, excited state. For example, on inhalation, the parasympathetic system is inhibited and the sympathetic system is more active, resulting in an increase in heart rate. In contrast, on exhalation, the parasympathetic system is active, resulting in a stronger parasympathetic signal to the heart and heart rate is decreased. The brainstem 5 also receives afferent information from the baroreceptor network, and other receptor neurons, located throughout the heart and in the aortic arch of the heart 7, which are sensitive to stretch (pressure) and chemical changes within the heart 7. As the heart 7 beats, and its walls swell, various baroreceptors are triggered, providing signals as a function of the heart beat, where increased heart rate is generally reflected by increased baroreceptor signals.

In response to the parasympathetic and sympathetic control signals from the brainstem 5, the heart rate 7 varies. The sinus node (SN) of the heart 7 is a group of cells which act as a natural pacemaker to initiate the onset of the heart beat at a rate which is non-linearly related to the relative strengths of these autonomic control signals. It has been determined that the heart beats with a certain variability, where the time between beats is not constant but rather varies according to the shifting relative balance between the parasympathetic and sympathetic signals. A typical heart rate variability (HRV) waveform, is illustrated in FIG. 1. Note that, as illustrated, the HRV is not constant but changes with time, while still displaying a generally cyclical pattern.

FIG. 2 illustrates, by way of example, the transformation of an HRV waveform, most conveniently measured in the time domain, into the frequency domain. Such a transformation can be accomplished by standard digital signal processing (DSP) methods, such as the well-known fast Fourier transform (FFT). This results in a type of histogram that measures the relative amplitudes for the different frequency components (rhythmic patterns) in the time domain waveform. Fast real-time rhythms map into peaks in the high frequency portion (right side) of the spectrum, whereas slow rhythms appear on the left, low frequency side. Any given peak may be due to a single rhythmic process or to a mixture of rhythms with very similar frequencies. The latter will contribute to both the height of a peak and increase its width. In the case of heart rate analysis, different frequencies (peaks) present in the power spectrum are due to cyclic fluctuations in autonomic activity (i.e., sympathetic and parasympathetic).

Once in the frequency domain, the power spectrum distribution (PSD) is calculated using known DSP techniques, and plotted on the vertical axis with frequency on the horizontal axis. In general, the power spectrum of a waveform is a plot of the wave amplitude for each component squared, as a function of the frequency of that component. Such a plot reveals the wave power, in units of energy per hertz, present in a small frequency range as a function of frequency, f. In the present example, the units of PSD are given as a power measurement, specifically squared beats-per-minute per second (BPM.sup.2 /Hz, where Hertz (Hz) is frequency or cycles-per-second).

It is generally known that the mental and emotional state of a human has significant effects upon ANS activity, and, in particular, the balance between the parasympathetic and sympathetic subsystems. Such effects can be clearly seen in the HRV waveforms. We have found that, in general, agitation or fear causes disorder, whereas emotions such as appreciation or love results in increased order. The latter state has been shown to encourage coupling between respiration and the HRV as well as other oscillatory systems in the body. For purposes of the present description, we shall refer to the state in which the HRV waveform and respiratory waveform are operating at the same rate and near the 0.1 hz frequency and appear as a sine wave as entrainment. As this mode of heart function has been documented to correlate with increased balance between the sympathetic and parasympathetic branches of the nervous system it is also referred to as a state of "autonomic balance" (AB). The present invention is specifically intended to assist or facilitate a user thereof in achieving entrainment and AB at will. Once achieved, various well documented, beneficial physiological processes will be enhanced. Several embodiments of the present invention, discussed below, are specially designed to provide visual feedback to the user in a manner which tends to further strengthen and prolong the essential characteristic of entrainment and AB.

Shown in FIG. 3A is the time domain HRV of a subject in various emotional states; FIG. 3B shows the corresponding PSDs. A Baseline condition is considered to be when the subject is in a normal, resting state. A Disordered state is where the subject is feeling agitated emotions such as anger or fear. Note the more irregular nature of this waveform, clearly showing the lower frequency components contributed by the sympathetic system. In contrast, in an entrainment state, the waveform is considerably more regular and orderly. Entrainment is a condition which we have shown can be attained by following a conscious plan or protocol for affecting a positive emotional state, such as appreciation or love.

As defined herein, these terms refer to the mental and emotional state of the individual, and the graphs serve to illustrate the electrophysiological characteristics of two, qualitatively distinct "heart function modes." According to one analysis methodology, the Entrainment Mode is reached when frequency locking occurs between the HRV waveform and other biological oscillators such as respiration. Note that other correlations may be made between the HRV waveform, as well as other parameters of the heart rate and its

variability, and the general state of the subject, including other physiological systems. The correspondence between HRV and the emotional and mental state of the subject is provided herein as an exemplar, as there is a strong, documented relationship. However, alternate embodiments may correlate HRV waveforms with other functions and conditions, and are not limited to those described herein as exemplars, but rather the analysis of the HRV waveform and the correlation with such conditions is achieved with the present invention. Similarly, the correspondence to emotional and mental states is not limited to those illustrated in FIGS. 3A and 3B.

Shown in FIG. 4A are three simultaneously recorded body responses for an individual taken before and after enacting the FF technique. The first recorded body response is HRV, displayed in beats per minute (BPM). The second recorded body response is pulse transit time (PTT), which is measured in seconds. The third recorded body response is respiration, the amplitude of which is measured in millivolts (mV). As shown in FIG. 4A, each of the recorded body responses undergo a dramatic transformation at approximately 300 seconds, the point at which the individual performs the FF technique. At that time entrainment of the HRV, PTT and respiration waveforms is achieved. Such entrainment is characteristic of AB and increased physiological coherence.

Shown in FIG. 4B are the corresponding PSD for each of the recorded body responses of FIG. 4A. Note: the power spectra for each of the recorded body responses has a broad frequency range before performing FF. After performing FF, as illustrated in FIG. 4C, however, the power spectra for each recorded body response has a much narrower frequency range, and in each case the maximum PSD is centered between a frequency of approximately 0.1 Hz and 0.15 Hz. In addition, during entrainment, the maximum PSD for both HRV and PTT is much larger than that recorded before FF.

Shown in FIG. 5 is an entrainment apparatus 10 constructed in accordance with one embodiment of the present invention. In this particular embodiment, entrainment apparatus 10 comprises a photo plethysmographic finger sensor 12 and a computer system 14 having a monitor 15. Photo plethysmographic sensor 12 is electrically coupled to computer system 14 via coupling cable 16.

During operation, an individual's finger 18 is placed in contact with the plethysmographic sensor 12. In this particular embodiment, the sensor 12 includes a strap 20 which is placed over finger 18 to ensure proper contact between finger 18 and sensor 12. The photo plethysmographic sensor 12 detects the pulse wave produced by the heart beat of the individual, by way of finger 18, and sends this information to computer system 14. Computer system 14 collects and analyzes this heart beat data, and determines the individual's level of entrainment. A representation of the attained level of entrainment is displayed on monitor 15.

Shown in FIG. 6 is a display output 22 produced by entrainment apparatus 10 in accordance with one embodiment of the present invention. In this particular embodiment, the individual's heart rate, measured in beats per minute (BPM), is graphically displayed for a selected time period. The individual's accumulated entrainment score for this same time period is graphically displayed in reference to the calculated entrainment zone. In addition, the individual's entrainment ratio and average heart rate are also graphically displayed for this same time period.

FIGS. 7A-7E illustrate a method of calculating an entrainment parameter (EP) according to the preferred embodiment of the present invention. In general, the method involves monitoring the beat-to-beat changes in heart rate, calculating the EP, and presenting a representation of the categorization of the calculated EP. The method begins at start block 30. The process is initialized at step 32, where HRV data is obtained and processed in preparation for the next step. At step 34 an entrainment parameter (EP) and score are calculated. The entrainment parameter is determined by the power distribution of the HRV processed data, and the score is a historical indication of the EP. The EP and score are then presented at step 36, which may involve providing this information to a display terminal. The process continues to decision diamond 38, to determine if the process is to terminate or end. If the process is to end, processing continues to step 40 where the process is terminated. If the process is not to end, process flow returns to block 34.

The process is further detailed in FIG. 7B, where the heart beat is monitored at step 42. This may involve using electrical sensing apparatus, such as an electrocardiograph (ECG), light sensing apparatus, such as

the photo plethysmographic sensor 12, or any other apparatus or means whereby each heart beat can be ascertained substantially in real time. For example, at regular time intervals, say 100 times per second, the output of sensor 12 is sampled and digitized using a conventional analog-to-digital (A/D) converter (not shown). At step 44, the raw samples are stored. This raw data is basically a record of each heart beat and the relative time of its occurrence. The stored raw data can be thought of as comprising inter-beat-interval (IBI) information, from which the time interval between beats can be determined. It is the IBI variation which is generally referred to as "heart rate variability" or simply HRV.

Ravg.sub.i-1 (1-P min)

Note that in monitoring the heart beat, artifacts, such as noise and/or misreads, may have a tendency to disturb the process. An optional step is provided at block 46 where the artifacts and other artificially introduced noise are rejected. This may be done using a conventional DSP artifact rejection technique. Block 46 is further detailed in FIG. 7E, starting at decision diamond 94. Here the current IBI, referred to as IBI.sub.i is compared to an absolute minimum interval between beats (Amin) and to an absolute maximum interval between beats (Amax). Amin and Amax are reflect the actual range within which the human heart beat falls. For example, Amax and Amin indicate that IBI is either too long and too short respectively, and IBI does not normally occur at that value; thus these conditions are used to detect artifacts which are not accurate data. If IBI.sub.i falls between these two extremes processing continues to step 96. If IBI.sub.i does not fall within this range, no further check is made and processing jumps to step 98 for elimination of bad IBI.sub.i data. Note that a running average (Ravg) is calculated for IBI values. A range of Ravg values is determined for each IBI.sub.i and is then used to verify then next value, IBI.sub.i+1. The range of Ravg values is determined as a percentage of the IBI value. For evaluation of IBI.sub.i the range of Ravg values for IBI.sub.i-1 is used. In one embodiment, the range is defined between Rmin.sub.i-1 and Rmax.sub.i-1, where Rmin.sub.i-1 is Ravg.sub.i-1 -30% and Rmax.sub.i-1 is Ravg.sub.i-1 +30%. IBI.sub.i falls within this range if it satisfies the following relationship:

IBI.sub.i.epsilon.[Ravg.sub.i-1 (1-Pmin),Ravg.sub.i-1 (1+Pmax)]

Continuing at step 96, if IBI.sub.i is within this range, processing jumps to step 100. If IBI.sub.i is not within this range, processing continues to step 98 where IBI.sub.i is eliminated as bad data. In a preferred embodiment, if too many errors are encountered, calculation is frozen until sufficient good data is received to warrant continuing. Sufficient good data is indicated by the following relationship:

Amin<.A-inverted..epsilon.[IBI.sub.j,IBI.sub.k]<Amax

wherein IBI includes values IBI.sub.j, . . . IBI.sub.k. At step 100 the running average of IBI.sub.i is calculated as Ravg.sub.i. At step 102 the minimum range of Ravg for IBI.sub.i is calculated as Rmin.sub.i. At step 104 the maximum range of Ravg for IBI.sub.i is calculated as Rmax.sub.i. These values will be used to verify the next IBI value, IBI.sub.i+1. Processing then continues to decision diamond 106 to determine if further IBI processing is to be done, and if so processing returns to decision diamond 94. If not, processing continues to step 48.

At step 48, a conveniently sized segment of the raw data samples, say 64 seconds, is selected, and then linearly interpolated using standard DSP techniques, at step 50. To facilitate discrimination, the raw IBI data points have been scaled by 1000, i.e., converted to milliseconds. The HRV graph shown in FIG. 8A illustrates a representative set of scaled IBI data and the linearly interpolated data points, where the IBI data points are indicated by a black dot and the interpolated data points are indicated by "x."

At step 52, the selected segment of HRV data is demeaned and detrended by subtracting a linear regression least squared fit line (a common DSP technique) to center the waveform with respect to the vertical axis, and to remove any tendency of the waveform to slowly decrease or increase. As illustrated in FIG. 8B, the HRV segment exhibits a decreasing trend over time, as can be seen from the superimposed linear regression line.

As will be clear to those skilled in this art, the segmentation process performed in step 48 has the undesirable side effect of convolving the HRV data with a square wave, and thus tends to introduce noise at the boundaries between each segment. For example, where the number of data points in each segment is 128, there will be significant noise introduced between sample 128 and 129. A well known DSP technique, called Hanning windowing, effectively weights the center data points of the segment more heavily than those at the edges to reduce the effects of this noise. As used in the present embodiment, the Hanning window equation uses a cosine taper as follows:

W(n)=0.5-0.5 cos(2.pi./N*n)

where N is the total number of data points in the segment, and n=[1,N-1]. At step 54, such a Hanning window is applied to the detrended data to eliminate the segmentation noise. As illustrated in FIG. 8C, the resultant HRV waveform is zero-referenced and exhibits no trend. It should be recognized that various other alternate methods or techniques can be employed to remove such noise as may have been introduced as artifacts of the recording, interpolating or segmentation processes.

At step 56, a user-established system control variable is examined to determine what type of spectrum analysis needs to be performed. If a magnitude spectrum is selected, an FFT is performed at step 58 to generate a magnitude spectrum. On the other hand, if a power spectrum is selected, the PSD of the detrended data is calculated, in step 60, using a standard FFT. This PSD is then normalized, at step 62, by dividing by the length of the segment in seconds (see, step 33). For example, if the number of data points was selected to be 128 points, the PSD is divided by 64, the duration of the segment, i.e., 64 seconds. This makes the units of power ms.sup.2 /Hz. Note that such a normalization process is not necessary if the magnitude spectrum is used.

The result after step 58 or 62 is illustrated in FIG. 8D, where the horizontal axis represents frequency (Hz) and the vertical axis represents power (ms.sup.2 /Hz). Note that HRV is portrayed in the form of a bar chart, wherein each bar represents the power contained in the HRV signal within a respective, narrow band of frequencies comprising a "bin," as illustrated in FIG. 8D. For convenience of reference, the bins are logically numbered sequentially, starting with bin 1 on the far left, and continuing to bin 64 on the far right, where each bin corresponds to a frequency. At step 64, a pair of user-selected system control variables is examined to select the range of bins from which the highest local peak will be selected. As it can be anticipated that the desired peak will be within a certain frequency range, it is neither necessary nor reasonable to consider the entire PSD. According to one embodiment, the starting search bin is selected by a variable "search bin start" (SBS), while the ending search bin is selected by a variable "search bin end" (SBE). For the example illustrated in FIG. 8D, the SBS is equal to 3 and the SBE is equal to 18, comprising the search range of bins 3, 4, 5, . . . , 18.

At step 66 (FIG. 7C), a search is made, within the bin range selected in step 64, for all local peaks in the HRV spectrum, each being represented by the single bin having the highest power level, i.e., the bin underneath the respective peak. Next, the bin representing the highest peak within the bin range is selected. In the example shown in FIG. 8D, there are three peaks within the bin range of bin 3 to bin 18. The highest peak is located at bin 5. Note that the first, and absolute largest, peak is represented by bin 2, so bin 3 is not considered to represent a peak.

Once the highest peak within the selected bin range has been determined, an entrainment parameter (EP) is calculated to indicate the energy of the wave in the entrainment area in relation to the total energy in the PSD. To calculate the EP, at step 66, the "width" of the peak is determined from a pair of user-selected variables: P1, which defines the number of bins to the left of the peak bin, and P2, which defines the number of bins to the right of the peak bin. Note that P1 and P2 may be different if an asymmetric distribution is desired. The total energy of the peak, Psum, is then calculated as the sum of the power values of all bins in the range [(Peak-P1), (Peak+P2)] at step 68.

Next, at step 70, the total power below the peak pulse (Pbelow) is calculated. The relevant range is determined by a pair of user-selected variables: B1 and B2. The value of Pbelow is a summation of the

power values of all bins in the range [B1, B2]. Similarly, at step 72, the total power above the peak (Pabove) is calculated, within a relevant range determined by a pair of user-selected variables: A1 and A2. The value of Pabove is a summation of the power values of all bins in the range [A1, A2]. This is clearly illustrated in FIG. 8E. Finally, at step 74, EP is calculated according to the following equation:

EP=(Psum/Pbelow)*(Psum/Pabove).

At step 76, the EP value is then "scored" according to a plurality of user-selected entrainment level thresholds. For example, three stages of entrainment can be conveniently defined using only two variables, NLT1 and NLT2, each of which represents a respective value of EP. In such an embodiment, for EP below NLT1, the subject may be considered as not having achieved significant entrainment, and is given a score of "0". For EP above NLT1 and below NLT2, the subject is considered to have achieved mild entrainment, and is given a score of "1". For EP above NLT2, the subject is considered to have achieved full entrainment, and is given a score of "2". Of course, other criteria may be used to determine achieved entrainment level.

In general, maximum entrainment is reached when the peak pulse contains a very large portion of the total power. A particularly high EP is illustrated in FIG. 8F, where Psum is great compared to both Pbelow and Pabove. This indicates that most of the power is concentrated at this small group of frequencies. Thus, EP tends to emphasize the condition wherein the majority of the power is concentrated within a selected, relatively narrow range of frequency bins. On the other hand, it is certainly possible to devise alternate calculations which will reflect concentration of significant levels of power distributed over a broader range of frequency bins.

At step 78, the most recently calculated score is recorded and an accumulated score is calculated based on prior, historical scores, referred to as accumulated scores. At step 36, the actual EP result and accumulated scores are prepared for presentation to the user as a system output. This preparation involves steps such as 76 and 78.

At decision step 80, it is determined if the user desires this information to be simply output on a status screen of the computer, in a presentation format such as that shown by way of example in FIG. 6. In the preferred embodiment of the present invention, the user can elect to have this information control a game, such as the balloon game shown in FIG. 10. If the user so selects, at decision step 80, EP is compared to a various threshold levels and assigned an EP score accordingly.

According to one embodiment, EP is assigned a score selected from the set of {0, 1, 2}. The score values have the following significance:

EP Score	EP value	Entrainment
0	EP < level1	Low
1	level1 < EP .ltoreq. level2	Medium
2	level2 < EP	High

According to one embodiment, level1 is set to 0.9, and level2 is set to 7.0, to provide a convenient distribution. In a computer program implementing this embodiment, these levels are provided as floating point values. Alternate embodiments may use additional levels, or may use two levels.

If the user selects a nonstatic format, processing continues to step 84 of FIG. 7D, where the accumulated score, "Ascore," is calculated based on the historical information of the EP and EP score values. Ascore is then calculated based on the score value, and the previous score value (prescore). This calculation is performed according to the following scheme:

EP Score	EP Prescore	Ascore(i)
2	0	Ascore(i - 1) + 1
1	0	Ascore(i - 1) + 1
0	0	Ascore(i - 1) - 2
2	1	Ascore(i - 1) + 1

1	1	Ascore(i - 1) + 1
0	1	Ascore(i - 1) - 1
2	2	Ascore(i - 1) + 2
1	2	Ascore(i - 1) + 1
0	2	Ascore(i - 1) - 2

According to one embodiment, Ascore has values in the range of {0, 1, 2, . . . 100}, however alternate embodiments may use an alternate range of values. The above scheme provides scaled response to the EP, where Ascore slowly increases while remaining in medium entrainment, but quickly increases while remaining in high entrainment. Similarly, this scheme provides a quick decrease while remaining in the low entrainment.

Ascore information may be then be used to provide a graphical display. One embodiment, illustrated in FIG. 7D begins at decision diamond 84 to determine the value of Ascore.sub.i with respect to Ascore.sub.i-1. Ascore.sub.i is the current calculated value of Ascore, and Ascore.sub.i-1 is the previous calculated value of Ascore.

If Ascore.sub.i is equal to Ascore.sub.i-1, processing returns to step 38 without effecting any change in the graphical display. Note that alternate embodiments may include additional steps which provide this information to the display. If A score of " Sub-I" is greater than Ascore.sub.i-1, processing continues to decision diamond 86 to determine if Ascore.sub.i has reached an Ascore.sub.max value. According to one embodiment, A score of "Sub-max" is equal to 100. If Ascore.sub.i is not greater than Ascore.sub.max, processing continues to step 88. At step 88 a graphical element transitions toward a goal. In one embodiment, the graphical element is a balloon, and the transition is to rise vertically into the air. In an alternate embodiment, the graphical element is a rainbow, and the rainbow begins to fill in colors to reach a pot of gold. Once the rainbow reaches the pot of gold, the pot begins to fill with coins and may overspill. In still another embodiment, a peaceful scene is slowly filled in with color and detail. Alternate embodiments may include other scenes, icons, or images, and may include obstacles to be overcome or various stages to be reached. Processing then returns to step 38.

Continuing with FIG. 7D, If Ascorei is greater than Ascore.sub.max, processing returns to step 38 without effecting any change in the graphical display. Note that alternate embodiments may include additional steps which provide this information to the display.

Returning to step 84 of FIG. 7D, if Ascore.sub.i is less than Ascore.sub.i-1, processing continues to decision diamond 90 to determine if Ascorei has reached an Ascore.sub.min value. According to one embodiment, Ascore.sub.min is equal to 0. If Ascore.sub.i is not less than Ascore.sub.min, processing continues to step 92. At step 92 a graphical element transitions away from a goal. In one embodiment where the graphical element is a balloon, the transition is to lower vertically toward the ground. In an alternate embodiment where the graphical element is a rainbow, the rainbow begins to lose colors and separate from a pot of gold. If the pot of gold includes gold coins, these coins are removed. In still another embodiment where a peaceful scene is displayed, color and detail are slowly removed from the display. Alternate embodiments may include other scenes, icons, or images, and may include obstacles to be overcome or various stages to be reached. Processing then returns to step 38.

At decision diamond 90, if Ascore, is less than Ascore.sub.min, processing continues to step 38 without effecting any change in the graphical display. Note that alternate embodiments may include additional steps which provide this information to the display. Note that in an alternate embodiment, a graphical element, such as a balloon figure, may be manipulated in an appropriate way, such as rising based directly on the EP score. As illustrated in FIG. 10, a hot air balloon is illustrated rising in the sky indicating a state of entrainment. As discussed hereinbelow, the background of the scene includes a grassy field with various obstacles positioned horizontally across the screen. The balloon must rise above various heights to avoid each obstacle. This display provides a visual indication of the state of entrainment and provide a visual reward for achieving entrainment. Control of the balloon illustrates the individual's control of the emotional and/or mental state. In alternate embodiment, other graphic scenarios may be used, which accomplish a particular goal as the EP score value reflects entrainment.

In accordance with the present invention, the method is recursive, performing the various steps described above periodically, say every 5 seconds or so. According to one embodiment, the method is implemented in the form of a software program which can be stored and distributed in a computer readable medium. The software is then operated on a personal computer, or a hand held computing device, or any other medium capable of operating a software program and providing a user information display.

Shown in FIG. 9, is an entrainment apparatus 100 in accordance with an alternative embodiment of the present invention. In this particular embodiment, entrainment apparatus 100 is hand held unit which allows an individual to determine his or her level of entrainment. In one embodiment, entrainment apparatus 100 comprises a photo plethysmographic sensor 102, a data processing system 104, and a display 106.

In one embodiment, an individual places a finger within a receptacle located on the back of entrainment apparatus 29 which contains photo plethysmographic sensor 102. Photo plethysmographic sensor 102 senses the heart beat of the individual, by way of the finger, and sends this heart beat information to data processing system 104. Data processing system 104 collects and analyzes this heart beat data, and determines the individuals level of entrainment. A display output containing information relating to the individuals entrainment level is then generated by data processing system 104 and displayed on display 106. In one form, information relating to the individuals entrainment ratio is displayed on display 106, and a mode allows the users to review his or her low entrainment ratio, medium entrainment ratio or high entrainment ratio.

In an alternative embodiment, the sensor 102 comprises a vest or strap containing ECG electrodes. The individual places the vest on and then electrically couples it to the hand held portion of entrainment apparatus 100. The vest or strap is then used to sense the individuals heart beat and send heart beat information to data processing system 104.

Shown in FIG. 10 is a presentation format 24 produced by entrainment apparatus 10 in accordance with an alternative embodiment of the present invention. In this particular embodiment, a hot air balloon floats across a country landscape and the background scenery scrolls slowly by as the balloon floats into the sky based on the individual's entrainment level. If the individual does not maintain entrainment, the balloon sinks to the ground. Obstacles like a brick wall or a tree, as shown in FIG. 10, are presented during the course of the flight. If the individual's entrainment level is not high enough to clear one of these obstacles, the balloon's flight is impeded until an entrainment level high enough to raise the balloon above the obstacle is achieved. The calculated entrainment zone defines the balloon's climbing slope for high entrainment and for low entrainment.

Shown in FIG. 11 is an alternative presentation format 26 produced by entrainment apparatus 10 in accordance with an alternative embodiment of the present invention. In this particular embodiment, a rainbow grows toward a pot when an individual is in a state of entrainment. Growth of the rainbow toward the pot is smooth and steady while the individual maintains entrainment, but the rainbow recedes if the individual does not maintain entrainment. Once the rainbow reaches the pot, gold coins accumulate and fill the pot if the individual continues to maintain entrainment. For example, one coin is added to the pot for each five second time period of medium entrainment and two coins are added to the pot for each five second time period of high entrainment. A total score is then presented at the end of a selected time period.

Shown in FIG. 12 is yet another possible presentation format 28 produced by entrainment apparatus 10 in accordance with an alternative embodiment of the present invention. In this particular embodiment, a nature scene changes with time as the individual maintains entrainment. For example, the scene changes for every 10 seconds that entrainment is held. If entrainment is low or not maintained the scene does not change.

Alternate embodiments may employ a variety of display formats including detailed information, graphical information, graphic images, video images, and audio images. According to one embodiment, the level of entrainment controls the volume on a music delivery system. This may be implemented based on the EP value, where the volume increases with increasing EP and decreases with decreasing EP. The system may

be optimized by using music especially designed to enhance the entrainment process. Further, in one embodiment, the music changes style with entrainment level. Additionally audio controllers may provide verbal messages.

It is possible to combine the game functionality with a hand-held device in the form of a toy. In one embodiment, a crystal ball lights up and glows brighter as entrainment is maintained. The light may change color as entrainment levels are reached. Again, the color of the light is designed to optimize the entrainment method. The crystal ball may be a hand-held, or other convenient device, and may be battery-operated and/or portable to allow enhanced life performance. Alternate embodiments use toy designs and methods, such as radio-controlled toys, such as cars, trucks, and animals. The toy operation is based on the level of entrainment. In still other embodiments, stuffed animals or toys emit harmonizing sounds and music based on the level of entrainment.

For visual display embodiments, one embodiment begins with a solid background of dots, which dissolve as higher levels of entrainment are reached to reveal a graphic image, such as a 3-dimensional image. As entrainment reduces to a lower level, the dots fill the screen again.

Additionally, various computer games may use entrainment levels and/or the EP value and/or the accumulated scores as triggers to produce varied results. For example, in action games entrainment triggers access to new adventures as the game unfolds. The adventure plays out differently depending on the pattern of entrainment, i.e whether entrainment is maintained at one level, or oscillates between levels, or increases, or increases. It is possible to combine keyboard strokes and mouse and/or joystick movements to facilitate the game. In one embodiment, a locked door is only unlocked when entrainment reaches a certain level. It may be necessary to maintain entrainment at that level for a predetermined amount of time. The objects of such games may include spacecraft moving through space, animals in a jungle, race cars on a track, or any other imagery applicable to a game.

Various images are more helpful in achieving entrainment for an individual than other images. Those images are selected based on predetermined visual and auditory rhythm, and may be specific to the individual and may change from day to day. In one embodiment, a screen saver provides a visual image having a predetermined visual and auditory rhythm, and includes options for the individual to select based on personal preferences. Where feedback is provided to the screensaver program, the screen saver program may perform adjustments to optimize the effects for the individual. Our research suggests several criteria that tend to enhance entrainment. For example, circles, and shapes with rounded edges or curved lines tend to enhance entrainment better than squares, having angular, jagged, or sharp lines. Additionally, movement of the images should be slow, coherent and rhythmic, and transitions are smooth, slow and flowing. Colors and rhythms should oscillate, where the illusion is of inward and outward movement simultaneously. Movements should transition smoothly, without jarring or erratic motion.

The present invention is also applicable to sports endeavors and athletes, particularly those performing in high stress situations, such as a critical hole in golf. The games, devices, and techniques allow the athlete to practicing attaining entrainment and thus gain familiarity with this feeling state which can then be more easily accessed during actual games for improved performance. Various game embodiments may be designed for the sports enthusiast. For example, a beautiful golf course comes into view as entrainment is reached. Other games could include a golfer swinging a club or hitting a ball, where the path of flight and distance are determined by the degree of entrainment prior to the shot. In one embodiment, the game keeps score, and if not entrained, the ball goes into a sandtrap or lands in the rough or water or other hazard. Prolonged states of entrainment produces a hole in one, or other reward. Alternate embodiments may employ a similar strategy for other sports, such as baseball, basketball, football, and other popular sports.

In one embodiment, a vehicle is stuck in a traffic jam in Silicon Valley and moves proportionally to entrainment. As the car moves faster it heads for a scenic place. Note that these games may be operated on a personal computer, or other display device, or may be operated on a portable device. The portable device is highly desirable, as the value of entrainment on reducing stress and increasing the quality of life is most necessary during everyday life events. For example, a business device may combine a calculator or personal planner with the present invention, to allow a business person to utilize the device at a business

meeting or negotiations without the knowledge of those around. In one embodiment, a touchpad used for manipulating a pointer on a display screen is also used to monitor heart beat data. It is also possible to have a device which is accessed by multiple persons. Here prior to beginning an activity, such as a business meeting or a sports event, each member must reach a predetermined level of entrainment for a predetermined period of time. Satisfaction of which may be indicated by a particular color light or a specified sound.

A hand-held device is applicable to education, where it effectively programs the neural network of the brain of the student allowing familiarity with the feeling of coherent and entrained states. Once developed, these states will carry over throughout adult life to influence attainment and maintenance of emotional balance and physiological coherence. By providing an easy to use format, geared to younger users, the present invention encourages them to learn how to create coherent and entrained heart rhythms. Cartoon characters, animals and popular images may be animated and provide instructions for reaching entrainment and rewards for success.

The present invention is also applicable to the medical community and medical applications. As the entrained state provides an efficient physiological state, by puffing less wear and tear on the glands and organs, the present method of reaching and monitoring the entrainment state is a nonintrusive preventive medical technique. Our research suggests that by teaching individuals with certain pathologies to self-generate health, high performance heart rhythms that the bodies own regenerative systems seem to be activated and healing is facilitated. Applications of the present invention for such use include pain control, blood pressure control, arrythmia stabilization, and diabetic management.

Research suggests that afferent input from the heart at the brain stem level modulates the ability of pain signals to transmit from the nervous system to the brain. The level of entrainment is proportional to afferent input, thereby affecting the inhibition of pain signals from the heart to the brain. A subject experiencing pain may use the present invention to reach a state of entrainment, where the pain is lessened. Further, an entrained state leads to more efficient blood flow throughout the organism and may reduce the deleterious effects of high blood pressure. In one embodiment, a game includes a visual image of the human body including arteries and major blood vessels. The level of entrainment controls the images of blood flow through the body. The display illustrates the functioning of the body internally, and indicates the specific differences in heart function during stress and high emotions, as compared to entrainment and coherence. As the rhythms of the heart become entrained, the blood flow images change to illustrate the efficient use of energy.

Still additional benefits of reaching and maintaining a state of entrainment include the efficient functioning of the autonomic nervous systems. In one embodiment, a game is used which provides visual images of the electrical signals of the nervous systems. Pulsating signals are displayed throughout the human system and are transmitted according to sensor detection from the subject. The goal of this game is to change the image such that the systems function efficiently, and to reduce or eliminate the frayed or frazzled images.

Our research has further shown that emotional self-management and physiological coherence are effective in reducing depression, anxiety, and other emotional stress, and also in improving glycemic control in diabetic populations. Additionally, maintaining an entrainment state is generally beneficial in treating anxiety, general depression, and other emotional disorders. For example, one embodiment provides a device for monitoring the autonomic balance according to the present invention prior to retiring for rest. This is particularly beneficial in the treatment of sleep disorders, and allows the subject to shift heart rhythms which tends to enhance sleep. Additionally, the present invention is applicable to impulse control, providing training to help overcome eating disorders, anger, and/or addiction. Our research suggests that the present invention is beneficial in learning stress management, and emotional self-management. In one embodiment, a visual display is provided to illustrate other systems within the body, such as neural and hormonal systems, where signals are displayed moving from the heart to the brain. Here the effects of these signals are clearly seen, and may be controlled by attaining a state of entrainment. Although various preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and/or substitutions are possible without departing from the scope and spirit of the present invention as disclosed in the claims.

BRAIN-WASHING:

A SYNTHESIS OF THE ROMANTIC DYSTOPIA ON PSYCHOPOLITICS

by John Mark Ockerbloom - September 1996

It is my good fortune to work in the used and rare book field in a moderately large city in the Pacific Northwest. Over the years I have seen many strange and wonderful titles. This is a tale of one of them, a book I never thought I would see once much less twice, and some suggestions as to its true origin.

All my life I have been interested in belief and control systems: among the groups I have investigated at length is the Church of Scientology.

The literature of Dianetics and Scientology, pro and con, is extensive. Add to this the tremendous debates occurring on the Internet and an impressive library of legal documents filed around the world and it is quite possible one could spend a lifetime defending, attacking or simply studying the legacy of L. Ron Hubbard. This brief essay concerns a specific piece of Dianetic/Scientology literature titled "Brain-Washing: A Synthesis of the Russian Textbook on Psychopolitics."

The author will assume some familiarity on the part of the reader regarding Dianetics, Scientology, Hubbard, etc.: the text of "Brain-Washing" has been posted in full to the newsgroup alt.religion.scientology and is likely archived somewhere. In brief, "Brain-Washing" presents itself as an address by Lavrenty Pavlovich Beria to American students at the Lenin University on the use of psychiatry as a means of social control.

"L. Ron Hubbard: Messiah or Madman" by Bent Corydon and L. Ron Hubbard Jr. quotes from "Brain-Washing" at length and postulates on its source. According to Corydon and Hubbard, the book first appeared in 1955. The official line was that it had been "slipped under the door of a Scientology org" (org being an abbreviation for organization). Hubbard Jr., however, states: "Dad wrote every word of it. Barbara Bryan and my wife typed the manuscript off his dictation." John Sanborne, editor of Hubbard Sr.'s books since the early 1950s, confirms that Hubbard dictated the book in 1955. Corydon also writes "The manual was later actually being distributed by such groups as the John Birch Society."

"Bare-Faced Messiah: The True Story of L. Ron Hubbard" by Russell Miller adds that the Federal Bureau of Investigations's Central Research Section, upon being presented with a copy of "Brain-Washing" by Hubbard, concluded its authenticity was doubtful and did not acknowledge receipt of the pamphlet.

In November 1963 the government of Victoria, Australia appointed a Board of Inquiry into Scientology. The Hubbard Association of Scientologists International provided the Board with its literature, including "Brain-Washing". The Board attributed the pamphlet to Hubbard and quoted at length in the October 1965 report as an example of the "evil" of Scientology.

The testimony of Hubbard Jr. and Sandborne, combined with the well documented history of deception on the part of Hubbard Sr., suggests that in fact "Brain-Washing" was written by Hubbard Sr. and is not what it presents itself to be. This is the conclusion of Corydon, Hubbard Jr, Miller, of Jon Atack in his book "A Piece of Blue Sky: Scientology, Dianetics and L. Ron Hubbard Exposed" and the majority of Scientology critics on the Internet.

I never imagined I would actually see a copy of "Brain-Washing." But to my great surprise I found a copy for sale in a drawer of paper ephemera at a former employer's book store, along with other older Scientology material. I photocopied it immediately, then put it on display. Not long after I bought the book: failing to capture such a rare bird for my ideological garden would have haunted me forever.

The book opens with an Editorial Note by one Charles Stickley (Atack suggests this too is L. Ron Hubbard), wherein we are told there are two groups "entirely above suspicion" who were antipathetic to the Soviet programme presented in "Brain-Washing." These are "the Christian Scientists and the Dianeticists.

Christian Science is an American Religion, intensely patriotic. Dianetics is the only entirely American developers in the field of the human mind." It was published as a public service by the Hubbard College of Scientology in Sussex, England.

The Editorial Note does little to add to our knowledge of the source of "Brain-Washing." To quote in full the first two paragraphs:

> This book is a synthesis of information gathered through observation, discussion, investigation and experience over the last ten years.
>
> I cannot entirely vouch for its authenticity. Disclosure of the sources form which it is drawn would undoubtedly lead to great difficulties for them. And in matters of this kind the Soviet is not accustomed to the issuance of validations.

The city I live in is not small, and the bookstores I have worked allowed me to handle thousands of books. Nonetheless, I was speechless when one day two men brought in a box of books for sale on behalf of an older relative, and tucked among the worthless paperbacks was a second - and significantly different - edition of "Brain-Washing." This time I bought it immediately: working in a used book store has its advantages.

The second copy of "Brain-Washing" I bought was published by Kenneth Goff of Englewood, Colorado. This undated edition contains much more information as to the source of "Brain-Washing" than the Scientology edition.

Kenneth Goff claimed to have been a member of the Communist Party from 2 May 1936 to 10 October 1939. He states that in 1939 he appeared before the Un-American Activities Committee in Washington D. C. (chaired at the time by Martin Dies), and that his testimony can be found in Volume Nine of that year's Congressional Report. However, if he did testify, his name is not mentioned and the themes presented in "Brain-Washing" do not appear. Goff wrote "Still 'tis our Ancient Foe," in which he claimed "The Frankenstein of Communism is the product of the Jewish Mind." Goff died of a heart attack in 1943. *(Ed: This is incorrect. Goff wrote articles in 1955 and died only in the 1970ies.)*

During his membership in the Communist Party, Goff attended the Eugene Debs Labor School in Milwaukee, Wisconsin (which is also not mentioned in the House Reports of the Un-American Activities Committee). Speaking of "Brain-Washing" in an Editorial Note, Goff states: "This book was used in underground schools, and contains the address of Beria to the American students in the Lenin University prior to 1936. The text in the book in general is from the Communist Manual of Instructions of Psychological Warfare, and was used in America for the training of Communist cadre. The only revision in this book is the summary, which was added by the Communists after the atomic bomb came into being."

The two editions of the book are nearly identical. The typeface, size, page count, covers and over-all look of the books have only minor variations. The significant differences in the two editions can be found only in a line-by-line, word-by-word comparison.

Page 3 paragraph 5 of the Goff edition reads:

> To achieve these goals the psychopolitician must crush every "home-grown" variety of mental healing in America. Actual teachings of James, Eddy and Pentecostal Bible faith healers amongst your misguided people must be swept aside.

Page 3 paragraph 5 of the Scientology edition reads:

> To achieve these goals the psychopolitician must crush every "home-grown" variety of mental healing in America. Actual teachings of Freud, James, Eddy and others amongst your misguided peoples must be swept away.

Page 49 paragraph 4 of the Goff edition reads:

> The psychopolitical operative should also spare no expense in smashing out of existence, by whatever means, any actual healing group, such as that of acupuncture, in China; such as Christian Science, Dianetics and faith healing, in the United States; such as Catholicism in Italy and Spain; and the practical psychological groups of England.

Page 49 paragraph 3 of the Scientology edition reads:

> The psychopolitical operative should also spare no expense in smashing out of existence, by whatever means, any actual healing group, such as that of acupuncture in China; such as Christian Science and Dianetics, in the United States; such as Catholicism in Italy and Spain; and the practical psychology groups of England.

Page 58 paragraph 5 of the Goff edition reads:

> Given any slightest encouragement, public support would swing on an instant all mental healing into the hands of the churches. And there are Churches waiting to receive it, clever churches. That terrible monster the Roman Catholic Church still dominates mental healing heavily throughout the Christian world and their well schooled priests are always at work to turn the public their way. Among Fundamentalist and Pentecostal groups healing campaigns are conducted, which, because of their results, win many to the cult of Christianity. In the field of pure healing the Church of Christ Science of Boston, Massachusetts excels in commanding the public favor and operates many sanitariums. All these must be swept aside. They must be ridiculed and defamed and every cure they advertise must be asserted as a hoax. [...]

Page 58 paragraph 5 of the Scientology edition reads:

> Given any slightest encouragement, public support would swing on an instant all mental healing into the hands of the churches. And there are Churches waiting to receive it, clever churches. That terrible monster the Roman Catholic Church still dominates mental healing heavily throughout the Christian world and their well schooled priests are always at work to turn the public their way. In the field of pure mental healing the Church of Christ Science of Boston, Massachusetts excels in commanding the public favour and operates many sanitoriums. All these must be swept aside. They must be ridiculed and defamed and every cure they advertise must be asserted as a hoax. [...]

In March 1996 I had the chance to examine yet another edition of this book, one transcribed and posted on the Internet by Martin Hunt. This edition was also published by Scientologists, but includes several neologism and Scientology terms not found in my copies.

And yet another edition of the book is quoted in "Vampire Killer 2000." This time the title is "The Soviet Art of Brainwashing: A Synthesis of the Russian Textbook on Psycho-politics" and is attributed to Kenneth Goff. Here, Beria is the Head of the Lenin School of Psycho-politics and speaks to a group of American/Marxist Psychology students in 1933.

And yet another edition of the book is listed in the catalog of A-Albionic Research: "Brainwashing: A Synthesis of the Russian Textbook on Psychopolitics; Psychopolitics and the Suppression of Man and Civilization." This edition is attributed to Kenneth Goff, and to "Stalin's head of the KGB," and to L. Ron Hubbard (all in the same sentence). It was published in 1988.

L. Ron Hubbard, like most people, on occasion told lies for personal gain. But was "Brain-Washing" one of his lies, an attempt to ride the demon engine of McCarthyism? By comparing the facts - and the lies - surrounding "Brain-Washing," an alternative origin appears in which everyone, even L. Ron Hubbard, gets to tell a little bit of the truth.

"Vampire Killer 2000" places "Brain-Washing" in 1933. Goff claims to have encountered it between 1936 and 1939, and that an appendix had been added after that time. It is attributed to Hubbard in 1955. Later on it is published by the John Birch Society and still later by A-Albionic Research. When was the book written? The time of origin of the book appears fluid, covering no less and perhaps more than fifty years.

The Goff edition speaks favorably of Pentecostal religion and faith healing: one wonders what denomination Goff was. Goff also states that earlier editions did not mention atomic warfare, which was included in later editions. The early Scientology edition does not include references to faith healing, and later editions add Scientology terms. The contents of the book also appear fluid, reflecting the personal interests and the times of the publisher.

The mailable origin and content of "Brain-Washing" suggest very strongly that it is a dystopian romance, a work of fiction that presents itself as fact to give urgency to its theme.

Dystopian works presented as fiction, such as "Gulliver's Travels" and "1984," have a ready place in literature. But when a dystopia is presented as fact, and some people accept it as a fact, its place is very different from that of literature. Dystopian fiction is traceable to a single source and is focused in its subject: dystopia presented as fact is molded to fit the agenda of the place and time it appears (or re-appears). Dystopian fiction is recognized as legitimate literature under names including satire, humor and commentary: dystopia presented as fact is not generally recognized as a literary form, although like the folk-lore it most resembles it has a very long history.

"Brain-Washing" is not the only dystopian romance. Generations have lived and died believing "The Protocol of the Elders of Zion" to be the actual meeting notes of the conspiracy that rules the world. "The Occult Technology of Power," "Silent Weapons for Quiet Wars," "Report from Stone Mountain" and "MJ-12" are more recent examples of the same literary form: social criticism presented as historic fact.

If "Brain-Washing" is a dystopian romance, it (like folklore) will have many origins and many forms. How can the claims surrounding it be best assimilated? While I have found many blossoms of this book, I have yet to see its roots and have doubts they will ever be uncovered. My comparing the different editions of "Brain-Washing," a chronological series of incarnations is suggested.

The book appears some time in the 1930s, and is used by (if not written by) Kenneth Goff to speak against Communism and for Pentecostal Christianity. Later he adds an afterward on atomic bombs, to update the red menace. When L. Ron Hubbard had need of the book in the 1950s, he reads it into a transcription machine as if he 'wrote' it. Initially he removes references to Pentecostal Christianity and faith healing and does not speak entirely unkindly of Freud; later on he demonizes psychiatry more than Communism. The John Birch Society uses the book for their ends, as do the Vampire Killers. Hubbard did indeed "write" "Brain-Washing" - but so did Kenneth Goff, the John Birch Society, the authors of Vampire Killers 2000 and probably many others.

Were it possible to trace the branches of "Brain-Washing" to a common trunk, it would likely be planted in the old soil that nourished the "Protocols" and every other urban legend you've ever encountered. Criticisms of social control mechanisms told as fact, whatever agenda they may serve, are ancient and universal. Those who have need of the dystopian romance as a literary form can pull out its skeleton, dress it in contemporary flesh and send it on its way. "Brain-Washing" belongs to us all.

About the author:

The author is familiar with the fashion by which the Church of Scientology meets its critics, and wishes to remain anonymous. No correspondence will be answered. The author is also familiar with the process of writing something, distributing it and having people believe it: magically, what once was only words becomes reality. In that spirit, let it be known the author is an independently wealthy person living in excellent health and happiness in a beautiful house surrounded by wonderful people and interesting books.

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Vampire Killer 2000, edited (written?) by Jack McLamb. Published by Police Against The New World Order.

A Piece of Blue Sky: Scientology, Dianetics and L. Ron Hubbard Exposed by Jon Atack, Lyle Stuart Inc. Secaucus NJ 1990 ISBN 0-685-45110-0

Brain-Washing: A Synthesis of the Russian Textbook on Psychopolitics by Beria. Martin Hunt, 1996

Various editions of "Brainwashing" are encountered:

> The book appears some time in the 1930s, and is used by (if not written by) Kenneth Goff to speak against Communism and for Pentecostal Christianity. Later he adds an afterward on atomic bombs, to update the red menace. When L. Ron Hubbard had need of the book in the 1950s, he reads it into a transcription machine as if he 'wrote' it.

The poster makes some interesting points, but ultimately does not make a convincing case for a pre-Hubbard origin for the text.

When researching the origins of this book for The On-Line Books Page, I did a search of WorldCat to find out what versions were out there. WorldCat is a subscription-based database of thousands of on-line library catalogs; if a book has made it into any university or major public library system in North America, chances are it's in WorldCat.

WorldCat does reveal that the "brainwashing" text is indeed now being disseminated in various forms by different (and usually somewhat paranoid) organizations, and that there are editions that credit Goff as the editor. However, there is *no* edition listed in WorldCat that's dated earlier than 1955, the year that Hubbard released his version of the text.

The editions that bear Goff's name either are undated or post-date 1943, which was the year Goff died. The attributions made to Goff in the editions themselves are also dubious, as can be seen by the example quotes that our anonymous poster supplies.

See, for instance:

> Kenneth Goff claimed to have been a member of the Communist Party from 2 May 1936 to 10 October 1939. He states that in 1939 he appeared before the Un-American Activities Committee in Washington D. C. (chaired at the time by Martin Dies), and that his testimony can be found in Volume Nine of that year's Congressional Report. However, if he did testify, his name is not mentioned and the themes presented in "Brain-Washing" do not appear.

So there is no public record that Goff ever actually testified as to the contents of the manual; and furthermore, the assertion the book makes that he testified at all is not borne out by the record.

See also:

> Speaking of "Brain-Washing" in an Editorial Note, Goff states: "This book was used in underground schools, and contains the address of Beria to the American students in the Lenin University prior to 1936. The text in the book in general is from the Communist Manual of Instructions of Psychological Warfare, and was used in America for the training of Communist cadre. The only revision in this book is the summary, which was added by the Communists after the atomic bomb came into being."

But this can't be Goff. He died in 1943, and the atomic bomb didn't actually "come into being" until 1945, when the first atomic tests were held. And Dianetics didn't get published until even later, but still is mentioned in the "Goff edition":

(Ed.: Since Goff lived until the 1970ies, this presumption is incorrect.)

Page 49 paragraph 4 of the Goff edition reads:

> The psychopolitical operative should also spare no expense in smashing out of existence, by whatever means, any actual healing group, such as that of acupuncture, in China; such as Christian Science, Dianetics and faith healing, in the United States...

This can't be explained away as a "later revision" either, since in the quote above this one the only thing that was claimed to have changed was the initial summary, after the atomic bomb was introduced.

Given all this, and the apparent lack of any print edition in libraries until 12 years after Goff's death and after the appearance of Hubbard's edition, I'd have to conclude that the attribution to Goff is another after-the-fact fabrication. (It's not an uncommon phenomenon for spurious origins to be added to paranoid tracts as they propagate; you'll find a number of examples in the alt.folklore.urban archives.)

So, who does that leave?

Well, Hubbard claimed to have received this text from a Charles Stickley, who claimed to be a professor writing from New York in 1955. But professors leave a rather obvious paper trail, in the form of scholarly papers, books, society and university records, and Who's Who entries. A quick check of WorldCat and Who's Who of 1955 turned up no publications or biographical information for this "Charles Stickley". I even emailed the webmaster of the Scientology[tm] web site, asking if they had any leads as to who he was or where he taught or published. They couldn't come up with anything.

That leaves Hubbard as the earliest documentable name attached to the document. The case for Hubbard as the author is quite good. _L. Ron Hubbard: Messiah or Madman_ contains two testimonies from people who said they were present when Hubbard wrote it. The subject matter fits Hubbard's own obsessions quite closely; both about the evils of psychiatry and about the influence of Dianetics. And the vocabulary, at least in the version that's posted on the Internet, also has Hubbard's marks all over it.

You can see this for yourself. Try an Alta Vista search of the word "thinkingness". When I tried it just now, the *only* places the word appeared on its own over the *entire* Web was in material known to be written by Hubbard or Scientology[tm] -- and in the "brainwashing manual". (You'll also find a couple of hits from other sources where it's used as part of a compound construct like "forward-thinkingness" or "right-thinkingness", but the use of "thinkingness" on its own seems to be unique to Hubbard.)

Given all this, I felt confident in giving Hubbard the authorship credit for Brainwashing when I listed it on the On-Line Books Page.

John Mark Ockerbloom
Editor, The On-Line Books Page

US6506148 *- Nervous System Manipulation by EM Fields from Monitors (TV and Computer) (Heartbeat)*

United States Patent ***6,506,148***
Loos **January 14, 2003**

Nervous system manipulation by electromagnetic fields from monitors

Abstract

Physiological effects have been observed in a human subject in response to stimulation of the skin with weak electromagnetic fields that are pulsed with certain frequencies near 1/2 Hz or 2.4 Hz, such as to excite a sensory resonance. Many computer monitors and TV tubes, when displaying pulsed images, emit pulsed electromagnetic fields of sufficient amplitudes to cause such excitation. It is therefore possible to manipulate the nervous system of a subject by pulsing images displayed on a nearby computer monitor or TV set. For the latter, the image pulsing may be imbedded in the program material, or it may be overlaid by modulating a video stream, either as an RF signal or as a video signal. The image displayed on a computer monitor may be pulsed effectively by a simple computer program. For certain monitors, pulsed electromagnetic fields capable of exciting sensory resonances in nearby subjects may be generated even as the displayed images are pulsed with subliminal intensity.

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Field of Search: 600/9-27,545 313/419 324/318 378/901 434/236

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Primary Examiner: Winakur; Eric F.
Assistant Examiner: Veniaminov; Nikita R

Claims

I claim:

1. A method for manipulating the nervous system of a subject located near a monitor, the monitor emitting an electromagnetic field when displaying an image by virtue of the physical display process, the subject having a sensory resonance frequency, the method comprising:

creating a video signal for displaying an image on the monitor, the image having an intensity;

modulating the video signal for pulsing the image intensity with a frequency in the range 0.1 Hz to 15 Hz; and

setting the pulse frequency to the resonance frequency.

2. A computer program for manipulating the nervous system of a subject located near a monitor, the monitor emitting an electromagnetic field when displaying an image by virtue of the physical display process, the subject having cutaneous nerves that fire spontaneously and have spiking patterns, the computer program comprising:

a display routine for displaying an image on the monitor, the image having an intensity;

a pulse routine for pulsing the image intensity with a frequency in the range 0.1 Hz to 15 Hz; and

a frequency routine that can be internally controlled by the subject, for setting the frequency;

whereby the emitted electromagnetic field is pulsed, the cutaneous nerves are exposed to the pulsed electromagnetic field, and the spiking patterns of the nerves acquire a frequency modulation.

3. The computer program of claim 2, wherein the pulsing has an amplitude and the program further comprises an amplitude routine for control of the amplitude by the subject.

4. The computer program of claim 2, wherein the pulse routine comprises:
a timing procedure for timing the pulsing; and an extrapolation procedure for improving the accuracy of the timing procedure.

5. The computer program of claim 2, further comprising a variability routine for introducing variability in the pulsing.

6. Hardware means for manipulating the nervous system of a subject located near a monitor, the monitor being responsive to a video stream and emitting an electromagnetic field when displaying an image by virtue of the physical display process, the image having an intensity, the subject having cutaneous nerves that fire spontaneously and have spiking patterns, the hardware means comprising:

pulse generator for generating voltage pulses;

means, responsive to the voltage pulses, for modulating the video stream to pulse the image intensity;

whereby the emitted electromagnetic field is pulsed, the cutaneous nerves are exposed to the pulsed electromagnetic field, and the spiking patterns of the nerves acquire a frequency modulation.

7. The hardware means of claim 6, wherein the video stream is a composite video signal that has a pseudo-dc level, and the means for modulating the video stream comprise means for pulsing the pseudo-dc level.

8. The hardware means of claim 6, wherein the video stream is a television broadcast signal, and the means for modulating the video stream comprise means for frequency wobbling of the television broadcast signal.

9. The hardware means of claim 6, wherein the monitor has a brightness adjustment terminal, and the means for modulating the video stream comprise a connection from the pulse generator to the brightness adjustment terminal.

10. A source of video stream for manipulating the nervous system of a subject located near a monitor, the monitor emitting an electromagnetic field when displaying an image by virtue of the physical display process, the subject having cutaneous nerves that fire spontaneously and have spiking patterns, the source of video stream comprising:

means for defining an image on the monitor, the image having an intensity; and

means for subliminally pulsing the image intensity with a frequency in the range 0.1 Hz to 15 Hz;

whereby the emitted electromagnetic field is pulsed, the cutaneous nerves are exposed to the pulsed electromagnetic field, and the spiking patterns of the nerves acquire a frequency modulation.

11. The source of video stream of claim 10 wherein the source is a recording medium that has recorded data, and the means for subliminally pulsing the image intensity comprise an attribute of the recorded data.

12. The source of video stream of claim 10 wherein the source is a computer program, and the means for subliminally pulsing the image intensity comprise a pulse routine.

13. The source of video stream of claim 10 wherein the source is a recording of a physical scene, and the means for subliminally pulsing the image intensity comprise:

pulse generator for generating voltage pulses;

light source for illuminating the scene, the light source having a power level; and

modulation means, responsive to the voltage pulses, for pulsing the power level.

14. The source of video stream of claim 10, wherein the source is a DVD, the video stream comprises a luminance signal and a chrominance signal, and the means for subliminal pulsing of the image intensity comprise means for pulsing the luminance signal.

Description

BACKGROUND OF THE INVENTION

The invention relates to the stimulation of the human nervous system by an electromagnetic field applied externally to the body. A neurological effect of external electric fields has been mentioned by Wiener (1958), in a discussion of the bunching of brain waves through nonlinear interactions. The electric field was arranged to provide "a direct electrical driving of the brain". Wiener describes the field as set up by a 10 Hz alternating voltage of 400 V applied in a room between ceiling and ground. Brennan (1992) describes in U.S. Pat. No. 5,169,380 an apparatus for alleviating disruptions in circadian rythms of a mammal, in which an alternating electric field is applied across the head of the subject by two electrodes placed a short distance from the skin.

A device involving a field electrode as well as a contact electrode is the "Graham Potentializer" mentioned by Hutchison (1991). This relaxation device uses motion, light and sound as well as an alternating electric field applied mainly to the head. The contact electrode is a metal bar in Ohmic contact with the bare feet of the subject, and the field electrode is a hemispherical metal headpiece placed several inches from the subject's head.

In these three electric stimulation methods the external electric field is applied predominantly to the head, so that electric currents are induced in the brain in the physical manner governed by electrodynamics. Such currents can be largely avoided by applying the field not to the head, but rather to skin areas away from the head. Certain cutaneous receptors may then be stimulated and they would provide a signal input into the brain along the natural pathways of afferent nerves. It has been found that, indeed, physiological effects can be induced in this manner by very weak electric fields, if they are pulsed with a frequency near 1/2 Hz. The observed effects include ptosis of the eyelids, relaxation, drowziness, the feeling of pressure at a centered spot on the lower edge of the brow, seeing moving patterns of dark purple and greenish yellow with the eyes closed, a tonic smile, a tense feeling in the stomach, sudden loose stool, and sexual excitement, depending on the precise frequency used, and the skin area to which the field is applied. The sharp frequency dependence suggests involvement of a resonance mechanism.

It has been found that the resonance can be excited not only by externally applied pulsed electric fields, as discussed in U.S. Pat. Nos. 5,782,874, 5,899,922, 6,081,744, and 6,167,304, but also by pulsed magnetic fields, as described in U.S. Pat. Nos. 5,935,054 and 6,238,333, by weak heat pulses applied to the skin, as discussed in U.S. Pat. Nos. 5,800,481 and 6,091,994, and by subliminal acoustic pulses, as described in U.S. Pat. No. 6,017,302. Since the resonance is excited through sensory pathways, it is called a sensory resonance. In addition to the resonance near 1/2 Hz, a sensory resonance has been found near 2.4 Hz. The latter is characterized by the slowing of certain cortical processes, as discussed in the '481, '922, '302, '744, '944, and '304 patents.

The excitation of sensory resonances through weak heat pulses applied to the skin provides a clue about what is going on neurologically. Cutaneous temperature-sensing receptors are known to fire spontaneously. These nerves spike somewhat randomly around an average rate that depends on skin temperature. Weak heat pulses delivered to the skin in periodic fashion will therefore cause a slight frequency modulation (fm) in the spike patterns generated by the nerves. Since stimulation through other sensory modalities results in similar physiological effects, it is believed that frequency modulation of spontaneous afferent neural spiking patterns occurs there as well.

It is instructive to apply this notion to the stimulation by weak electric field pulses administered to the skin. The externally generated fields induce electric current pulses in the underlying tissue, but the current density is much too small for firing an otherwise quiescent nerve. However, in experiments with adapting stretch receptors of the crayfish, Terzuolo and Bullock (1956) have observed that very small electric fields can suffice for modulating the firing of already active nerves. Such a modulation may occur in the electric field stimulation under discussion.

Further understanding may be gained by considering the electric charges that accumulate on the skin as a result of the induced tissue currents. Ignoring thermodynamics, one would expect the accumulated polarization charges to be confined strictly to the outer surface of the skin. But charge density is caused by a slight excess in positive or negative ions, and thermal motion distributes the ions through a thin layer. This implies that the externally applied electric field actually penetrates a short distance into the tissue, instead of stopping abruptly at the outer skin surface. In this manner a considerable fraction of the applied field may be brought to bear on some cutaneous nerve endings, so that a slight modulation of the type noted by Terzuolo and Bullock may indeed occur.

The mentioned physiological effects are observed only when the strength of the electric field on the skin lies in a certain range, called the effective intensity window. There also is a bulk effect, in that weaker fields suffice when the field is applied to a larger skin area. These effects are discussed in detail in the '922 patent.

Since the spontaneous spiking of the nerves is rather random and the frequency modulation induced by the pulsed field is very shallow, the signal to noise ratio (S/N) for the fm signal contained in the spike trains along the afferent nerves is so small as to make recovery of the fm signal from a single nerve fiber impossible. But application of the field over a large skin area causes simultaneous stimulation of many cutaneous nerves, and the fm modulation is then coherent from nerve to nerve. Therefore, if the afferent signals are somehow summed in the brain, the fm modulations add while the spikes from different nerves mix and interlace. In this manner the S/N can be increased by appropriate neural processing. The matter is discussed in detail in the '874 patent. Another increase in sensitivity is due to involving a resonance mechanism, wherein considerable neural circuit oscillations can result from weak excitations.

An easily detectable physiological effect of an excited 1/2 Hz sensory resonance is ptosis of the eyelids. As discussed in the '922 patent, the ptosis test involves first closing the eyes about half way. Holding this eyelid position, the eyes are rolled upward, while giving up voluntary control of the eyelids. The eyelid position is then determined by the state of the autonomic nervous system. Furthermore, the pressure exerted on the eyeballs by the partially closed eyelids increases parasympathetic activity. The eyelid position thereby becomes somewhat labile, as manifested by a slight flutter. The labile state is sensitive to very small shifts in autonomic state. The ptosis influences the extent to which the pupil is hooded by the eyelid, and thus how much light is admitted to the eye. Hence, the depth of the ptosis is seen by the subject, and can be graded on a scale from 0 to 10.

In the initial stages of the excitation of the 1/2 Hz sensory resonance, a downward drift is detected in the ptosis frequency, defined as the stimulation frequency for which maximum ptosis is obtained. This drift is believed to be caused by changes in the chemical milieu of the resonating neural circuits. It is thought that the resonance causes perturbations of chemical concentrations somewhere in the brain, and that these perturbations spread by diffusion to nearby resonating circuits. This effect, called "chemical detuning", can be so strong that ptosis is lost altogether when the stimulation frequency is kept constant in the initial stages of the excitation. Since the stimulation then falls somewhat out of tune, the resonance decreases in amplitude and chemical detuning eventually diminishes. This causes the ptosis frequency to shift back up, so that the stimulation is more in tune and the ptosis can develop again. As a result, for fixed stimulation frequencies in a certain range, the ptosis slowly cycles with a frequency of several minutes. The matter is discussed in the '302 patent.

The stimulation frequencies at which specific physiological effects occur depend somewhat on the autonomic nervous system state, and probably on the endocrine state as well.

Weak magnetic fields that are pulsed with a sensory resonance frequency can induce the same physiological effects as pulsed electric fields. Unlike the latter however, the magnetic fields penetrate biological tissue with nearly undiminished strength. Eddy currents in the tissue drive electric charges to the skin, where the charge distributions are subject to thermal smearing in much the same way as in electric field stimulation, so that the same physiological effects develop. Details are discussed in the '054 patent.

SUMMARY

Computer monitors and TV monitors can be made to emit weak low-frequency electromagnetic fields merely by pulsing the intensity of displayed images. Experiments have shown that the 1/2 Hz sensory resonance can be excited in this manner in a subject near the monitor. The 2.4 Hz sensory resonance can also be excited in this fashion. Hence, a TV monitor or computer monitor can be used to manipulate the nervous system of nearby people.

The implementations of the invention are adapted to the source of video stream that drives the monitor, be it a computer program, a TV broadcast, a video tape or a digital video disc (DVD).

For a computer monitor, the image pulses can be produced by a suitable computer program. The pulse frequency may be controlled through keyboard input, so that the subject can tune to an individual sensory resonance frequency. The pulse amplitude can be controlled as well in this manner. A program written in Visual Basic(R) is particularly suitable for use on computers that run the Windows 95(R) or Windows 98(R) operating system. The structure of such a program is described. Production of periodic pulses requires an accurate timing procedure. Such a procedure is constructed from the GetTimeCount function available in the Application Program Interface (API) of the Windows operating system, together with an extrapolation procedure that improves the timing accuracy.

Pulse variability can be introduced through software, for the purpose of thwarting habituation of the nervous system to the field stimulation, or when the precise resonance frequency is not known. The variability may be a pseudo-random variation within a narrow interval, or it can take the form of a frequency or amplitude sweep in time. The pulse variability may be under control of the subject.

The program that causes a monitor to display a pulsing image may be run on a remote computer that is connected to the user computer by a link; the latter may partly belong to a network, which may be the Internet.

For a TV monitor, the image pulsing may be inherent in the video stream as it flows from the video source, or else the stream may be modulated such as to overlay the pulsing. In the first case, a live TV broadcast can be arranged to have the feature imbedded simply by slightly pulsing the illumination of the scene that is being broadcast. This method can of course also be used in making movies and recording video tapes and DVDs.

Video tapes can be edited such as to overlay the pulsing by means of modulating hardware. A simple modulator is discussed wherein the luminance signal of composite video is pulsed without affecting the chroma signal. The same effect may be introduced at the consumer end, by modulating the video stream that is produced by the video source. A DVD can be edited through software, by introducing pulse-like variations in the digital RGB signals. Image intensity pulses can be overlaid onto the analog component video output of a DVD player by modulating the luminance signal component. Before entering the TV set, a television signal can be modulated such as to cause pulsing of the image intensity by means of a variable delay line that is connected to a pulse generator.

Certain monitors can emit electromagnetic field pulses that excite a sensory resonance in a nearby subject, through image pulses that are so weak as to be subliminal. This is unfortunate since it opens a way for mischievous application of the invention, whereby people are exposed unknowingly to manipulation of their nervous systems for someone else's purposes. Such application would be unethical and is of course not advocated. It is mentioned here in order to alert the public to the possibility of covert abuse that may occur while being online, or while watching TV, a video, or a DVD.

DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates the electromagnetic field that emanates from a monitor when the video signal is modulated such as to cause pulses in image intensity, and a nearby subject who is exposed to the field.

FIG. 2 shows a circuit for modulation of a composite video signal for the purpose of pulsing the image intensity.

FIG. 3 shows the circuit for a simple pulse generator.

FIG. 4 illustrates how a pulsed electromagnetic field can be generated with a computer monitor.

FIG. 5 shows a pulsed electromagnetic field that is generated by a television set through modulation of the RF signal input to the TV.

FIG. 6 outlines the structure of a computer program for producing a pulsed image.

FIG. 7 shows an extrapolation procedure introduced for improving timing accuracy of the program of FIG. 6.

FIG. 8 illustrates the action of the extrapolation procedure of FIG. 7.

FIG. 9 shows a subject exposed to a pulsed electromagnetic field emanating from a monitor which is responsive to a program running on a remote computer via a link that involves the Internet.

FIG. 10 shows the block diagram of a circuit for frequency wobbling of a TV signal for the purpose of pulsing the intensity of the image displayed on a TV monitor.

FIG. 11 depicts schematically a recording medium in the form of a video tape with recorded data, and the attribute of the signal that causes the intensity of the displayed image to be pulsed.

FIG. 12 illustrates how image pulsing can be embedded in a video signal by pulsing the illumination of the scene that is being recorded.

FIG. 13 shows a routine that introduces pulse variability into the computer program of FIG. 6.

FIG. 14 shows schematically how a CRT emits an electromagnetic field when the displayed image is pulsed.

FIG. 15 shows how the intensity of the image displayed on a monitor can be pulsed through the brightness control terminal of the monitor.

FIG. 16 illustrates the action of the polarization disc that serves as a model for grounded conductors in the back of a CRT screen.

FIG. 17 shows the circuit for overlaying image intensity pulses on a DVD output.

FIG. 18 shows measured data for pulsed electric fields emitted by two different CRT type monitors, and a comparison with theory.

DETAILED DESCRIPTION

Computer monitors and TV monitors emit electromagnetic fields. Part of the emission occurs at the low frequencies at which displayed images are changing. For instance, a rythmic pulsing of the intensity of an image causes electromagnetic field emission at the pulse frequency, with a strength proportional to the pulse amplitude. The field is briefly referred to as "screen emission". In discussing this effect, any part or all what is displayed on the monitor screen is called an image. A monitor of the cathode ray tube (CRT) type has three electron beams, one for each of the basic colors red, green, and blue. The intensity of an image is here defined as

I=.intg.j dA, (1)

where the integral extends over the image, and

j=jr+jg+jb, (2)

jr, jg, and jb being the electric current densities in the red, green, and blue electron beams at the surface area dA of the image on the screen. The current densities are to be taken in the distributed electron beam model, where the discreteness of pixels and the raster motion of the beams are ignored, and the back of the monitor screen is thought to be irradiated by diffuse electron beams. The beam current densities are then functions of the coordinates x and y over the screen. The model is appropriate since we are interested in the electromagnetic field emision caused by image pulsing with the very low frequencies of sensory resonances, whereas the emissions with the much higher horizontal and vertical sweep frequencies are of no concern. For a CRT the intensity of an image is expressed in millamperes.

For a liquid crystal display (LCD), the current densities in the definition of image intensity are to be replaced by driving voltages, multiplied by the aperture ratio of the device. For an LCD, image intensities are thus expressed in volts.

It will be shown that for a CRT or LCD screen emissions are caused by fluctuations in image intensity. In composite video however, intensity as defined above is not a primary signal feature, but luminance Y is. For any pixel one has

Y=0.299R+0.587G+0.114B, (3)

where R, G, and B are the intensities of the pixel respectively in red, green and blue, normalized such as to range from 0 to 1. The definition (3) was provided by the Commission Internationale de l'Eclairage (CIE), in order to account for brightness differences at different colors, as perceived by the human visual system. In composite video the hue of the pixel is determined by the chroma signal or chrominance, which has the components R-Y and B-Y It follows that pulsing pixel luminance while keeping the hue fixed is equivalent to pulsing the pixel intensity, up to an amplitude factor. This fact will be relied upon when modulating a video stream such as to overlay image intensity pulses.

It turns out that the screen emission has a multipole expansion wherein both monopole and dipole contributions are proportional to the rate of change of the intensity I of (1). The higher order multipole contributions are proportional to the rate of change of moments of the current density j over the image, but since these contributions fall off rapidly with distance, they are not of practical importance in the present context. Pulsing the intensity of an image may involve different pulse amplitudes, frequencies, or phases for different parts of the image. Any or all of these features may be under subject control.

The question arises whether the screen emission can be strong enough to excite sensory resonances in people located at normal viewing distances from the monitor. This turns out to be the case, as shown by sensory resonance experiments and independently by measuring the strength of the emitted electric field pulses and comparing the results with the effective intensity window as explored in earlier work.

One-half Hertz sensory resonance experiments have been conducted with the subject positioned at least at normal viewing distance from a 15" computer monitor that was driven by a computer program written in Visual Basic(R), version 6.0 (VB6). The program produces a pulsed image with uniform luminance and hue over the full screen, except for a few small control buttons and text boxes. In VB6, screen pixel colors are determined by integers R, G, and B, that range from 0 to 255, and set the contributions to the pixel color made by the basic colors red, green, and blue. For a CRT-type monitor, the pixel intensities for the primary colors may depend on the RGB values in a nonlinear manner that will be discussed. In the VB6 program the RGB values are modulated by small pulses .DELTA.R, .DELTA.G, .DELTA.B, with a frequency that can be chosen by the subject or is swept in a predetermined manner. In the sensory resonance experiments mentioned above, the ratios .DELTA.R/R, .DELTA.G/G, and .DELTA.B/B were always smaller than 0.02, so that the image pulses are quite weak. For certain frequencies near 1/2 Hz, the subject experienced physiological effects that are known to accompany the excitation of the 1/2 Hz sensory resonance as mentioned in the Background Section. Moreover, the measured field pulse amplitudes fall within the effective intensity window for the 1/2 Hz resonance, as explored in earlier experiments and discussed in the '874, '744, '922, and '304 patents. Other experiments have shown that the 2.4 Hz sensory resonance can be exited as well by screen emissions from monitors that display pulsed images.

These results confirm that, indeed, the nervous system of a subject can be manipulated through electromagnetic field pulses emitted by a nearby CRT or LCD monitor which displays images with pulsed intensity.

The various implementations of the invention are adapted to the different sources of video stream, such as video tape, DVD, a computer program, or a TV broadcast through free space or cable. In all of these implementations, the subject is exposed to the pulsed electromagnetic field that is generated by the monitor as the result of image intensity pulsing. Certain cutaneous nerves of the subject exhibit spontaneous spiking in patterns which, although rather random, contain sensory information at least in the form of average frequency. Some of these nerves have receptors that respond to the field stimulation by changing their average spiking frequency, so that the spiking patterns of these nerves acquire a frequency modulation, which is conveyed to the brain. The modulation can be particularly effective if it has a frequency at or near a sensory resonance frequency. Such frequencies are expected to lie in the range from 0.1 to 15 Hz.

An embodiment of the invention adapted to a VCR is shown in FIG. 1, where a subject 4 is exposed to a pulsed electric field 3 and a pulsed magnetic field 39 that are emitted by a monitor 2, labeled "MON", as the result of pulsing the intensity of the displayed image. The image is here generated by a video casette recorder 1, labeled "VCR", and the pulsing of the image intensity is obtained by modulating the composite video signal from the VCR output. This is done by a video modulator 5, labeled "VM", which responds to the signal from the pulse generator 6, labeled "GEN". The frequency and amplitude of the image pulses can be adjusted with the frequency control 7 and amplitude control 8. Frequency and amplitude adjustments can be made by the subject.

The circuit of the video modulator 5 of FIG. 1 is shown in FIG. 2, where the video amplifiers 11 and 12 process the composite video signal that enters at the input terminal 13. The level of the video signal is modulated slowly by injecting a small bias current at the inverting input 17 of the first amplifier 11. This current is caused by voltage pulses supplied at the modulation input 16, and can be adjusted through the potentiometer 15. Since the noninverting input of the amplifier is grounded, the inverting input 17 is kept essentially at ground potential, so that the bias current is is not influenced by the video signal. The inversion of the signal by the first amplifier 11 is undone by the second amplifier 12. The gains of the amplifiers are chosen such as to give a unity overall gain. A slowly varying current injected at the inverting input 17 causes a slow shift in the "pseudo-dc" level of the composite video signal, here defined as the short-term average of the signal. Since the pseudo-dc level of the chroma signal section determines the luminance, the latter is modulated by the injected current pulses. The chroma signal is not affected by the slow modulation of the pseudodc level, since that signal is determined by the amplitude and phase with respect to the color carrier which is locked to the color burst. The effect on the sync pulses and color bursts is of no consequence either if the injected current pulses are very small, as they are in practice. The modulated composite video signal, available at the output 14 in FIG. 2, will thus exhibit a modulated luminance, whereas the chroma signal is unchanged. In the light of the foregoing discussion about

luminance and intensity, it follows that the modulator of FIG. 2 causes a pulsing of the image intensity I. It remains to give an example how the pulse signal at the modulation input 16 may be obtained. FIG. 3 shows a pulse generator that is suitable for this purpose, wherein the RC timer 21 (Intersil ICM7555) is hooked up for astable operation and produces a square wave voltage with a frequency that is determined by capacitor 22 and potentiometer 23. The timer 21 is powered by a battery 26, controlled by the switch 27. The square wave voltage at output 25 drives the LED 24, which may be used for monitoring of the pulse frequency, and also serves as power indicator. The pulse output may be rounded in ways that are well known in the art. In the setup of FIG. 1, the output of VCR 1 is connected to the video input 13 of FIG. 2, and the video output 14 is connected to the monitor 2 of FIG. 1.

In the preferred embodiment of the invention, the image intensity pulsing is caused by a computer program. As shown in FIG. 4, monitor 2, labeled "MON", is connected to computer 31 labeled "COMPUTER", which runs a program that produces an image on the monitor and causes the image intensity to be pulsed. The subject 4 can provide input to the computer through the keyboard 32 that is connected to the computer by the connection 33. This input may involve adjustments of the frequency or the amplitude or the variability of the image intensity pulses. In particular, the pulse frequency can be set to a sensory resonance frequency of the subject for the purpose of exciting the resonance.

The structure of a computer program for pulsing image intensity is shown in FIG. 6. The program may be written in Visual Basic(R) version 6.0 (VB6), which involves the graphics interface familiar from the Windows(R) operating system. The images appear as forms equipped with user controls such as command buttons and scroll bars, together with data displays such as text boxes. A compiled VB6 program is an executable file. When activated, the program declares variables and functions to be called from a dynamic link library (DLL) that is attached to the operating system; an initial form load is performed as well. The latter comprises setting the screen color as specified by integers R, G, and B in the range 0 to 255, as mentioned above. In FIG. 6, the initial setting of the screen color is labeled as 50. Another action of the form load routine is the computation 51 of the sine function at eight equally spaced points, I=0 to 7, around the unit circle. These values are needed when modulating the RGB numbers. Unfortunately, the sine function is distorted by the rounding to integer RGB values that occurs in the VB6 program. The image is chosen to fill as much of the screen area as possible, and it has spatially uniform luminance and hue.

The form appearing on the monitor displays a command button for starting and stopping the image pulsing, together with scroll bars 52 and 53 respectively for adjustment of the pulse frequency F and the pulse amplitude A. These pulses could be initiated by a system timer which is activated upon the elapse of a preset time interval. However, timers in VB6 are too inaccurate for the purpose of providing the eight RGB adjustment points in each pulse cycle. An improvement can be obtained by using the GetTickCount function that is available in the Application Program Interface (API) of Windows 95(R) and Windows 98(R). The GetTickCount function returns the system time that has elapsed since starting Windows, expressed in milliseconds. User activation of the start button 54 provides a tick count TN through request 55 and sets the timer interval to TT miliseconds, in step 56. TT was previously calculated in the frequency routine that is activated by changing the frequency, denoted as step 52.

Since VB6 is an event-driven program, the flow chart for the program falls into disjoint pieces. Upon setting the timer interval to TT in step 56, the timer runs in the background while the program may execute subroutines such as adjustment of pulse frequency or amplitude. Upon elapse of the timer interval TT, the timer subroutine 57 starts execution with request 58 for a tick count, and in 59 an upgrade is computed of the time TN for the next point at which the RGB values are to be adjusted. In step 59 the timer is turned off, to be reactivated later in step 67. Step 59 also resets the parameter CR which plays a role in the extrapolation procedure 61 and the condition 60. For ease of understanding at this point, it is best to pretend that the action of 61 is simply to get a tick count, and to consider the loop controled by condition 60 while keeping CR equal to zero. The loop would terminate when the tick count M reaches or exceeds the time TN for the next phase point, at which time the program should adjust the image intensity through steps 63-65. For now step 62 is to be ignored also, since it has to do with the actual extrapolation procedure 61. The increments to the screen colors R1, G1, and B1 at the new phase point are computed according to the sine function, applied with the amplitude A that was set by the user in step 53. The number I that labels the phase point is incremented by unity in step 65, but if this results in I=8 the value is reset to zero in 66.

Finally, the timer is reactivated in step 67, initiating a new 1/8-cycle step in the periodic progression of RGB adjustments.

A program written in this way would exhibit a large jitter in the times at which the RGB values are changed. This is due to the lumpiness in the tick counts returned by the GetTickCount function. The lumpiness may be studied separately by running a simple loop with C=GetTickCount, followed by writing the result C to a file. Inspection shows that C has jumped every 14 or 15 milliseconds, between long stretches of constant values. Since for a 1/2 Hz image intensity modulation the 1/8-cycle phase points are 250 ms apart, the lumpiness of 14 or 15 ms in the tick count would cause considerable inaccuracy. The full extrapolation procedure 61 is introduced in order to diminish the jitter to acceptable levels. The procedure works by refining the heavy-line staircase function shown in FIG. 8, using the slope RR of a recent staircase step to accurately determine the loop count 89 at which the loop controled by 60 needs to be exited. Details of the extrapolation procedure are shown in FIG. 7 and illustrated in FIG. 8. The procedure starts at 70 with both flags off, and CR=0, because of the assignment in 59 or 62 in FIG. 6. A tick count M is obtained at 71, and the remaining time MR to the next phase point is computed in 72. Conditions 77 and 73 are not satisfied and therefore passed vertically in the flow chart, so that only the delay block 74 and the assignments 75 are executed. Condition 60 of FIG. 6 is checked and found to be satisfied, so that the extrapolation procedure is reentered. The process is repeated until the condition 73 is met when the remaining time MR jumps down through the 15 ms level, shown in FIG. 8 as the transition 83. The condition 73 then directs the logic flow to the assignments 76, in which the number DM labeled by 83 is computed, and FLG1 is set. The computation of DM is required for finding the slope RR of the straight-line element 85. One also needs the "Final LM" 86, which is the number of loops traversed from step 83 to the next downward step 84, here shown to cross the MR=0 axis. The final LM is determined after repeatedly incrementing LM through the side loop entered from the FLG1=1 condition 77, which is now satisfied since FLG1 was set in step 76. At the transition 84 the condition 78 is met, so that the assignments 79 are executed. This includes computation of the slope RR of the line element 85, setting FLG2, and resetting FLG1. From here on, the extrapolation procedure increments CR in steps of RR while skipping tick counts until condition 60 of FIG. 6 is violated, the loop is exited, and the RGB values are adjusted.

A delay block 74 is used in order to stretch the time required for traversing the extrapolation procedure. The block can be any computation intensive subroutine such as repeated calculations of tangent and arc tangent functions.

As shown in step 56 of FIG. 6, the timer interval TT is set to 4/10 of the time TA from one RGB adjustment point to the next. Since the timer runs in the background, this arrangement provides an opportunity for execution of other processes such as user adjustment of frequency or amplitude of the pulses.

The adjustment of the frequency and other pulse parameters of the image intensity modulation can be made internally, i.e., within the running program. Such internal control is to be distinguished from the external control provided, for instance, in screen savers. In the latter, the frequency of animation can be modified by the user, but only after having exited the screen saver program. Specifically, in Windows 95(R) or Windows 98(R), to change the animation frequency requires stopping the screen saver execution by moving the mouse, whereafter the frequency may be adjusted through the control panel. The requirement that the control be internal sets the present program apart from so-called banners as well.

The program may be run on a remote computer that is linked to the user computer, as illustrated in FIG. 9. Although the monitor 2, labeled "MON", is connected to the computer 31', labeled "COMPUTER", the program that pulses the images on the monitor 2 runs on the remoter computer 90, labeled "REMOTE COMPUTER", which is connected to computer 31' through a link 91 which may in part belong to a network. The network may comprise the Internet 92.

The monitor of a television set emits an electromagnetic field in much the same way as a computer monitor. Hence, a TV may be used to produce screen emissions for the purpose of nervous system manipulation. FIG. 5 shows such an arrangement, where the pulsing of the image intensity is achieved by inducing a small slowly pulsing shift in the frequency of the RF signal that enters from the antenna. This process is here called "frequency wobbling" of the RF signal. In FM TV, a slight slow frequency wobble of the RF signal produces a pseudo-dc signal level fluctuation in the composite video signal, which in turn causes a slight intensity fluctuation of the image displayed on the monitor in the same manner as discussed above for the modulator of FIG. 2. The frequency wobbling is induced by the wobbler 44 of FIG. 5 labeled "RFM", which is placed in the antenna line 43. The wobbler is driven by the pulse generator 6, labeled "GEN". The subject can adjust the frequency and the amplitude of the wobble through the tuning control 7 and the amplitude control 41. FIG. 10 shows a block diagram of the frequency wobbler circuit that employs a variable delay line 94, labelled "VDL". The delay is determined by the signal from pulse generator 6, labelled "GEN". The frequency of the pulses can be adjusted with the tuning control 7. The amplitude of the pulses is determined by the unit 98, labelled "MD", and can be adjusted with the amplitude control 41. Optionally, the input to the delay line may be routed through a preprocessor 93, labelled "PRP", which may comprise a selective RF amplifier and down converter; a complimentary up conversion should then be performed on the delay line output by a postprocessor 95, labelled "POP". The output 97 is to be connected to the antenna terminal of the TV set.

The action of the variable delay line 94 may be understood as follows. Let periodic pulses with period L be presented at the input. For a fixed delay the pulses would emerge at the output with the same period L. Actually, the time delay T is varied slowly, so that it increases approximately by LdT/dt between the emergence of consecutive pulses at the device output. The pulse period is thus increased approximately by

.DELTA.L=LdT/dt. (4)

In terms of the frequency .intg., Eq. (4) implies approximately

.DELTA..intg./.intg.=-dT/dt. (5)

For sinusoidal delay T(t) with amplitude b and frequency g, one has

.DELTA..intg./.intg.=-2.pi.gb cos (2.pi.gt), (6)

which shows the frequency wobbling. The approximation is good for gb<<1, which is satisfied in practice. The relative frequency shift amplitude 2.pi.gb that is required for effective image intensity pulses is very small compared to unity. For a pulse frequency g of the order of 1 Hz, the delay may have to be of the order of a millisecond. To accomodate such long delay values, the delay line may have to be implemented as a digital device. To do so is well within the present art. In that case it is natural to also choose digital implementations for the pulse generator 6 and the pulse amplitude controller 98, either as hardware or as software.

Pulse variability may be introduced for alleviating the need for precise tuning to a resonance frequency. This may be important when sensory resonance frequencies are not precisely known, because of the variation among individuals, or in order to cope with the frequency drift that results from chemical detuning that is discussed in the '874 patent. A field with suitably chosen pulse variability can then be more effective than a fixed frequency field that is out of tune. One may also control tremors and seizures, by interfering with the pathological oscillatory activity of neural circuits that occurs in these disorders. Electromagnetic fields with a pulse variability that results in a narrow spectrum of frequencies around the frequency of the pathological oscillatory activity may then evoke nerve signals that cause phase shifts which diminish or quench the oscillatory activity.

Pulse variability can be introduced as hardware in the manner described in the '304 patent. The variability may also be introduced in the computer program of FIG. 6, by setting FLG3 in step 68, and choosing the amplitude B of the frequency fluctuation. In the variability routine 46, shown in some detail in FIG. 13, FLG3 is detected in step 47, whereupon in steps 48 and 49 the pulse frequency F is modified pseudo randomly by a term proportional to B, every 4th cycle. Optionally, the amplitude of the image intensity pulsing may be modified as well, in similar fashion. Alternatively, the frequency and amplitude may be swept through an adjustable ramp, or according to any suitable schedule, in a manner known to those skilled in the art. The pulse variability may be applied to subliminal image intensity pulses.

When an image is displayed by a TV monitor in response to a TV broadcast, intensity pulses of the image may simply be imbedded in the program material. If the source of video signal is a recording medium, the means for pulsing the image intensity may comprise an attribute of recorded data. The pulsing may be subliminal. For the case of a video signal from a VCR, the pertinent data attribute is illustrated in FIG. 11, which shows a video signal record on part of a video tape 28. Depicted schematically are segments of the video signal in intervals belonging to lines in three image frames at different places along the tape. In each segment, the chroma signal 9 is shown, with its short-term average level 29 represented as a dashed line. The short-term average signal level, also called the pseudo-dc level, represents the luminance of the image pixels. Over each segment, the level is here constant because the image is for simplicity chosen as having a uniform luminance over the screen. However, the level is seen to vary from frame to frame, illustrating a luminance that pulses slowly over time. This is shown in the lower portion of the drawing, wherein the IRE level of the short-term chroma signal average is plotted versus time. The graph further shows a gradual decrease of pulse amplitude in time, illustrating that luminance pulse amplitude variations may also be an attribute of the recorded data on the video tape. As discussed, pulsing the luminance for fixed chrominance results in pulsing of the image intensity.

Data stream attributes that represent image intensity pulses on video tape or in TV signals may be created when producing a video rendition or making a moving picture of a scene, simply by pulsing the illumination of the scene. This is illustrated in FIG. 12, which shows a scene 19 that is recorded with a video camera 18, labelled "VR". The scene is illuminated with a lamp 20, labelled "LAMP", energized by an electric current through a cable 36. The current is modulated in pulsing fashion by a modulator 30, labeled "MOD", which is driven by a pulse generator 6, labelled "GENERATOR", that produces voltage pulses 35. Again, pulsing the luminance but not the chrominance amounts to pulsing the image intensity.

The brightness of monitors can usually be adjusted by a control, which may be addressable through a brightness adjustment terminal. If the control is of the analog type, the displayed image intensity may be pulsed as shown in FIG. 15, simply by a pulse generator 6, labeled "GEN", that is connected to the brigthness adjustment terminal 88 of the monitor 2, labeled "MON". Equivalent action can be provided for digital brightness controls, in ways that are well known in the art.

The analog component video signal from a DVD player may be modulated such as to overlay image intensity pulses in the manner illustrated in FIG. 17. Shown are a DVD player 102, labeled "DVD", with analog component video output comprised of the luminance Y and chrominance C. The overlay is accomplished simply by shifting the luminance with a voltage pulse from generator 6, labeled "GENERATOR". The generator output is applied to modulator 106, labeled "SHIFTER". Since the luminance Y is pulsed without changing the chrominance C, the image intensity is pulsed. The frequency and amplitude of the image intensity pulses can be adjusted respectively with the tuner 7 and amplitude control 107. The modulator 105 has the same structure as the modulator of FIG. 2, and the pulse amplitude control 107 operates the potentiometer 15 of FIG. 2. The same procedure can be followed for editing a DVD such as to overlay image intensity pulses, by processing the modulated luminance signal through an analog-to-digital converter, and recording the resulting digital stream onto a DVD, after appropriate compression. Alternatively, the digital luminance data can be edited by electronic reading of the signal, decompression, altering the digital data by software, and recording the resulting digital signal after proper compression, all in a manner that is well known in the art.

The mechanism whereby a CRT-type monitor emits a pulsed electromagnetic field when pulsing the intensity of an image is illustrated in FIG. 14. The image is produced by an electron beam 10 which impinges upon the backside 88 of the screen, where the collisions excite phosphors that subsequently emit light. In the process, the electron beam deposits electrons 18 on the screen, and these electrons contribute to an electric field 3 labelled "E". The electrons flow along the conductive backside 88 of the screen to the terminal 99 which is hooked up to the high-voltage supply 40, labelled "HV". The circuit is completed by the ground connection of the supply, the video amplifier 87, labeled "VA", and its connection to the cathodes of the CRT. The electron beams of the three electron guns are collectively shown as 10, and together the beams carry a current J. The electric current J flowing through the described circuit induces a magnetic field 39, labeled "B". Actually, there are a multitude of circuits along which the electron beam current is returned to the CRT cathodes, since on a macroscopic scale the conductive back surface 88 of the screen provides a continuum of paths from the beam impact point to the high-voltage terminal 99. The magnetic fields induced by the currents along these paths partially cancel each other, and the resulting field depends on the location of the pixel that is addressed. Since the beams sweep over the screen through a raster of horizontal lines, the spectrum of the induced magnetic field contains strong peaks at the horizontal and vertical frequencies. However, the interest here is not in fields at those frequencies, but rather in emissions that result from an image pulsing with the very low frequencies appropriate to sensory resonances. For this purpose a diffuse electron current model suffices, in which the pixel discreteness and the raster motion of the electron beams are ignored, so that the beam current becomes diffuse and fills the cone subtended by the displayed image. The resulting low-frequency magnetic field depends on the temporal changes in the intensity distribution over the displayed image. Order-of-magnitude estimates show that the low-frequency magnetic field, although quite small, may be sufficient for the excitation of sensory resonances in subjects located at a normal viewing distance from the monitor.

The monitor also emits a low-frequency electric field at the image pulsing frequency. This field is due in part to the electrons 18 that are deposited on the screen by the electron beams 10. In the diffuse electron beam model, screen conditions are considered functions of the time t and of the Cartesian coordinates x and y over a flat CRT screen.

The screen electrons 18 that are dumped onto the back of the screen by the sum j(x,y,t) of the diffuse current distributions in the red, green, and blue electron beams cause a potential distribution V(x,y,t) which is influenced by the surface conductivity .sigma. on the back of the screen and by capacitances. In the simple model where the screen has a capacitance distribution c(x,y) to ground and mutual capacitances between parts of the screen at different potentials are neglected, a potential distribution V(x,y,t) over the screen implies a surface charge density distribution

q=Vc(x,y), (7)

and gives rise to a current density vector along the screen,

j.sub.s =-.sigma.grad.sub.s V, (8)

where grad.sub.s is the gradient along the screen surface. Conservation of electric charge implies

j=cV-div.sub.s (.sigma.grad.sub.s V), (9)

where the dot over the voltage denotes the time derivative, and div.sub.s is the divergence in the screen surface. The partial differential equation (9) requires a boundary condition for the solution V(x,y,t) to be unique. Such a condition is provided by setting the potential at the rim of the screen equal to the fixed anode voltage. This is a good approximation, since the resistance R.sub.r between the screen rim and the anode terminal is chosen small in CRT design, in order to keep the voltage loss JR.sub.r to a minimum, and also to limit low-frequency emissions.

Something useful can be learned from special cases with simple solutions. As such, consider a circular CRT screen of radius R with uniform conductivity, showered in the back by a diffuse electron beam with a spatially uniform beam current density that is a constant plus a sinusoidal part with frequency .intg.. Since the problem is linear, the voltage V due to the sinusoidal part of the beam current can be considered separately, with the boundary condition that V vanish at the rim of the circular screen. Eq. (9) then simplifies to

V"+V"/r-i2.pi..intg.cn V=-J.eta./A, r.ltoreq.R, (10)

where r is a radial coordinate along the screen with its derivative denoted by a prime, .eta.=1/.sigma. is the screen resistivity, A the screen area, J the sinusoidal part of the total beam current, and i=(-1), the imaginary unit. Our interest is in very low pulse frequencies .intg. that are suitable for excitation of sensory resonances. For those frequencies and for practical ranges for c and .eta., the dimensionless number 2.pi..intg.cA.eta. is very much smaller than unity, so that it can be neglected in Eq. (10). The boundary value problem then has the simple solution ##EQU1##

In deriving (11) we neglected the mutual capacitance between parts of the screen that are at different potentials. The resulting error in (10) is negligible for the same reason that the i2.pi..intg.cA.eta. term in (10) can be neglected.

The potential distribution V(r) of (11) along the screen is of course accompanied by electric charges. The field lines emanating from these charges run mainly to conductors behind the screen that belong to the CRT structure and that are either grounded or connected to circuitry with a low impedance path to ground. In either case the mentioned conductors must be considered grounded in the analysis of charges and fields that result from the pulsed component J of the total electron beam current. The described electric field lines end up in electric charges that may be called polarization charges since they are the result of the polarization of the conductors and circuitry by the screen emission. To estimate the pulsed electric field, a model is chosen where the mentioned conductors are represented together as a grounded perfectly conductive disc of radius R, positioned a short distance .delta. behind the screen, as depicted in FIG. 16. Since the grounded conductive disc carries polarization charges, it is called the polarization disc. FIG. 16 shows the circular CRT screen 88 and the polarization disc 101, briefly called "plates". For small distances .delta., the capacitance density between the plates of opposite polarity is nearly equal to .epsilon./.delta., where .epsilon. is the permittivity of free space. The charge distributions on the screen and polarization disc are respectively .epsilon.V(r)/.delta.+q.sub.0 and -.epsilon.V(r)/.delta.+q.sub.0, where the .epsilon.V(r)/.delta. terms denote opposing charge densities at the end of the dense field lines that run between the two plates. That the part q.sub.0 is needed as well will become clear in the sequel.

The charge distributions .epsilon.V(r)/.delta.+q.sub.0 and -.epsilon.V(r)/.delta.+q.sub.0 on the two plates have a dipole moment with the density ##EQU2##

directed perpendicular to the screen. Note that the plate separation .delta. has dropped out. This means that the precise location of the polarization charges is not critical in the present model, and further that .delta. may be taken as small as desired. Taking .delta. to zero, one thus arrives at the mathematical model of pulsed dipoles distributed over the circular CRT screen. The field due to the charge distribution q.sub.0 will be calculated later.

The electric field induced by the distributed dipoles (12) can be calculated easily for points on the centerline of the screen, with the result ##EQU3##

where V(0) is the pulse voltage (11) at the screen center, .rho. the distance to the rim of the screen, and z the distance to the center of the screen. Note that V(0) pulses harmonically with frequency .intg., because in (11) the sinusoidal part J of the beam current varies in this manner.

The electric field (13) due to the dipole distribution causes a potential distribution V(r)/2 over the screen and a potential distribution of -V(r)/2 over the polarization disc, where V(r) is nonuniform as given by (11). But since the polarization disc is a perfect conductor it cannot support voltage gradients, and therefore cannot have the potential distribution -V(r)/2. Instead, the polarization disc is at ground potential. This is where the charge distribution q.sub.0 (r) comes in; it must be such as to induce a potential distribution V(r)/2 over the polarization disc. Since the distance between polarization disc and screen vanishes in the mathematical model, the potential distribution V(r)/2 is induced over the screen as well. The total potential over the monitor screen thus becomes V(r) of (11), while the total potential distribution over the polarization disc becomes uniformly zero. Both these potential distributions are as physically required. The electric charges q.sub.0 are moved into position by polarization and are partly drawn from the earth through the ground connection of the CRT.

In our model the charge distribution q.sub.0 is located at the same place as the dipole distribution, viz., on the plane z=0 within the circle with radius R. At points on the center line of the screen, the electric field due to the monopole distribution q.sub.0 is calculated in the following manner. As discussed, the monopoles must be such that they cause a potential .phi..sub.0 that is equal to V(r)/2 over the disc with radius R centered in the plane z=0. Although the charge distribution q.sub.0 (r) is uniquely defined by this condition, it cannot be calculated easily in a straightforward manner. The difficulty is circumvented by using an intermediate result derived from Exercise 2 on page 191 of Kellogg (1953), where the charge distribution over a thin disc with uniform potential is given. By using this result one readily finds the potential .phi.*(z) on the axis of this disc as ##EQU4##

where .beta.(R.sub.1) is the angle subtended by the disc radius R.sub.1, as viewed from the point z on the disc axis, and V* is the disc potential. The result is used here in an attempt to construct the potential .phi..sub.0 (z) for a disc with the nonuniform potential V(r)/2, by the ansatz of writing the field as due to a linear combination of abstract discs with various radii R.sub.1 and potentials, all centered in the plane z=0. In the ansatz the potential on the symmetry axis is written ##EQU5##

where W is chosen as the function 1-R.sub.1.sup.2 /R.sup.2, and the constants a and b are to be determined such that the potential over the plane z=0 is V(r)/2 for radii r ranging from 0 to R, with V(r) given by (11). Carrying out the integration in (15) gives

.phi..sub.0 (z)=.alpha..beta.(R)-b{(1+z.sup.2 /R.sup.2).beta.(R)-.vertline.z.vertline./R}. (16)

In order to find the potential over the disc r<R in the plane z=0, the function .phi..sub.0 (z) is expanded in powers of z/R for 0<z<R, whereafter the powers z.sup.n are replaced by r.sup.n P.sub.n (cos.theta.), where the P.sub.n are Legendre polynomials, and (r,.theta.) are symmetric spherical coordinates centered at the screen center. This procedure amounts to a continuation of the potential from the z-axis into the half ball r<R, z>0, in such a manner that the Laplace equation is satisfied. The method is discussed by Morse and Feshbach (1953). The "Laplace continuation" allows calculation of the potential .phi..sub.0 along the surface of the disc r<R centered in the plane z=0. The requirement that this potential be V(r)/2 with the function V(r) given by (11) allows solving for the constants a and b, with the result

a=-V(0)/.pi., b=-2V(0)/.pi.. (17)

Using (17) in (16) gives ##EQU6##

and by differentiation with respect to z one finally finds ##EQU7##

for the electric field on the center line of the screen brought about by the charge distribution q.sub.0 (z).

The center-line electric field is the sum of the part (13) due to distributed pulsed dipoles and part (19) due to distributed pulsed monopoles. Although derived for circular screens, the results may serve as an approximation for other shapes, such as the familiar rounded rectangle, by taking R as the radius of a circle that has the same area as the screen.

For two CRT-type monitors the pulsed electric field due to image intensity pulsing has been measured at several points on the screen center line for pulse frequencies of 1/2 Hz. The monitors were the 15" computer monitor used in the sensory resonance experiments mentioned above, and a 30" TV tube. The experimental results need to be compared with the theory derived above. Since R is determined by the screen area, the electric fields given by (13) and (19) have as only free parameter the pulse voltage V(0) at the screen center. The amplitude of this voltage can therefore be determined for the tested monitors by fitting the experimental data to the theoretical results. Prior to fitting, the data were normalized to an image that occupies the entire screen and is pulsed uniformly with a 100% intensity amplitude. The results of the one-parameter fit are displayed in FIG. 18, which shows the theoretical graph 100, together with the normalized experimental data points 103 for the 15- computer monitor and for the 30" TV tube. FIG. 18 shows that the developed theory agrees fairly well with the experimental results. From the best fit one can find the center-screen voltage pulse amplitudes. The results, normalized as discussed above, are .vertline.V(0).vertline.=266.2 volt for the 15" computer monitor and .vertline.V(0).vertline.=310.1 volt for the 30" TV tube. With these amplitudes in hand, the emitted pulsed electric field along the center line of the monitors can be calculated from the sum of the fields (13) and (19). For instance, for the 15" computer monitor with 1.8% RGB pulse modulation used in the 1/2 Hz sensory resonance experiments mentioned above, the pulsed electric field at the center of the subject, located at z=70 cm on the screen center line, is calculated as having an amplitude of 0.21 V/m. That such a pulsed electric field, applied to a large portion of the skin, is sufficient for exciting the 1/2 Hz sensory resonance is consistent with experimental results discussed in the '874 patent.

In deriving (11), the dimensionless number 2.pi..intg.cA.eta. was said to be much smaller than unity. Now that the values for .vertline.V(0).vertline. are known, the validity of this statement can be checked. Eq. (11) implies that .vertline.V(0).vertline. is equal to .eta..vertline.J.vertline./4.pi.. The sum of the beam currents in the red, green, and blue electron guns for 100% intensity modulation is estimated to have pulse amplitudes .vertline.J.vertline. of 0.5 mA and 2.0 mA respectively for the 15" computer monitor and the 30" TV tube. Using the derived values for .vertline.V(0).vertline., one arrives at estimates for the screen resistivity .eta. as 6.7 M.OMEGA./square and 1.9 M.OMEGA./square respectively for the 15" computer monitor and the 30" TV tube. Estimating the screen capacity cA as 7 pf and 13 pf, 2.pi..intg.cA.eta. is found to be 148.times.10.sup.-6 and 78.times.10.sup.-6, respectively for the 15" computer monitor and the 30" TV tube. These numbers are very small compared to unity, so that the step from (10) to (11) is valid.

The following procedures were followed in preparing pulsed images for the field measurements. For the 15" computer monitor the images were produced by running the VB6 program discussed above. The pulsed image comprised the full screen with basic RGB values chosen uniformly as R=G=B=127, with the exception of an on/off button and a few data boxes which together take up 17% of the screen area. The image intensity was pulsed by modifying the R, G, and B values by integer-rounded sine functions .DELTA.R(t), .DELTA.G(t), and .DELTA.B(t), uniformly over the image, except at the button and the data boxes. The measured electric field pulse amplitudes were normalized to a pulsed image that occupies all of the screen area and has 100% intensity modulation for which the image pulses between black and the maximum intensity, for the fixed RGB ratios used. The image intensity depends on the RGB values in a nonlinear manner that will be be discussed. For the measurements of the pulsed electric field emitted by 30" TV tube, a similar image was used as for the 15" computer monitor. This was done by playing back a camcorder recording of the computer monitor display when running the VB6 program, with 40% pulse modulation of R, G, and B.

In front of the monitor, i.e., for z>0, the parts (13) and (19) contribute about equally to the electric field over a practical range of distances z. When going behind the monitor where z is negative the monopole field flips sign so that the two parts nearly cancel each other, and the resulting field is very small. Therefore, in the back of the CRT, errors due to imperfections in the theory are relatively large. Moreover our model, which pretends that the polarization charges are all located on the polarization disc, fails to account for the electric field flux that escapes from the outer regions of the back of the screen to the earth or whatever conductors happen to be present in the vicinity of the CRT. This flaw has relatively more serious consequences in the back than in front of the monitor.

Screen emissions in front of a CRT can be cut dramatically by using a grounded conductive transparent shield that is placed over the screen or applied as a coating. Along the lines of our model, the shield amounts to a polarization disc in front of the screen, so that the latter is now sandwiched between to grounded discs. The screen has the pulsed potential distribution V(r) of (11), but no electric flux can escape. The model may be modified by choosing the polarization disc in the back somewhat smaller than the screen disc, by a fraction that serves as a free parameter. The fraction may then be determined from a fit to measured fields, by minimizing the relative standard deviation between experiment and theory.

In each of the electron beams of a CRT, the beam current is a nonlinear function of the driving voltage, i.e., the voltage between cathode and control grid. Since this function is needed in the normalization procedure, it was measured for the 15" computer monitor that has been used in the 1/2 Hz sensory resonance experiments and the electric field measurements. Although the beam current density j can be determined, it is easier to measure the luminance, by reading a light meter that is brought right up to the monitor screen. With the RGB values in the VB6 program taken as the same integer K, the luminance of a uniform image is proportional to the image intensity I. The luminance of a uniform image was measured for various values of K. The results were fitted with

I=c.sub.1 K.sup..gamma., (20)

where c.sub.1 is a constant. The best fit, with 6.18% relative standard deviation, was obtained for .gamma.=2.32.

Screen emissions also occur for liquid crystal displays (LCD). The pulsed electric fields may have considerable amplitude for LCDs that have their driving electrodes on opposite sides of the liquid crystal cell, for passive matrix as well as for active matrix design, such as thin film technology (TFT). For arrangements with in-plane switching (IPS) however, the driving electrodes are positioned in a single plane, so that the screen emission is very small. For arrangements other than IPS, the electric field is closely approximated by the fringe field of a two-plate condenser, for the simple case that the image is uniform and extends over the full screen. For a circular LCD screen with radius R, the field on the center line can be readily calculated as due to pulsed dipoles that are uniformly distributed over the screen, with the result

E.sub.d (z)=(1/2)VR.sup.2 /(z.sup.2 +R.sup.2).sup.3/2, (21)

where E.sub.d (z) is the amplitude of the pulsed electric field at a distance z from the screen and V is a voltage pulse amplitude, in which the aperture ratio of the LCD has been taken into account. Eq. (21) can be used as an approximation for screens of any shape, by taking R as the radius of a circle with the same area as the screen. The result applies to the case that the LCD does not have a ground connection, so that the top and bottom electrodes are at opposite potential, i.e., V/2 and -V/2.

If one set of LCD electrodes is grounded, monopoles are needed to keep these electrodes at zero potential, much as in the case of a CRT discussed above. The LCD situation is simpler however, as there is no charge injection by electron beams, so that the potentials on the top and bottom plates of the condenser in the model are spatially uniform. From (14) it is seen that monopoles, distributed over the disc of radius R in the plane z=0 such as to provide on the disc a potential V/2, induce on the symmetry axis a potential ##EQU8##

Differentiating with respect to z gives the electric field on the symmetry axis ##EQU9##

induced by the pulsed monopoles. For an LCD with one set of electrodes grounded, the pulsed electric field for screen voltage pulse amplitude V at a distance z from the screen on the center line has an amplitude that is the sum of the parts (21) and (23). The resultant electric field in the back is relatively small, due to the change in sign in the monopole field that is caused by the factor z/.vertline.z.vertline.. Therefore, screen emissions in front of an LCD can be kept small simply by having the grounded electrodes in front.

As a check on the theory, the pulsed electric field emitted by the 3" LCD-TFT color screen of the camcorder mentioned above has been measured at eleven points on the center line of the screen, ranging from 4.0 cm to 7.5 cm. The pulsed image was produced by playing back the video recording of the 15" computer monitor that was made while running the VB6 program discussed above, for a image intensity pulse frequency of 1/2 Hz, R=G=B=K, modulated around K=127 with an amplitude .DELTA.K=51. After normalization to a uniform full screen image with 100% intensity modulation by using the nonlinear relation (20), the experimental data were fitted to the theoretical curve that expresses the sum of the fields (21) and (23). The effective screen pulse voltage amplitude V was found to be 2.1 volt. The relative standard deviation in V for the fit is 5.1%, which shows that theory and experiment are in fairly good agreement.

Certain monitors can cause excitation of sensory resonances even when the pulsing of displayed images is subliminal, i.e., unnoticed by the average person. When checking this condition on a computer monitor, a problem arises because of the rounding of RGB values to integers, as occurs in the VB6 program. For small pulse amplitude the sine wave is thereby distorted into a square wave, which is easier to spot. This problem is alleviated somewhat by choosing .DELTA.R=0, .DELTA.G=0, and .DELTA.B=2, since then the 8 rounded sine functions around the unit circle, multiplied with the pulse amplitude .DELTA.B=2 become the sequence 1, 2 11 2, 1, -1 -2, -2, -1, etc, which is smoother to the eye than a square wave. Using the VB6 program and the 15" computer monitor mentioned above with R=71, G=71, and B=233, a 1/2 Hz pulse modulation with amplitudes .DELTA.R=.DELTA.G=0 and .DELTA.B=2 could not be noticed by the subject, and is therefore considered subliminal. It is of interest to calculate the screen emission for this case, and conduct a sensory resonance experiment as well. A distance z=60 cm was chosen for the calculation and the experiment. Using Eq. (20), the image intensity pulse modulation for the case is found to be 1.0% of the maximum intensity modulation. Using R=13.83 cm together with .vertline.V(0).vertline.=266.2 V for the 15" computer monitor, and the theoretical graph 100 of FIG. 18, the pulsed electric field at z=60 cm was found to have an amplitude of 138 mV/m. In view of the experimental results discussed in the '874 and '922 patents, such a field, used at a pulse frequency chosen appropriately for the 1/2 Hz sensory resonance and applied predominantly to the face, is expected to be sufficient for exciting the 1/2 Hz sensory resonance. A confirmation experiment was done by running the VB6 program with the discussed settings and the 15" monitor. The center of the subject's face was positioned on the screen center line, at a distance of 60 cm from the screen. A frequency sweep of -0.1% per ten cycles was chosen, with an initial pulse frequency of 34 ppm. Full ptosis was experienced by the subject at 20 minutes into the run, when the pulse frequency was f=31.76 ppm. At 27 minutes into the run, the frequency sweep was reversed to +0.1% per ten cycles. Full ptosis was experienced at f=31.66 ppm. At 40 minutes into the run, the frequency sweep was set to -0.1% per ten cycles. Full ptosis occurred at f=31.44 ppm. The small differences in ptosis frequency are attributed to chemical detuning, discussed in the Background Section. It is concluded that the 1/2 Hz sensory resonance was excited in this experiment by screen emissions from subliminal image pulsing on the 15" computer monitor at a distance of 60 cm. For each implementation and embodiment discussed, the image pulsing may be subliminal.

The human eye is less sensitive to changes in hue than to changes in brightness. In composite video this fact allows using a chrominance bandwidth that is smaller than the luminance bandwidth. But it also has the consequence that pulsing of the chrominance for fixed luminance allows larger pulse amplitudes while staying within the subliminal pulse regime. Eq. (3) shows how to pulse the chrominance components R-Y and B-Y while keeping Y fixed; for the change in pixel intensity one then has

.DELTA.I.sub.h =0.491.DELTA.(R-Y)+0.806.DELTA.(B-Y). (24)

Luminance pulses with fixed chrominance give a change in pixel intensity

.DELTA.I.sub.1 =3.DELTA.Y. (25)

Of course, pure chrominance pulses may be combined with pure luminance pulses; an instance of such combination has been mentioned above.

The subliminal region in color space needs to be explored to determine how marginally subliminal pulses .DELTA.R, .DELTA.G, and .DELTA.B depend on RGB values. Prior to this, the condition for image pulses to be subliminal should not be phrased solely in terms of the percentage of intensity pulse amplitude. The subliminal image pulsing case considered above, where the monitor is driven by a VB6 computer program with R=G=71, B=233, and .DELTA.R=.DELTA.G=0, .DELTA.B=2 for full-screen images will be referred to as "the standard subliminal image pulsing".

In the interest of the public we need to know the viewing distances at which a TV with subliminally pulsed images can cause excitation of sensory resonances. A rough exploration is reported here which may serve as starting point for further work. The exploration is limited to estimating the largest distance z=z.sub.max along the center line of the 30" TV at which screen emissions can excite the 1/2 Hz resonance, as determined by the ptosis test. The TV is to display an image which undergoes the standard subliminal pulsing as defined above. It would be best to perform this test with the 30" TV on which the subliminally pulsed images are produced by means of a video. Since such a video was not available, the ptosis test was conducted instead with a pulsed electric field source consisting of a small grounded doublet electrode of the type discussed in the '874 patent. The doublet was driven with a sinusoidal voltage of 10 V amplitude, and the center of mass of the subject was located on the center line of the doublet at a distance z=z.sub.d =323 cm. The doublet electrodes are rectangles of 4.4 cm by 4.7 cm. At the large distance z.sub.d there is whole-body exposure to the field, so that the bulk effect discussed in the '874 patent comes into play, as is expected to happen also at the distance z.sub.max from the 30" TV monitor. The subject was facing the "hot" electrode of the doublet, so that at the subject center the electric field was the sum of the parts (21) and (23), for positive values of z. It was thought important to use a sine wave, since that would be the "commercially" preferred pulse shape which allows larger pulse amplitudes without being noticed. The only readily available sine wave generator with the required voltage was an oscillator with a rather coarse frequency control that cannot be set accurately, although the frequency is quite stable and can be measured accurately. For the experiment a pulse frequency of 0.506 Hz was accepted, although it differs considerably from the steady ptosis frequency for this case. The subject experienced several ptosis cycles of moderate intensity, starting 8 minutes into the experiment run. It is concluded that the 1/2 Hz sensory resonance was excited, and that the stimulating field was close to the weakest field capable of excitation. From Eqs. (21) and (23), the electric field pulse amplitude at the center of mass of the subject was found to be 7.9 mV/m. That an electric field with such a small pulse amplitude, applied to the whole body, is capable of exciting the 1/2 Hz sensory resonance is consistent with experimental results reported in the '874 patent, although these were obtained for the 2.4 Hz resonance. Next, the distance z.sub.max was determined at which the 30" TV tube with 1% image intensity pulse amplitude produces an electric field with a pulse amplitude of 7.9 mV/m, along the center line of the screen. From Eqs. (13) and (19) one finds z.sub.max =362.9 cm. At more than 11 feet, this is a rather large distance for viewing a 30" TV. Yet, the experiment and theory discussed show that the 1/2 Hz sensory resonance can be excited at this large distance, by pulsing the image intensity subliminally. Of course, the excitation occurs as well for a range of smaller viewing distances. It is thus apparent that the human nervous system can be manipulated by screen emissions from subliminal TV image pulses.

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The invention is not limited by the embodiments shown in the drawings and described in the specification, which are given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

This next section is the actual application. You'll notice upon critical inspection that it's different in some areas and parts are missing in others altogether. It's these small little differences that make truth finding an almost impossible mission. Still, if you look closely they aren't exact duplicates. Also, if you research Hendricus G. Loos, you'll find out he had three papers published as early as 1963. They were papers on nuclear physics at first. My point is that it's too late to change the world now, those were the old days.

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NERVOUS SYSTEM MANIPULATION BY ELECTROMAGNETIC FIELDS FROM MONITORS

Abstract

Physiological effects have been observed in a human subject in response to stimulation of the skin with weak electromagnetic fields that are pulsed with certain frequencies near 1/2 Hz or 2.4 Hz, such as to excite a sensory resonance. Many computer monitors and TV tubes, when displaying pulsed images, emit pulsed electromagnetic fields of sufficient amplitudes to cause such excitation. It is therefore possible to manipulate the nervous system of a subject by pulsing images displayed on a nearby computer monitor or TV set. For the latter, the image pulsing may be imbedded in the program material, or it may be overlaid by modulating a video stream, either as an RF signal or as a video signal. The image displayed on a computer monitor may be pulsed effectively by a simple computer program. For certain monitors, pulsed electromagnetic fields capable of exciting sensory resonances in nearby subjects may be generated even as the displayed images are pulsed with ***subliminal*** intensity.

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Claims

I claim:

1. A method for manipulating the nervous system of a subject located near a monitor, the monitor emitting an electromagnetic field when displaying an image by virtue of the physical display process, the subject having a sensory resonance frequency, the method comprising: creating a video signal for displaying an image on the monitor, the image having an intensity; modulating the video signal for pulsing the image intensity with a frequency in the range 0.1 Hz to 15 Hz; and setting the pulse frequency to the resonance frequency.

2. A computer program for manipulating the nervous system of a subject located near a monitor, the monitor emitting an electromagnetic field when displaying an image by virtue of the physical display process, the subject having cutaneous nerves that fire spontaneously and have spiking patterns, the computer program comprising: a display routine for displaying an image on the monitor, the image having an intensity; a pulse routine for pulsing the image intensity with a frequency in the range 0.1 Hz to 15 Hz; and a frequency routine that can be internally controlled by the subject, for setting the frequency; whereby the emitted electromagnetic field is pulsed, the cutaneous nerves are exposed to the pulsed electromagnetic field, and the spiking patterns of the nerves acquire a frequency modulation.

3. The computer program of claim 2, wherein the pulsing has an amplitude and the program further comprises an amplitude routine for control of the amplitude by the subject.

4. The computer program of claim 2, wherein the pulse routine comprises: a timing procedure for timing the pulsing; and an extrapolation procedure for improving the accuracy of the timing procedure.

5. The computer program of claim 2, further comprising a variability routine for introducing variability in the pulsing.

6. Hardware means for manipulating the nervous system of a subject located near a monitor, the monitor being responsive to a video stream and emitting an electromagnetic field when displaying an image by virtue of the physical display process, the image having an intensity, the subject having cutaneous nerves that fire spontaneously and have spiking patterns, the hardware means comprising: pulse generator for generating voltage pulses; means, responsive to the voltage pulses, for modulating the video stream to pulse the image intensity; whereby the emitted electromagnetic field is pulsed, the cutaneous nerves are exposed to the pulsed electromagnetic field, and the spiking patterns of the nerves acquire a frequency modulation.

7. The hardware means of claim 6, wherein the video stream is a composite video signal that has a pseudo-dc level, and the means for modulating the video stream comprise means for pulsing the pseudo-dc level.

8. The hardware means of claim 6, wherein the video stream is a television broadcast signal, and the means for modulating the video stream comprise means for frequency wobbling of the television broadcast signal.

9. The hardware means of claim 6, wherein the monitor has a brightness adjustment terminal, and the means for modulating the video stream comprise a connection from the pulse generator to the brightness adjustment terminal.

10. A source of video stream for manipulating the nervous system of a subject located near a monitor, the monitor emitting an electromagnetic field when displaying an image by virtue of the physical display process, the subject having cutaneous nerves that fire spontaneously and have spiking patterns, the source of video signal comprising: means for defining an image on the monitor, the image having an intensity; and means for subliminally pulsing the image intensity with a frequency in the range 0.1 Hz to 15 Hz; whereby the emitted electromagnetic field is pulsed, the cutaneous nerves are exposed to the pulsed electromagnetic field, and the spiking patterns of the nerves acquire a frequency modulation.

11. The source of video stream of claim 10 wherein the source is a recording medium that has recorded data, and the means for subliminally pulsing the image intensity comprise an attribute of the recorded data.

12. The source of video stream of claim 10 wherein the source is a computer program, and the means for subliminally pulsing the image intensity comprise a pulse routine.

13. The source of video stream of claim 10 wherein the source is a recording of a physical scene, and the means for subliminally pulsing the image intensity comprise: pulse generator for generating voltage pulses; light source for illuminating the scene, the light source having a power level; and modulation means, responsive to the voltage pulses, for pulsing the power level.

14. The source of video stream of claim 10, wherein the source is a DVD, the video stream comprises a luminance signal and a chrominance signal, and the means for ***subliminal*** pulsing of the image intensity comprise means for pulsing the luminance signal.

Description

BACKGROUND OF THE INVENTION

[0001] The invention relates to the stimulation of the human nervous system by an electromagnetic field applied externally to the body. A neurological effect of external electric fields has been mentioned by Wiener (1958), in a discussion of the bunching of brain waves through nonlinear interactions. The electric field was arranged to provide "a direct electrical driving of the brain". Wiener describes the field as set up by a 10 Hz alternating voltage of 400 V applied in a room between ceiling and ground.

[0002] Brennan (1992) describes in U.S. Pat. No. 5,169,380 an apparatus for alleviating disruptions in circadian rythms of a mammal, in which an alternating electric field is applied across the head of the subject by two electrodes placed a short distance from the skin.

[0003] A device involving a field electrode as well as a contact electrode is the "Graham Potentializer" mentioned by Hutchison (1991). This relaxation device uses motion, light and sound as well as an alternating electric field applied mainly to the head. The contact electrode is a metal bar in Ohmic contact with the bare feet of the subject, and the field electrode is a hemispherical metal headpiece placed several inches from the subject's head.

[0004] In these three electric stimulation methods the external electric field is applied predominantly to the head, so that electric currents are induced in the brain in the physical manner governed by electrodynamics. Such currents can be largely avoided by applying the field not to the head, but rather to skin areas away from the head. Certain cutaneous receptors may then be stimulated and they would provide a signal input into the brain along the natural pathways of afferent nerves. It has been found that, indeed, physiological effects can be induced in this manner by very weak electric fields, if they are pulsed with a frequency near 1/2 Hz. The observed effects include ptosis of the eyelids, relaxation, drowziness, the feeling of pressure at a centered spot on the lower edge of the brow, seeing moving patterns of dark purple and greenish yellow with the eyes closed, a tonic smile, a tense feeling in the stomach, sudden loose stool, and sexual excitement, depending on the precise frequency used, and the skin area to which the field is applied. The sharp frequency dependence suggests involvement of a resonance mechanism.

[0005] It has been found that the resonance can be excited not only by externally applied pulsed electric fields, as discussed in U.S. Pat. Nos. 5,782,874, 5,899,922, 6081744, and 6,167,304, but also by pulsed magnetic fields, as described in U.S. Pat. Nos. 5,935,054 and 6,238,333, by weak heat pulses applied to the skin, as discussed in U.S. Pat. Nos. 5,800,481 and 6,091,994, and by ***subliminal*** acoustic pulses, as described in U.S. Pat. No. 6,017,302. Since the resonance is excited through sensory pathways, it is called a sensory resonance. In addition to the resonance near 1/2 Hz, a sensory resonance has been found near 2.4 Hz. The latter is characterized by the slowing of certain cortical processes, as discussed in the '481, '922, '302, '744, '944, and '304 patents.

[0006] The excitation of sensory resonances through weak heat pulses applied to the skin provides a clue about what is going on neurologically. Cutaneous temperature--sensing receptors are known to fire spontaneously. These nerves spike somewhat randomly around an average rate that depends on skin temperature. Weak heat pulses delivered to the skin in periodic fashion will therefore cause a slight frequency modulation (fm) in the spike patterns generated by the nerves. Since stimulation through other sensory modalities results in similar physiological effects, it is believed that frequency modulation of spontaneous afferent neural spiking patterns occurs there as well.

[0007] It is instructive to apply this notion to the stimulation by weak electric field pulses administered to the skin. The externally generated fields induce electric current pulses in the underlying tissue, but the current density is much too small for firing an otherwise quiescent nerve. However, in experiments with adapting stretch receptors of the crayfish, Terzuolo and Bullock (1956) have observed that very small electric fields can suffice for modulating the firing of already active nerves. Such a modulation may occur in the electric field stimulation under discussion.

[0008] Further understanding may be gained by considering the electric charges that accumulate on the skin as a result of the induced tissue currents. Ignoring thermodynamics, one would expect the accumulated polarization charges to be confined strictly to the outer surface of the skin. But charge density is caused by a slight excess in positive or negative ions, and thermal motion distributes the ions through a thin layer. This implies that the externally applied electric field actually penetrates a short distance into the tissue, instead of stopping abruptly at the outer skin surface. In this manner a considerable fraction of the applied field may be brought to bear on some cutaneous nerve endings, so that a slight modulation of the type noted by Terzuolo and Bullock may indeed occur.

[0009] The mentioned physiological effects are observed only when the strength of the electric field on the skin lies in a certain range, called the effective intensity window. There also is a bulk effect, in that weaker fields suffice when the field is applied to a larger skin area. These effects are discussed in detail in the 1922 patent.

[0010] Since the spontaneous spiking of the nerves is rather random and the frequency modulation induced by the pulsed field is very shallow, the signal to noise ratio (S/N) for the fm signal contained in the spike trains along the afferent nerves is so small as to make recovery of the fm signal from a single nerve fiber impossibile. But application of the field over a large skin area causes simultaneous stimulation of many cutaneous nerves, and the fm modulation is then coherent from nerve to nerve. Therefore, if the afferent signals are somehow summed in the brain, the fm modulations add while the spikes from different nerves mix and interlace. In this manner the S/N can be increased by appropriate neural processing. The matter is discussed in detail in the '874 patent. Another increase in sensitivity is due to involving a resonance mechanism, wherein considerable neural circuit oscillations can result from weak excitations.

[0011] An easily detectable physiological effect of an excited 1/2 Hz sensory resonance is ptosis of the eyelids. As discussed in the '922 patent, the ptosis test involves first closing the eyes about half way. Holding this eyelid position, the eyes are rolled upward, while giving up voluntary control of the eyelids. The eyelid position is then determined by the state of the autonomic nervous system. Furthermore, the pressure excerted on the eyeballs by the partially closed eyelids increases parasympathetic activity. The eyelid position thereby becomes somewhat labile, as manifested by a slight flutter. The labile state is sensitive to very small shifts in autonomic state. The ptosis influences the extent to which the pupil is hooded by the eyelid, and thus how much light is admitted to the eye. Hence, the depth of the ptosis is seen by the subject, and can be graded on a scale from 0 to 10.

[0012] In the initial stages of the excitation of the 1/2 Hz sensory resonance, a downward drift is detected in the ptosis frequency, defined as the stimulation frequency for which maximum ptosis is obtained. This drift is believed to be caused by changes in the chemical milieu of the resonating neural circuits. It is thought that the resonance causes perturbations of chemical concentrations somewhere in the brain, and that these perturbations spread by diffusion to nearby resonating circuits. This effect, called "chemical detuning", can be so strong that ptosis is lost altogether when the stimulation frequency is kept constant in the initial stages of the excitation. Since the stimulation then falls somewhat out of tune, the resonance decreases in amplitude and chemical detuning eventually diminishes. This causes the ptosis frequency to shift back up, so that the stimulation is more in tune and the ptosis can develop again. As a result, for fixed stimulation frequencies in a certain range, the ptosis slowly cycles with a frequency of several minutes. The matter is discussed in the '302 patent.

[0013] The stimulation frequencies at which specific physiological effects occur depend somewhat on the autonomic nervous system state, and probably on the endocrine state as well.

[0014] Weak magnetic fields that are pulsed with a sensory resonance frequency can induce the same physiological effects as pulsed electric fields. Unlike the latter however, the magnetic fields penetrate biological tissue with nearly undiminished strength. Eddy currents in the tissue drive electric charges to the skin, where the charge distributions are subject to thermal smearing in much the same way as in electric field stimulation, so that the same physiological effects develop. Details are discussed in the '054 patent.

SUMMARY

[0015] Computer monotors and TV monitors can be made to emit weak low-frequency electromagnetic fields merely by pulsing the intensity of displayed images. Experiments have shown that the 1/2 Hz sensory resonance can be excited in this manner in a subject near the monitor. The 2.4 Hz sensory resonance can also be excited in this fashion. Hence, a TV monitor or computer monitor can be used to manipulate the nervous system of nearby people.

[0016] The implementations of the invention are adapted to the source of video stream that drives the monitor, be it a computer program, a TV broadcast, a video tape or a digital video disc (DVD).

[0017] For a computer monitor, the image pulses can be produced by a suitable computer program. The pulse frequency may be controlled through keyboard input, so that the subject can tune to an individual sensory resonance frequency. The pulse amplitude can be controlled as well in this manner. A program written in Visual Basic(R) is particularly suitable for use on computers that run the Windows 95(R) or Windows 98(R) operating system. The structure of such a program is described. Production of periodic pulses requires an accurate timing procedure. Such a procedure is constructed from the GetTimeCount function available in the Application Program Interface (API) of the Windows operating system, together with an extrapolation procedure that improves the timing accuracy.

[0018] Pulse variability can be introduced through software, for the purpose of thwarting habituation of the nervous system to the field stimulation, or when the precise resonance frequency is not known. The variability may be a pseudo-random variation within a narrow interval, or it can take the form of a frequency or amplitude sweep in time. The pulse variability may be under control of the subject.

[0019] The program that causes a monitor to display a pulsing image may be run on a remote computer that is connected to the user computer by a link; the latter may partly belong to a network, which may be the Internet.

[0020] For a TV monitor, the image pulsing may be inherent in the video stream as it flows from the video source, or else the stream may be modulated such as to overlay the pulsing. In the first case, a live TV broadcast can be arranged to have the feature imbedded simply by slightly pulsing the illumination of the scene that is being broadcast. This method can of course also be used in making movies and recording video tapes and DVDs.

[0021] Video tapes can be edited such as to overlay the pulsing by means of modulating hardware. A simple modulator is discussed wherein the luminance signal of composite video is pulsed without affecting the chroma signal. The same effect may be introduced at the consumer end, by modulating the video stream that is produced by the video source. A DVD can be edited through software, by introducing pulse-like variations in the digital RGB signals. Image intensity pulses can be overlaid onto the analog component video output of a DVD player by modulating the luminance signal component. Before entering the TV set, a television signal can be modulated such as to cause pulsing of the image intensity by means of a variable delay line that is connected to a pulse generator.

[0022] Certain monitors can emit electromagnetic field pulses that excite a sensory resonance in a nearby subject, through image pulses that are so weak as to be ***subliminal***. This is unfortunate since it opens a way for mischievous application of the invention, whereby people are exposed unknowingly to manipulation of their nervous systems for someone else's purposes. Such application would be unethical and is of course not advocated. It is mentioned here in order to alert the public to the possibility of covert abuse that may occur while being online, or while watching TV, a video, or a DVD.

DESCRIPTION OF THE DRAWINGS

[0023] FIG. 1 illustrates the electromagnetic field that emanates from a monitor when the video signal is modulated such as to cause pulses in image intensity, and a nearby subject who is exposed to the field.

[0024] FIG. 2 shows a circuit for modulation of a composite video signal for the purpose of pulsing the image intensity.

[0025] FIG. 3 shows the circuit for a simple pulse generator.

[0026] FIG. 4 illustrates how a pulsed electromagnetic field can be generated with a computer monitor.

[0027] FIG. 5 shows a pulsed electromagnetic field that is generated by a television set through modulation of the RF signal input to the TV.

[0028] FIG. 6 outlines the structure of a computer program for producing a pulsed image.

[0029] FIG. 7 shows an extrapolation procedure introduced for improving timing accuracy of the program of FIG. 6.

[0030] FIG. 8 illustrates the action of the extrapolation procedure of FIG. 7.

[0031] FIG. 9 shows a subject exposed to a pulsed electromagnetic field emanating from a monitor which is responsive to a program running on a remote computer via a link that involves the Internet.

[0032] FIG. 10 shows the block diagram of a circuit for frequency wobbling of a TV signal for the purpose of pulsing the intensity of the image displayed on a TV monitor.

[0033] FIG. 11 depicts schematically a recording medium in the form of a video tape with recorded data, and the attribute of the signal that causes the intensity of the displayed image to be pulsed.

[0034] FIG. 12 illustrates how image pulsing can be embedded in a video signal by pulsing the illumination of the scene that is being recorded.

[0035] FIG. 13 shows a routine that introduces pulse variability into the computer program of FIG. 6.

[0036] FIG. 14 shows schematically how a CRT emits an electromagnetic field when the displayed image is pulsed.

[0037] FIG. 15 shows how the intensity of the image displayed on a monitor can be pulsed through the brightness control terminal of the monitor.

[0038] FIG. 16 illustrates the action of the polarization disc that serves as a model for grounded conductors in the back of a CRT screen.

[0039] FIG. 17 shows the circuit for overlaying image intensity pulses on a DVD output.

[0040] FIG. 18 shows measured data for pulsed electric fields emitted by two different CRT type monitors, and a comparison with theory.

DETAILED DESCRIPTION

[0041] Computer monitors and TV monitors emit electromagnetic fields. Part of the emission occurs at the low frequencies at which displayed images are changing. For instance, a rythmic pulsing of the intensity of an image causes electromagnetic field emission at the pulse frequency, with a strength proportional to the pulse amplitude. The field is briefly referred to as "screen emission". In discussing this effect, any part or all what is displayed on the monitor screen is called an image. A monitor of the cathode ray tube (CRT) type has three electron beams, one for each of the basic colors red, green, and blue. The intensity of an image is here defined as

I=.intg.jdA, (1)

[0042] where the integral extends over the image, and

j=j.sub.r+j.sub.g+j.sub.b, (2)

[0043] j.sub.r, j.sub.g, and j.sub.b being the electric current densities in the red, green, and blue electron beams at the surface area dA of the image on the screen. The current densities are to be taken in the distributed electron beam model, where the discreteness of pixels and the raster motion of the beams are ignored, and the back of the monitor screen is thought to be irradiated by diffuse electron beams. The beam current densities are then functions of the coordinates x and y over the screen. The model is appropriate since we are interested in the electromagnetic field emision caused by image pulsing with the very low frequencies of sensory resonances, whereas the emissions with the much higher horizontal and vertical sweep frequencies are of no concern. For a CRT the intensity of an image is expressed in millamperes.

[0044] For a liquid crystal display (LCD), the current densities in the definition of image intensity are to be replaced by driving voltages, multiplied by the aperture ratio of the device. For an LCD, image intensities are thus expressed in volts.

[0045] It will be shown that for a CRT or LCD screen emissions are caused by fluctuations in image intensity. In composite video however, intensity as defined above is not a primary signal feature, but luminance Y is. For any pixel one has

Y=0.299R+0.587G+0.114B, (3)

[0046] where R, G, and B are the intensities of the pixel respectively in red, green and blue, normalized such as to range from 0 to 1. The definition (3) was provided by the Commisssion Internationale de l'Eclairage (CIE), in order to account for brightness differences at different colors, as perceived by the human visual system. In composite video the hue of the pixel is determined by the chroma signal or chrominance, which has the components R-Y and B-Y. It follows that pulsing pixel luminance while keeping the hue fixed is equivalent to pulsing the pixel intensity, up to an amplitude factor. This fact will be relied upon when modulating a video stream such as to overlay image intensity pulses.

[0047] It turns out that the screen emission has a multipole expansion wherein both monopole and dipole contributions are proportional to the rate of change of the intensity I of (1). The higher order multipole contributions are proportional to the rate of change of moments of the current density j over the image, but since these contributions fall off rapidly with distance, they are not of practical importance in the present context. Pulsing the intensity of an image may involve different pulse amplitudes, frequencies, or phases for different parts of the image. Any or all of these features may be under subject control.

[0048] The question arises whether the screen emission can be strong enough to excite sensory resonances in people located at normal viewing distances from the monitor. This turns out to be the case, as shown by sensory resonance experiments and independently by measuring the strength of the emitted electric field pulses and comparing the results with the effective intensity window as explored in earlier work.

[0049] One-half Hertz sensory resonance experiments have been conducted with the subject positioned at least at normal viewing distance from a 15" computer monitor that was driven by a computer program written in Visual Basic(R), version 6.0 (VB6). The program produces a pulsed image with uniform luminance and hue over the full screen, except for a few small control buttons and text boxes. In VB6, screen pixel colors are determined by integers R, G, and B, that range from 0 to 255, and set the contributions to the pixel color made by the basic colors red, green, and blue. For a CRT-type monitor, the pixel intensities for the primary colors may depend on the RGB values in a nonlinear manner that will be discussed. In the VB6 program the RGB values are modulated by small pulses .DELTA.R, .DELTA.G, .DELTA.B, with a frequency that can be chosen by the subject or is swept in a predetermined manner. In the sensory resonance experiments mentioned above, the ratios .DELTA.R/R, 66 G/G, and .DELTA.B/B were always smaller than 0.02, so that the image pulses are quite weak. For certain frequencies near 1/2 Hz, the subject experienced physiological effects that are known to accompany the excitation of the 1/2 Hz sensory resonance as mentioned in the Background Section. Moreover, the measured field pulse amplitudes fall within the effective intensity window for the 1/2 Hz resonance, as explored in earlier experiments and discussed in the '874, '744, '922, and '304 patents. Other experiments have shown that the 2.4 Hz sensory resonance can be exited as well by screen emissions from monitors that display pulsed images.

[0050] These results confirm that, indeed, the nervous system of a subject can be manipulated through electromagnetic field pulses emitted by a nearby CRT or LCD monitor which displays images with pulsed intensity.

[0051] The various implementations of the invention are adapted to the different sources of video stream, such as video tape, DVD, a computer program, or a TV broadcast through free space or cable. In all of these implementations, the subject is exposed to the pulsed electromagnetic field that is generated by the monitor as the result of image intensity pulsing. Certain cutaneous nerves of the subject exhibit spontaneous spiking in patterns which, although rather random, contain sensory information at least in the form of average frequency. Some of these nerves have receptors that respond to the field stimulation by changing their average spiking frequency, so that the spiking patterns of these nerves acquire a frequency modulation, which is conveyed to the brain. The modulation can be particularly effective if it has a frequency at or near a sensory resonance frequency. Such frequencies are expected to lie in the range from 0.1 to 15 Hz.

[0052] An embodiment of the invention adapted to a VCR is shown in FIG. 1, where a subject 4 is exposed to a pulsed electric field 3 and a pulsed magnetic field 39 that are emitted by a monitor 2, labeled "MON", as the result of pulsing the intensity of the displayed image. The image is here generated by a video casette recorder 1, labeled "VCR", and the pulsing of the image intensity is obtained by modulating the composite video signal from the VCR output. This is done by a video modulator 5, labeled "VM", which responds to the signal from the pulse generator 6, labeled "GEN". The frequency and amplitude of the image pulses can be adjusted with the frequency control 7 and amplitude control 8. Frequency and amplitude adustments can be made by the subject.

[0053] The circuit of the video modulator 5 of FIG. 1 is shown in FIG. 2, where the video amplifiers 11 and 12 process the composite video signal that enters at the input terminal 13. The level of the video signal is modulated slowly by injecting a small bias current at the inverting input 17 of the first amplifier 11. This current is caused by voltage pulses supplied at the modulation input 16, and can be adjusted through the potentiometer 15. Since the noninverting input of the amplifier is grounded, the inverting input 17 is kept essentially at ground potential, so that the bias current is is not influenced by the video signal. The inversion of the signal by the first amplifier 11 is undone by the second amplifier 12. The gains of the amplifiers are chosen such as to give a unity overall gain. A slowly varying current injected at the inverting input 17 causes a slow shift in the "pseudo-dc" level of the composite video signal, here defined as the short-term average of the signal. Since the pseudo-dc level of the chroma signal section determines the luminance, the latter is modulated by the injected current pulses. The chroma signal is not affected by the slow modulation of the pseudo-dc level, since that signal is determined by the amplitude and phase with respect to the color carrier which is locked to the color burst. The effect on the sync pulses and color bursts is of no consequence either if the injected current pulses are very small, as they are in practice. The modulated composite video signal, available at the output 14 in FIG. 2, will thus exhibit a modulated

luminance, whereas the chroma signal is unchanged. In the light of the foregoing discussion about luminance and intensity, it follows that the modulator of FIG. 2 causes a pulsing of the image intensity I. It remains to give an example how the pulse signal at the modulation input 16 may be obtained. FIG. 3 shows a pulse generator that is suitable for this purpose, wherein the RC timer 21 (Intersil ICM7555) is hooked up for astable operation and produces a square wave voltage with a frequency that is determined by capacitor 22 and potentiometer 23. The timer 21 is powered by a battery 26, controlled by the switch 27. The square wave voltage at output 25 drives the LED 24, which may be used for monitoring of the pulse frequency, and also serves as power indicator. The pulse output may be rounded in ways that are well known in the art. In the setup of FIG. 1, the output of VCR 1 is connected to the video input 13 of FIG. 2, and the video output 14 is connected to the monitor 2 of FIG. 1.

[0054] In the preferred embodiment of the invention, the image intensity pulsing is caused by a computer program. As shown in FIG. 4, monitor 2, labeled "MON", is connected to computer 31 labeled "COMPUTER", which runs a program that produces an image on the monitor and causes the image intensity to be pulsed. The subject 4 can provide input to the computer through the keyboard 32 that is connected to the computer by the connection 33. This input may involve adjustments of the frequency or the amplitude or the variability of the image intensity pulses. In particular, the pulse frequency can be set to a sensory resonance frequency of the subject for the purpose of exciting the resonance.

[0055] The structure of a computer program for pulsing image intensity is shown in FIG. 6. The program may be written in Visual Basic(R) version 6.0 (VB6), which involves the graphics interface familiar from the Windows(R) operating system. The images appear as forms equiped with user controls such as command buttons and scroll bars, together with data displays such as text boxes. A compiled VB6 program is an executable file. When activated, the program declares variables and functions to be called from a dynamic link library (DLL) that is attached to the operating system; an initial form load is performed as well. The latter comprises setting the screen color as specified by integers R, G, and B in the range 0 to 255, as mentioned above. In FIG. 6, the initial setting of the screen color is labeled as 50. Another action of the form load routine is the computation 51 of the sine function at eight equally spaced points, I=0 to 7, around the unit circle. These values are needed when modulating the RGB numbers. Unfortunately, the sine function is distorted by the rounding to integer RGB values that occurs in the VB6 program. The image is chosen to fill as much of the screen area as possible, and it has spatially uniform luminance and hue.

[0056] The form appearing on the monitor displays a command button for starting and stopping the image pulsing, together with scroll bars 52 and 53 respectively for adjustment of the pulse frequency F and the pulse amplitude A. These pulses could be initiated by a system timer which is activated upon the elapse of a preset time interval. However, timers in VB6 are too inaccurate for the purpose of providing the eight RGB adjustment points in each pulse cycle. An improvement can be obtained by using the GetTickCount function that is available in the Application Program Interface (API) of Windows 95(R) and Windows 98(R). The GetTickCount function returns the system time that has elapsed since starting Windows, expressed in milliseconds. User activation of the start button 54 provides a tick count TN through request 55 and sets the timer interval to TT miliseconds, in step 56. TT was previously calculated in the frequency routine that is activated by changing the frequency, denoted as step 52.

[0057] Since VB6 is an event-driven program, the flow chart for the program falls into disjoint pieces. Upon setting the timer interval to TT in step 56, the timer runs in the background while the program may execute subroutines such as adjustment of pulse frequency or amplitude. Upon elapse of the timer interval TT, the timer subroutine 57 starts execution with request 58 for a tick count, and in 59 an upgrade is computed of the time TN for the next point at which the RGB values are to be adjusted. In step 59 the timer is turned off, to be reactivated later in step 67. Step 59 also resets the parameter CR which plays a role in the extrapolation procedure 61 and the condition 60. For ease of understanding at this point, it is best to pretend that the action of 61 is simply to get a tick count, and to consider the loop controled by condition 60 while keeping CR equal to zero. The loop would terminate when the tick count M reaches or exceeds the time TN for the next phase point, at which time the program should adjust the image intensity through steps 63-65. For now step 62 is to be ignored also, since it has to do with the actual extrapolation procedure 61. The increments to the screen colors R1, G1, and B1 at the new phase point are computed according to the sine function, applied with the amplitude A that was set by the user in step 53. The number I that labels

the phase point is incremented by unity in step 65, but if this results in I=8 the value is reset to zero in 66. Finally, the timer is reactivated in step 67, initiating a new 1/8-cycle step in the periodic progression of RGB adjustments.

[0058] A program written in this way would exhibit a large jitter in the times at which the RGB values are changed. This is due to the lumpiness in the tick counts returned by the GetTickCount function. The lumpiness may be studied separately by running a simple loop with C=GetTickCount, followed by writing the result C to a file. Inspection shows that C has jumped every 14 or 15 milliseconds, between long stretches of constant values. Since for a 1/2 Hz image intensity modulation the 1/8-cycle phase points are 250 ms apart, the lumpiness of 14 or 15 ms in the tick count would cause considerable inaccuracy. The full extrapolation procedure 61 is introduced in order to diminish the jitter to acceptable levels. The procedure works by refining the heavy-line staircase function shown in FIG. 8, using the slope RR of a recent staircase step to accurately determine the loop count 89 at which the loop controled by 60 needs to be exited. Details of the extrapolation procedure are shown in FIG. 7 and illustrated in FIG. 8. The procedure starts at 70 with both flags off, and CR=0, because of the assignment in 59 or 62 in FIG. 6. A tick count M is obtained at 71, and the remaining time MR to the next phase point is computed in 72. Conditions 77 and 73 are not satisfied and therefore passed vertically in the flow chart, so that only the delay block 74 and the assignments 75 are executed. Condition 60 of FIG. 6 is checked and found to be satisfied, so that the extrapolation procedure is reentered. The process is repeated until the condition 73 is met when the remaining time MR jumps down through the 15 ms level, shown in FIG. 8 as the transition 83. The condition 73 then directs the logic flow to the assignments 76, in which the number DM labeled by 83 is computed, and FLG1 is set. The computation of DM is required for finding the slope RR of the straight-line element 85. One also needs the "Final LM" 86, which is the number of loops traversed from step 83 to the next downward step 84, here shown to cross the MR=0 axis. The final LM is determined after repeatedly incrementing LM through the side loop entered from the FLG1=1 condition 77, which is now satisfied since FLG1 was set in step 76. At the transition 84 the condition 78 is met, so that the assignments 79 are executed. This includes computation of the slope RR of the line element 85, setting FLG2, and resetting FLG1. From here on, the extrapolation procedure increments CR in steps of RR while skipping tick counts until condition 60 of FIG. 6 is violated, the loop is exited, and the RGB values are adjusted.

[0059] A delay block 74 is used in order to stretch the time required for traversing the extrapolation procedure. The block can be any computation intensive subroutine such as repeated calculations of tangent and arc tangent functions.

[0060] As shown in step 56 of FIG. 6, the timer interval TT is set to {fraction (4/10)} of the time TA from one RGB adjustment point to the next. Since the timer runs in the background, this arrangement provides an opportunity for execution of other processes such as user adjustment of frequency or amplitude of the pulses.

[0061] The adjustment of the frequency and other pulse parameters of the image intensity modulation can be made internally, i.e., within the running program. Such internal control is to be distinguished from the external control provided, for instance, in screen savers. In the latter, the frequency of animation can be modified by the user, but only after having exited the screen saver program. Specifically, in Windows 95(R) or Windows 98(R), to change the animation frequency requires stopping the screen saver execution by moving the mouse, whereafter the frequency may be adjusted through the control panel. The requirement that the control be internal sets the present program apart from so-called banners as well.

[0062] The program may be run on a remote computer that is linked to the user computer, as illustrated in FIG. 9. Although the monitor 2, labeled "MON", is connected to the computer 31, labeled "COMPUTER", the program that pulses the images on the monitor 2 runs on the remoter computer 90, labeled "REMOTE COMPUTER", which is connected to computer 31 through a link 91 which may in part belong to a network. The network may comprise the Internet 92.

[0063] The monitor of a television set emits an electromagnetic field in much the same way as a computer monitor. Hence, a TV may be used to produce screen emissions for the purpose of nervous system manipulation. FIG. 5 shows such an arrangement, where the pulsing of the image intensity is achieved by

inducing a small slowly pulsing shift in the frequency of the RF signal that enters from the antenna. This process is here called "frequency wobbling" of the RF signal. In FM TV, a slight slow frequency wobble of the RF signal produces a pseudo-dc signal level fluctuation in the composite video signal, which in turn causes a slight intensity fluctuation of the image displayed on the monitor in the same manner as discussed above for the modulator of FIG. 2. The frequency wobbling is induced by the wobbler 44 of FIG. 5 labeled "RFM", which is placed in the antenna line 43. The wobbler is driven by the pulse generator 6, labeled "GEN". The subject can adjust the frequency and the amplitude of the wobble through the tuning control 7 and the amplitude control 41. FIG. 10 shows a block diagram of the frequency wobbler circuit that employs a variable delay line 94, labelled "VDL". The delay is determined by the signal from pulse generator 6, labelled "GEN". The frequency of the pulses can be adjusted with the tuning control 7. The amplitude of the pulses is determined by the unit 98, labelled "MD", and can be adjusted with the amplitude control 41. Optionally, the input to the delay line may be routed through a preprocessor 93, labelled "PRP", which may comprise a selective RF amplifier and down converter; a complimentary up conversion should then be performed on the delay line output by a postprocessor 95, labelled "POP". The output 97 is to be connected to the antenna terminal of the TV set.

[0064] The action of the variable delay line 94 may be understood as follows. Let periodic pulses with period L be presented at the input. For a fixed delay the pulses would emerge at the output with the same period L. Actually, the time delay T is varied slowly, so that it increases approximately by LdT/dt between the emergence of consecutive pulses at the device output. The pulse period is thus increased approximately by

.DELTA.L=LdT/dt. (4)

[0065] In terms of the frequency f, Eq. (4) implies approximately

.DELTA.f/f=-dT/dt. (5)

[0066] For sinusoidal delay T(t) with amplitude b and frequency g, one has

.DELTA.f/f=-2.pi.gb cos(2.pi.gt), (6)

[0067] which shows the frequency wobbling. The approximation is good for gb<<1, which is satisfied in practice. The relative frequency shift amplitude 2.pi.gb that is required for effective image intensity pulses is very small compared to unity. For a pulse frequency g of the order of 1 Hz, the delay may have to be of the order of a millisecond. To accomodate such long delay values, the delay line may have to be implemented as a digital device. To do so is well within the present art. In that case it is natural to also choose digital implementations for the pulse generator 6 and the pulse amplitude controller 98, either as hardware or as software.

[0068] Pulse variability may be introduced for alleviating the need for precise tuning to a resonance frequency. This may be important when sensory resonance frequencies are not precisely known, because of the variation among individuals, or in order to cope with the frequency drift that results from chemical detuning that is discussed in the '874 patent. A field with suitably chosen pulse variability can then be more effective than a fixed frequency field that is out of tune. One may also control tremors and seizures, by interfering with the pathological oscillatory activity of neural circuits that occurs in these disorders. Electromagnetic fields with a pulse variability that results in a narrow spectrum of frequencies around the frequency of the pathological oscillatory activity may then evoke nerve signals that cause phase shifts which diminish or quench the oscillatory activity.

[0069] Pulse variability can be introduced as hardware in the manner described in the '304 patent. The variability may also be introduced in the computer program of FIG. 6, by setting FLG3 in step 68, and choosing the amplitude B of the frequency fluctuation. In the variability routine 46, shown in some detail in FIG. 13, FLG3 is detected in step 47, whereupon in steps 48 and 49 the pulse frequency F is modified pseudo randomly by a term proportional to B, every 4th cycle. Optionally, the amplitude of the image intensity pulsing may be modified as well, in similar fashion. Alternatively, the frequency and amplitude

may be swept through an adjustable ramp, or according to any suitable schedule, in a manner known to those skilled in the art. The pulse variability may be applied to ***subliminal*** image intensity pulses.

[0070] When an image is displayed by a TV monitor in response to a TV broadcast, intensity pulses of the image may simply be imbedded in the program material. If the source of video signal is a recording medium, the means for pulsing the image intensity may comprise an attribute of recorded data. The pulsing may be ***subliminal***. For the case of a video signal from a VCR, the pertinent data attribute is illustrated in FIG. 11, which shows a video signal record on part of a video tape 28. Depicted schematically are segments of the video signal in intervals belonging to lines in three image frames at different places along the tape. In each segment, the chroma signal 9 is shown, with its short-term average level 29 represented as a dashed line. The short-term average signal level, also called the pseudo-dc level, represents the luminance of the image pixels. Over each segment, the level is here constant because the image is for simplicity chosen as having a uniform luminance over the screen. However, the level is seen to vary from frame to frame, illustrating a luminance that pulses slowly over time. This is shown in the lower portion of the drawing, wherein the IRE level of the short-term chroma signal average is plotted versus time. The graph further shows a gradual decrease of pulse amplitude in time, illustrating that luminance pulse amplitude variations may also be an attribute of the recorded data on the video tape. As discussed, pulsing the luminance for fixed chrominance results in pulsing of the image intensity.

[0071] Data stream attributes that represent image intensity pulses on video tape or in TV signals may be created when producing a video rendition or making a moving pixture of a scene, simply by pulsing the illumination of the scene. This is illustrated in FIG. 12, which shows a scene 19 that is recorded with a video camera 18, labelled "VR". The scene is illuminated with a lamp 20, labelled "LAMP", energized by an electric current through a cable 36. The current is modulated in pulsing fashion by a modulator 30, labeled "MOD", which is driven by a pulse generator 6, labelled "GENERATOR", that produces voltage pulses 35. Again, pulsing the luminance but not the chrominance amounts to pulsing the image intensity.

[0072] The brightness of monitors can usually be adjusted by a control, which may be addressable through a brightness adjustment terminal. If the control is of the analog type, the displayed image intensity may be pulsed as shown in FIG. 15, simply by a pulse generator 6, labeled "GEN", that is connected to the brigthness adjustment terminal 88 of the monitor 2, labeled "MON". Equivalent action can be provided for digital brightness controls, in ways that are well known in the art.

[0073] The analog component video signal from a DVD player may be modulated such as to overlay image intensity pulses in the manner illustrated in FIG. 17. Shown are a DVD player 102, labeled "DVD", with analog component video output comprised of the luminance Y and chrominance C. The overlay is accomplished simply by shifting the luminance with a voltage pulse from generator 6, labeled "GENERATOR". The generator output is applied to modulator 106, labeled "SHIFTER". Since the luminance Y is pulsed without changing the chrominance C, the image intensity is pulsed. The frequency and amplitude of the image intensity pulses can be adjusted respectively with the tuner 7 and amplitude control 107. The modulator 105 has the same structure as the modulator of FIG. 2, and the pulse amplitude control 107 operates the potentiometer 15 of FIG. 2. The same procedure can be followed for editing a DVD such as to overlay image intensity pulses, by processing the modulated luminance signal through an analog-to-digital converter, and recording the resulting digital stream onto a DVD, after appropriate compression. Alternatively, the digital luminance data can be edited by electronic reading of the signal, decompression, altering the digital data by software, and recording the resulting digital signal after proper compression, all in a manner that is well known in the art.

[0074] The mechanism whereby a CRT-type monitor emits a pulsed electromagnetic field when pulsing the intensity of an image is illustrated in FIG. 14. The image is produced by an electron beam 10 which impinges upon the backside 88 of the screen, where the collisions excite phosphors that subsequently emit light. In the process, the electron beam deposits electrons 18 on the screen, and these electrons contribute to an electric field 3 labelled "E". The electrons flow along the conductive backside 88 of the screen to the terminal 99 which is hooked up to the high-voltage supply 40, labelled "HV". The circuit is completed by the ground connection of the supply, the video amplifier 87, labeled "VA", and its connection to the cathodes of the CRT. The electron beams of the three electron guns are collectively shown as 10, and

together the beams carry a current J. The electric current J flowing through the described circuit induces a magnetic field 39, labeled "B". Actually, there are a multitude of circuits along which the electron beam current is returned to the CRT cathodes, since on a macroscopic scale the conductive back surface 88 of the screen provides a continuum of paths from the beam impact point to the high-voltage terminal 99. The magnetic fields induced by the currents along these paths partially cancel each other, and the resulting field depends on the location of the pixel that is addressed. Since the beams sweep over the screen through a raster of horizontal lines, the spectrum of the induced magnetic field contains strong peaks at the horizontal and vertical frequencies. However, the interest here is not in fields at those frequencies, but rather in emissions that result from an image pulsing with the very low frequencies appropriate to sensory resonances. For this purpose a diffuse electron current model suffices, in which the pixel discreteness and the raster motion of the electron beams are ignored, so that the beam current becomes diffuse and fills the cone subtended by the displayed image. The resulting low-frequency magnetic field depends on the temporal changes in the intensity distribution over the dispayed image. Order-of-magnitude estimates show that the low-frequency magnetic field, although quite small, may be sufficient for the excitation of sensory resonances in subjects located at a normal viewing distance from the monitor.

[0075] The monitor also emits a low-frequency electric field at the image pulsing frequency. This field is due in part to the electrons 18 that are deposited on the screen by the electron beams 10. In the diffuse electron beam model, screen conditions are considered functions of the time t and of the Cartesian coordinates x and y over a flat CRT screen.

[0076] The screen electrons 18 that are dumped onto the back of the screen by the sum j(x,y,t) of the diffuse current distributions in the red, green, and blue electron beams cause a potential distribution V(x,y,t) which is influenced by the surface conductivity .sigma. on the back of the screen and by capacitances. In the simple model where the screen has a capacitance distribution c(x,y) to ground and mutual capacitances between parts of the screen at different potentials are neglected, a potential distribution V(x,y,t) over the screen implies a surface charge density distribution

q=Vc(x,y), (7)

[0077] and gives rise to a current density vector along the screen,

j.sub.s=-.sigma.grad.sub.sV, (8)

[0078] where grad.sub.s is the gradient along the screen surface. Conservation of electric charge implies

j=cV-div.sub.s(.sigma.grad.sub.sV), (9)

[0079] where the dot over the voltage denotes the time derivative, and div.sub.s is the divergence in the screen surface. The partial differential equation (9) requires a boundary condition for the solution V(x,y,t) to be unique. Such a condtion is provided by setting the potential at the rim of the screen equal to the fixed anode voltage. This is a good approximation, since the resistance R.sub.r between the screen rim and the anode terminal is chosen small in CRT design, in order to keep the voltage loss JR.sub.r to a minimum, and also to limit low-frequency emissions.

[0080] Something useful can be learned from special cases with simple solutions. As such, consider a circular CRT screen of radius R with uniform conductivity, showered in the back by a diffuse electron beam with a spatially uniform beam current density that is a constant plus a sinusoidal part with frequency f Since the problem is linear, the voltage V due to the sinusoidal part of the beam current can be considered separately, with the boundary condition that V vanish at the rim of the circular screen. Eq. (9) then simplifies to

V"+V'/r-i2.pi.fc.eta.V=-J.eta./A, r.ltoreq.R, (10)

[0081] where r is a radial coordinate along the screen with its derivative denoted by a prime, .eta.=1/.sigma. is the screen resistivity, A the screen area, J the sinusoidal part of the total beam current, and i={square

root}(-1), the imaginary unit. Our interest is in very low pulse frequencies f that are suitable for excitation of sensory resonances. For those frequencies and for practical ranges for c and .eta., the dimensionless number 2.pi.fcA.eta. is very much smaller than unity, so that it can be neglected in Eq. (10). The boundary value problem then has the simple solution 1 V (r) = J 4 (1 - (r / R) 2) . (11)

[0082] In deriving (11) we neglected the mutual capacitance between parts of the screen that are at different potentials. The resulting error in (10) is negligible for the same reason that the i2.pi.fcA.eta. term in (10) can be neglected.

[0083] The potential distribution V(r) of (11) along the screen is of course accompanied by electric charges. The field lines emanating from these charges run mainly to conductors behind the screen that belong to the CRT structure and that are either grounded or connected to circuitry with a low impedance path to ground. In either case the mentioned conductors must be considered grounded in the analysis of charges and fields that result from the pulsed component J of the total electron beam current. The described electric field lines end up in electric charges that may be called polarization charges since they are the result of the polarization of the conductors and circuitry by the screen emission. To estimate the pulsed electric field, a model is chosen where the mentioned conductors are represented together as a grounded perfectly conductive disc of radius R, positioned a short distance .delta. behind the screen, as depicted in FIG. 16. Since the grounded conductive disc carries polarization charges, it is called the polarization disc. FIG. 16 shows the circular CRT screen 88 and the polarization disc 101, briefly called "plates". For small distances 6, the capacitance density between the plates of opposite polarity is nearly equal to .epsilon./.delta., where e is the permittivity of free space. The charge distributions on the screen and polarization disc are respectively .epsilon.V(r)/.delta.+q.sub.0 and -.epsilon.V(r)/.delta.+q.sub.0, where the .epsilon.V(r)/.delta. terms denote opposing charge densities at the end of the dense field lines that run between the two plates. That the part q.sub.0 is needed as well will become clear in the sequel.

[0084] The charge distributions .epsilon.V(r)/.delta.+q.sub.0 and -.epsilon.V(r)/.delta.+q.sub.0 on the two plates have a dipole moment with the density 2 D (r) = V (r) = J 4 (1 - (r / R) 2) , (12)

[0085] directed perpendicular to the screen. Note that the plate separation .delta. has dropped out. This means that the precise location of the polarization charges is not critical in the present model, and further that .delta. may be taken as small as desired. Taking .delta. to zero, one thus arrives at the mathematical model of pulsed dipoles distributed over the circular CRT screen. The field due to the charge distribution q.sub.0 will be calculated later.

[0086] The electric field induced by the distributed dipoles (12) can be calculated easily for points on the centerline of the screen, with the result 3 E (z) = V (0) R { 2 / R - R / - 2 | z | / R } , (13)

[0087] where V(0) is the pulse voltage (11) at the screen center, .rho. the distance to the rim of the screen, and z the distance to the center of the screen. Note that V(0) pulses harmonically with frequency f, because in (11) the sinusoidal part J of the beam current varies in this manner.

[0088] The electric field (13) due to the dipole distribution causes a potential distribution V(r)/2 over the screen and a potential distribution of -V(r)/2 over the polarization disc, where V(r) is nonuniform as given by (11). But since the polarization disc is a perfect conductor it cannot support voltage gradients, and therefore cannot have the potential distribution -V(r)/2. Instead, the polarization disc is at ground potential. This is where the charge distribution q.sub.0(r) comes in; it must be such as to induce a potential distribution V(r)/2 over the polarization disc. Since the distance between polarization disc and screen vanishes in the mathematical model, the potential distribution V(r)/2 is induced over the screen as well. The total potential over the monitor screen thus becomes V(r) of (11), while the total potential distribution over the polarization disc becomes uniformly zero. Both these potential distributions are as physically required. The electric charges q.sub.0 are moved into position by polarization and are partly drawn from the earth through the ground connection of the CRT.

[0089] In our model the charge distribution q.sub.0 is located at the same place as the dipole distribution, viz., on the plane z=0 within the circle with radius R. At points on the center line of the screen, the electric

field due to the monopole distribution q.sub.0 is calculated in the following manner. As discussed, the monopoles must be such that they cause a potential .phi..sub.0 that is equal to V(r)/2 over the disc with radius R centered in the plane z=0. Although the charge distribution q.sub.0(r) is uniquely defined by this condition, it cannot be calculated easily in a straightforward manner. The difficulty is circumvented by using an intermediate result derived from Excercise 2 on page 191 of Kellogg (1953), where the charge distribution over a thin disc with uniform potential is given. By using this result one readily finds the potential .phi.*(z) on the axis of this disc as 4 * (z) = 2 V * (R 1) , (14)

[0090] where .beta.(R.sub.1) is the angle subtended by the disc radius R.sub.1, as viewed from the point z on the disc axis, and V* is the disc potential. The result is used here in an attempt to construct the potential .phi..sub.0(z) for a disc with the nonuniform potential V(r)/2, by the ansatz of writing the field as due to a linear combination of abstract discs with various radii R.sub.1 and potentials, all centered in the plane z=0. In the ansatz the potential on the symmetry axis is written

.phi..sub.0(z)=.alpha..beta.(R)+b.intg..sub.0.sup.R.beta.(R.sub.1)dW, (15)

[0091] where W is chosen as the function 1-R.sub.1.sup.2/R.sup.2, and the constants a and b are to be determined such that the potential over the plane z=0 is V(r)/2 for radii r ranging from 0 to R, with V(r) given by (11). Carrying out the integration in (15) gives

.phi..sub.0(z)=.alpha..beta.(R)-b{(1+z.sup.2/R.sup.2).beta.(R)-.vertline.z- .vertline./R}. (16)

[0092] In order to find the potential over the disc r<R in the plane z=0, the function .phi..sub.0(z) is expanded in powers of z/R for 0<z<R, whereafter the powers zn are replaced by r.sup.nP.sub.n(cos .theta.), where the P.sub.n are Legendre polynomials, and (r,.theta.) are symmetric spherical coordinates centered at the screen center. This procedure amounts to a continuation of the potential from the z-axis into the half ball r<R, z>0, in such a manner that the Laplace equation is satisfied. The method is discussed by Morse and Feshbach (1953). The "Laplace continuation" allows calculation of the potential .phi..sub.o along the surface of the disc r<R centered in the plane z=0. The requirement that this potential be V(r)/2 with the function V(r) given by (11) allows solving for the constants a and b, with the result

a=-V(0)/.pi., b=-2V(0)/.pi.. (17)

[0093] Using (17) in (16) gives 5 0 (z) = V (0) [(1 + 2 z 2 / R 2) (R) - 2 | z | / R] , (18)

[0094] and by differentiation with respect to z one finally finds 6 E 0 (z) = V (0) R (z / | z |) [4 - (R /) 2 - 4 (R) | z | / R] (19)

[0095] for the electric field on the center line of the screen brought about by the charge distribution q.sub.0(z).

[0096] The center-line electric field is the sum of the part (13) due to distributed pulsed dipoles and part (19) due to distributed pulsed monopoles. Although derived for circular screens, the results may serve as an approximation for other shapes, such as the familiar rounded rectangle, by taking R as the radius of a circle that has the same area as the screen.

[0097] For two CRT-type monitors the pulsed electric field due to image intensity pulsing has been measured at several points on the screen center line for pulse frequencies of 1/2 Hz. The monitors were the 15" computer monitor used in the sensory resonance experiments mentioned above, and a 30" TV tube. The experimental results need to be compared with the theory derived above. Since R is determined by the screen area, the electric fields given by (13) and (19) have as only free parameter the pulse voltage V(0) at the screen center. The amplitude of this voltage can therefore be determined for the tested monitors by fitting the experimental data to the theoretical results. Prior to fitting, the data were normalized to an image that occupies the entire screen and is pulsed uniformly with a 100% intensity amplitude. The results of the one-parameter fit are displayed in FIG. 18, which shows the theoretical graph 100, together with the normalized experimental data points 103 for the 15" computer monitor and for the 30" TV tube. FIG. 18

shows that the developed theory agrees fairly well with the experimental results. From the best fit one can find the center-screen voltage pulse amplitudes. The results, normalized as discussed above, are .vertline.V(0)=266.2 volt for the 15" computer monitor and .vertline.V(0)=310.1 volt for the 30" TV tube. With these amplitudes in hand, the emitted pulsed electric field along the center line of the monitors can be calculated from the sum of the fields (13) and (19). For instance, for the 15" computer monitor with 1.8% RGB pulse modulation used in the 1/2 Hz sensory resonance experiments mentioned above, the pulsed electric field at the center of the subject, located at z=70 cm on the screen center line, is calculated as having an amplitude of 0.21 V/m. That such a pulsed electric field, applied to a large portion of the skin, is sufficient for exciting the 1/2 Hz sensory resonance is consistent with experimental results discussed in the '874 patent.

[0098] In deriving (11), the dimensionless number 2.pi.rfcA.eta. was said to be much smaller than unity. Now that the values for .vertline.V(0).vertline. are known, the validity of this statement can be checked. Eq. (11) implies that .vertline.V(0).vertline. is equal to .eta..vertline.J.vertline./4.pi.. The sum of the beam currents in the red, green, and blue electron guns for 100% intensity modulation is estimated to have pulse amplitudes .vertline.J.vertline. of 0.5 mA and 2.0 mA respectively for the 15" computer monitor and the 30" TV tube. Using the derived values for .vertline.V(0).vertline., one arrives at estimates for the screen resistivity .eta. as 6.7 M.OMEGA./square and 1.9 M.OMEGA./square respectively for the 15" computer monitor and the 30" TV tube. Estimating the screen capacity cA as 7 pf and 13 pf, 2.pi.rfcA.eta. is found to be 148.times.10.sup.-6 and 78.times.10.sup.-6, respectively for the 15" computer monitor and the 30" TV tube. These numbers are very small compared to unity, so that the step from (10) to (11) is valid.

[0099] The following procedures were followed in preparing pulsed images for the field measurements. For the 15" computer monitor the images were produced by running the VB6 program discussed above. The pulsed image comprised the full screen with basic RGB values chosen uniformly as R=G=B=127, with the exception of an on/off button and a few data boxes which together take up 17% of the screen area. The image intensity was pulsed by modifying the R, G, and B values by integer-rounded sine functions .DELTA.R(t), .DELTA.G(t), and .DELTA.B(t), uniformly over the image, except at the button and the data boxes. The measured electric field pulse amplitudes were normalized to a pulsed image that occupies all of the screen area and has 100% intensity modulation for which the image pulses between black and the maximum intensity, for the fixed RGB ratios used. The image intensity depends on the RGB values in a nonlinear manner that will be be discussed. For the measurements of the pulsed electric field emitted by 30" TV tube, a similar image was used as for the 15" computer monitor. This was done by playing back a camcorder recording of the computer monitor display when running the VB6 program, with 40% pulse modulation of R, G, and B.

[0100] In front of the monitor, i.e., for z>0, the parts (13) and (19) contribute about equally to the electric field over a practical range of distances z. When going behind the monitor where z is negative the monopole field flips sign so that the two parts nearly cancel each other, and the resulting field is very small. Therefore, in the back of the CRT, errors due to imperfections in the theory are relatively large. Moreover our model, which pretends that the polarization charges are all located on the polarization disc, fails to account for the electric field flux that escapes from the outer regions of the back of the screen to the earth or whatever conductors happen to be present in the vincinity of the CRT. This flaw has relatively more serious consequences in the back than in front of the monitor.

[0101] Screen emissions in front of a CRT can be cut dramatically by using a grounded conductive transparent shield that is placed over the screen or applied as a coating. Along the lines of our model, the shield amounts to a polarization disc in front of the screen, so that the latter is now sandwiched between to grounded discs. The screen has the pulsed potential distribution V(r) of (11), but no electric flux can escape. The model may be modified by choosing the polarization disc in the back somewhat smaller than the screen disc, by a fraction that serves as a free parameter. The fraction may then be determined from a fit to measured fields, by minimizing the relative standard deviation between experiment and theory.

[0102] In each of the electron beams of a CRT, the beam current is a nonlinear function of the driving voltage, i.e., the voltage between cathode and control grid. Since this function is needed in the normalization procedure, it was measured for the 15" computer monitor that has been used in the 1/2 Hz

sensory resonance experiments and the electric field measurements. Although the beam current density j can be determined, it is easier to measure the luminance, by reading a light meter that is brought right up to the monitor screen. With the RGB values in the VB6 program taken as the same integer K, the luminance of a uniform image is proportional to the image intensity I. The luminance of a uniform image was measured for various values of K. The results were fitted with

I=c.sub.1K.sup..gamma., (20)

[0103] where c.sub.1 is a constant. The best fit, with 6.18% relative standard deviation, was obtained for .gamma.=2.32.

[0104] Screen emissions also occur for liquid crystal displays (LCD). The pulsed electric fields may have considerable amplitude for LCDs that have their driving electrodes on opposite sides of the liquid crystal cell, for passive matrix as well as for active matrix design, such as thin film technology (TFT). For arrangements with in-plane switching (IPS) however, the driving electrodes are positioned in a single plane, so that the screen emission is very small. For arrangements other than IPS, the electric field is closely approximated by the fringe field of a two-plate condenser, for the simple case that the image is uniform and extends over the full screen. For a circular LCD screen with radius R, the field on the center line can be readily calculated as due to pulsed dipoles that are uniformly distributed over the screen, with the result

E.sub.d(z)=(1/2)VR.sup.2/(z.sup.2+R.sup.2).sup.3/2 (21)

[0105] where E.sub.d(z) is the amplitude of the pulsed electric field at a distance z from the screen and V is a voltage pulse amplitude, in which the aperture ratio of the LCD has been taken into account. Eq. (21) can be used as an approximation for screens of any shape, by taking R as the radius of a circle with the same area as the screen. The result applies to the case that the LCD does not have a ground connection, so that the top and bottom electrodes are at opposite potential, i.e., V/2 and -V/2.

[0106] If one set of LCD electrodes is grounded, monopoles are needed to keep these electrodes at zero potential, much as in the case of a CRT discussed above. The LCD situation is simpler however, as there is no charge injection by electron beams, so that the potentials on the top and bottom plates of the condenser in the model are spatially uniform. From (14) it is seen that monopoles, distributed over the disc of radius R in the plane z=0 such as to provide on the disc a potential V/2, induce on the symmetry axis a potential 7 (z) = 1 V (R) . (22)

[0107] Differentiating with respect to z gives the electric field on the symmetry axis 8 E m (z) = z V R | z | (z 2 + R 2) , (23)

[0108] induced by the pulsed monopoles. For an LCD with one set of electrodes grounded, the pulsed electric field for screen voltage pulse amplitude V at a distance z from the screen on the center line has an amplitude that is the sum of the parts (21) and (23). The resultant electric field in the back is relatively small, due to the change in sign in the monopole field that is caused by the factor z/.vertline.z.vertline.. Therefore, screen emissions in front of an LCD can be kept small simply by having the grounded electrodes in front.

[0109] As a check on the theory, the pulsed electric field emitted by the 3" LCD-TFT color screen of the camcorder mentioned above has been measured at eleven points on the center line of the screen, ranging from 4.0 cm to 7.5 cm. The pulsed image was produced by playing back the video recording of the 15" computer monitor that was made while running the VB6 program discussed above, for a image intensity pulse frequency of 1/2 Hz, R=G=B=K, modulated around K=127 with an amplitude .DELTA.K=51. After normalization to a uniform full screen image with 100% intensity modulation by using the nonlinear relation (20), the experimental data were fitted to the theoretical curve that expresses the sum of the fields (21) and (23). The effective screen pulse voltage amplitude V was found to be 2.1 volt. The relative standard deviation in V for the fit is 5.1%, which shows that theory and experiment are in fairly good agreement.

[0110] Certain monitors can cause excitation of sensory resonances even when the pulsing of displayed images is ***subliminal,*** i.e., unnoticed by the average person. When checking this condition on a computer monitor, a problem arises because of the rounding of RGB values to integers, as occurs in the VB6 program. For small pulse amplitude the sine wave is thereby distorted into a square wave, which is easier to spot. This problem is alleviated somewhat by choosing AR=0, AG=0, and AB=2, since then the 8 rounded sine functions around the unit circle, multiplied with the pulse amplitude AB=2 become the sequence 1, 2, 2, 1, -1 -12, -2, -1, etc, which is smoother to the eye than a square wave. Using the VB6 program and the 15" computer monitor mentioned above with R=71, G=71, and B=233, a 1/2 Hz pulse modulation with amplitudes AR=AG=0 and AB=2 could not be noticed by the subject, and is therefore considered ***subliminal***. It is of interest to calculate the screen emission for this case, and conduct a sensory resonance experiment as well. A distance z=60 cm was chosen for the calculation and the experiment. Using Eq. (20), the image intensity pulse modulation for the case is found to be 1.0% of the maximum intensity modulation. Using R=13.83 cm together with .vertline.V(0)=266.2 V for the 15" computer monitor, and the theoretical graph 100 of FIG. 18, the pulsed electric field at z=60 cm was found to have an amplitude of 138 mV/m. In view of the experimental results discussed in the '874 and '922 patents, such a field, used at a pulse frequency chosen appropriately for the 1/2 Hz sensory resonance and applied predominantly to the face, is expected to be sufficient for exciting the 1/2 Hz sensory resonance. A confirmation experiment was done by running the VB6 program with the discussed settings and the 15" monitor. The center of the subject's face was positioned on the screen center line, at a distance of 60 cm from the screen. A frequency sweep of -0.1% per ten cycles was chosen, with an initial pulse frequency of 34 ppm. Full ptosis was experienced by the subject at 20 minutes into the run, when the pulse frequency was f=31.76 ppm. At 27 minutes into the run, the frequency sweep was reversed to +0.1% per ten cycles. Full ptosis was experienced at f=31.66 ppm. At 40 minutes into the run, the frequency sweep was set to -0.1% per ten cycles. Full ptosis occurred at f=31.44 ppm. The small differences in ptosis frequency are attributed to chemical detuning, discussed in the Background Section. It is concluded that the 1/2 Hz sensory resonance was excited in this experiment by screen emissions from ***subliminal*** image pulsing on the 15" computer monitor at a distance of 60 cm. For each implementation and embodiment discussed, the image pulsing may be ***subliminal***.

[0111] The human eye is less sensitive to changes in hue than to changes in brightness. In composite video this fact allows using a chrominance bandwidth that is smaller than the luminance bandwidth. But it also has the consequence that pulsing of the chrominance for fixed luminance allows larger pulse amplitudes while staying within the ***subliminal*** pulse regime. Eq. (3) shows how to pulse the chrominance components R-Y and B-Y while keeping Y fixed; for the change in pixel intensity one then has

.DELTA.I.sub.h=0.491.DELTA.(R-Y)+0.806.DELTA.(B-1). (24)

[0112] Luminance pulses with fixed chrominance give a change in pixel intensity

.DELTA.I.sub.1=3.DELTA.Y. (25)

[0113] Of course, pure chrominance pulses may be combined with pure luminance pulses; an instance of such combination has been mentioned above.

[0114] The ***subliminal*** region in color space needs to be explored to determine how marginally ***subliminal*** pulses .DELTA.R, .DELTA.G, and .DELTA.B depend on RGB values. Prior to this, the condition for image pulses to be ***subliminal*** should not be phrased solely in terms of the percentage of intensity pulse amplitude. The ***subliminal*** image pulsing case considered above, where the monitor is driven by a VB6 computer program with R=G=71, B=233, and .DELTA.R=.DELTA.G=0, .DELTA.B=2 for full-screen images will be referred to as "the standard ***subliminal*** image pulsing".

[0115] In the interest of the public we need to know the viewing distances at which a TV with subliminally pulsed images can cause excitation of sensory resonances. A rough exploration is reported here which may serve as starting point for further work. The exploration is limited to estimating the largest distance z=z.sub.max along the center line of the 30" TV at which screen emissions can excite the 1/2 Hz resonance,

as determined by the ptosis test. The TV is to display an image wich undergoes the standard ***subliminal*** pulsing as defined above. It would be best to perform this test with the 30" TV on which the subliminally pulsed images are produced by means of a video. Since such a video was not available, the ptosis test was conducted instead with a pulsed electric field source consisting of a small grounded doublet electrode of the type discussed in the '874 patent. The doublet was driven with a sinusoidal voltage of 10 V amplitude, and the center of mass of the subject was located on the center line of the doublet at a distance z=z.sub.d=323 cm. The doublet electrodes are rectangles of 4.4 cm by 4.7 cm. At the large distance Zd there is whole-body exposure to the field, so that the bulk effect discussed in the '874 patent comes into play, as is expected to happen also at the distance z.sub.max from the 30" TV monitor. The subject was facing the "hot" electrode of the doublet, so that at the subject center the electric field was the sum of the parts (21) and (23), for positive values of z. It was thought important to use a sine wave, since that would be the "commercially" preferred pulse shape which allows larger pulse amplitudes without being noticed. The only readily available sine wave generator with the required voltage was an oscillator with a rather coarse frequency control that cannot be set accurately, although the frequency is quite stable and can be measured accurately. For the experiment a pulse frequency of 0.506 Hz was accepted, although it differs considerably from the steady ptosis frequency for this case. The subject experienced several ptosis cycles of moderate intensity, starting 8 minutes into the experiment run. It is concluded that the 1/2 Hz sensory resonance was excited, and that the stimulating field was close to the weakest field capable of excitation. From Eqs. (21) and (23), the electric field pulse amplitude at the center of mass of the subject was found to be 7.9 mV/m. That an electric field with such a small pulse amplitude, applied to the whole body, is capable of exciting the 1/2 Hz sensory resonance is consistent with experimental results reported in the '874 patent, although these were obtained for the 2.4 Hz resonance. Next, the distance z.sub.max was determined at which the 30" TV tube with 1% image intensity pulse amplitude produces an electric field with a pulse amplitude of 7.9 mV/m, along the center line of the screen. From Eqs. (13) and (19) one finds z.sub.max=362.9 cm. At more than 11 feet, this is a rather large distance for viewing a 30" TV. Yet, the experiment and theory discussed show that the 1/2 Hz sensory resonance can be excited at this large distance, by pulsing the image intensity subliminally. Of course, the excitation occurs as well for a range of smaller viewing distances. It is thus apparent that the human nervous system can be manipulated by screen emissions from ***subliminal*** TV image pulses.

[0116] Windows 95, Windows 98, and Visual Basic are registered trademarks of Microsoft Corporation.

[0117] The invention is not limited by the embodiments shown in the drawings and described in the specification, which are given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

EKG's, emotional signature clustering, patented technology and beyond:

Before we get into EKG's, emotional signature clusters and the very science of Sub-Natural Strategy, first we must understand that the possibilities of manipulation are endless. It's now a question of the human soul and what living in today's world can really mean. Our search for meaning can be easily fulfilled.

This next section will cover patents that can be easily looked up on the Internet or wherever. Although I consider some old and outdated by today's standard, their technology is the foundation we use to gauge the future. The patents I'm presenting below are just a sample of what's out there. My point here is that we can research for ourselves what has been invented and patents detail what's been "Invented" up until now.

The "Signals" are out there. Learning about them is easy. Signals, primarily in the ULF (ultra-low-frequency) and ELF frequency range, have been recorded on a variety of equipment by several researchers and have been analyzed. During the many months these signals have been broadcast, they have been transmitting TWENTY-FOUR hours a day, EVERY DAY!!" If we research patents on our own, we'll see this truth for ourselves

You can start anywhere. All through out this book I've listed patents. Some like US Patent # 5213562: Method of inducing mental, emotional and physical states of consciousness, including specific mental activity in human beings. Others I've listed outright with descriptions and my own commentary. I started with out with US Patent # 5159703: Silent Subliminal Presentation System. One of the details of the experiments that was "analyzed" was the fact that, once a specific frequency for a certain type of brain function is proven, that frequency of transmission can be recorded on a computer. "The purpose of all this high technology is to plot and display a moving cluster of periodic brainwave signals. An EEG display from a single individual is taken of left and right hemispheres simultaneously ... By using these computer-enhanced EEGs, scientists can identify and isolate the brain's low-amplitude '***emotion signature clusters***', synthesize them and store them on another computer. In other words, by studying the subtle characteristic brainwave patterns that occur when a subject experiences a ***particular emotion***, scientists have been able to identify the concomitant brainwave pattern and ***can now duplicate it***. These clusters are then placed on the Silent Sound[TM] carrier frequencies and will silently trigger the occurrence of the same basic emotion in another human being!" Once these specific frequencies that causes a certain emotion or thought is precisely identified so exactly that a "fingerprint" of it can be made and stored on a computer, then this "fingerprint" can be sent out over other types of Mass Media! In other words, the frequency of brain wave are proven to be recorded by computer and then subliminally sent out via radio programs or TV shows. In theory, if the government wanted to cause huge numbers of people to suddenly go into depression, or into euphoria, they can emit the recorded signals via radio or TV and reach the entire population over a period of time. This capability can even implant specific thoughts or commands into the minds of people. I asked, *how can this be?*

A graphic illustration is found in product literature: "Induced Alpha to Theta Biofeedback cluster movement is labeled #AB 116-394-95 UNCLASSIFIED and is the output of the worlds most versatile and most sensitive EEG machine. It has a gain capability of 200,000 and is software driven by the fastest computers using noise-nulling technology similar to that used of nuclear submarines for detecting small objects underwater at extreme range. You won't need a submarine to read about the patents covered next…

US 4,335,710 Device for the induction of specific brain wave patterns - white noise
US 4,395,600 Auditory subliminal message system and method - Anti-shoplifting device
US 4,717,343 Method of changing a person's behavior
US 4,777,529 Auditory subliminal programming system
US 4,834,701 Apparatus for inducing frequency reduction in brain wave
US 5,151,080 Method and Apparatus for inducing and establishing a changed state of consciousness
US 5,159,703 Silent subliminal presentation system
US 6,024,700 System and Method for Detecting a thought and generating a control instruction in response thereto
US 6,219,657 Device and Method for Creation of Emotions
US 6,258,022 Behavior Modification
US 6,358,201 Method and apparatus for facilitating physiological coherence and autonomic balance

United States Patent ***4,335,710***
Williamson **June 22, 1982**

Device for the induction of specific brain wave patterns

Abstract

Brain wave patterns associated with relaxed and meditative states in a subject are gradually induced without deleterious chemical or neurological side effects. A white noise generator (11) has the spectral noise density of its output signal modulated in a manner similar to the brain wave patterns by a switching transistor (18) within a spectrum modulator (12). The modulated white noise signal is amplified by output amplifier (13) and converted to an audio signal by acoustic transducer (14). Ramp generator (16) gradually increases the voltage received by and resultant output frequency of voltage controlled oscillator (17) whereby switching transistor (18) periodically shunts the high frequency components of the white noise signal to ground.

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1. A device for the induction of brain wave patterns associated with relaxed and meditative states in a subject comprising:

means for generating a white noise signal having a uniform spectral noise density;

means for receiving said white noise signal and modulating its said spectral noise density in a manner similar to the brain wave patterns associated with relaxed and meditative states; and

means receiving said modulated noise signal for coupling said modulated signal to the subject.

2. A device, as set forth in claim 1, wherein the brain wave patterns associated with relaxed and meditative states occur in a range of freqencies, said means for modulating the spectral noise density including means for modulating said white noise signal beginning at a frequency greater than that of the brain wave patterns.

3. A device, as set forth in claim 2, wherein said means for modulating the spectral noise density further includes means for gradually reducing the frequency at which said spectral noise density is modulated.

4. A device, as set forth in claim 3, wherein said means for modulating the spectral noise density further includes means for terminating all modulation of said white noise signal upon reaching its lowest frequency of modulation.

5. A device, as set forth in claim 3 or 4, wherein said means for modulating the spectral noise density further includes means for reaching a steady state frequency of modulation at a frequency slightly lower than the lowest said brain wave pattern frequency.

6. A device, as set forth in claim 5, wherein said means for modulating said spectral noise density includes switching means for receiving said white noise signal, providing said modulated noise signal, and periodically shunting to ground the high frequency components of said white noise signal.

7. A device, as set forth in claim 6, wherein said means for modulating said spectral noise density further includes oscillator means for controlling the instantaneous frequency at which said switching means periodically shunts to ground said high frequency components of said white noise signal and generator means for controlling the instantaneous frequency of said oscillator means.

8. A device, as set forth in claim 7, wherein said generator means generates an output signal having a variable voltage, which signal is received by said oscillator means and causes said oscillator means to generate a modulation signal having a frequency of from approximately 14 to 15 Hz.

9. A device, as set forth in claim 8, wherein said output signal from said generator means begins operation at its negative most voltage amplitude and continuously gradually increases to a steady-state value at its positive most voltage amplitude, said oscillator means beginning operation at approximately 14 Hz and continuously gradually increasing to a steady-state value at approximately 5 Hz, whereby said switching means modulates the high frequency components of said white noise signal at the instantaneous frequency of said oscillator means.

10. A device, as set forth in claim 9, wherein said means for coupling said modulated signal to the subject is a headphone transducer for converting said modulated signal to an audio signal and having pneumatic tubes adopted to carry said audio signal to the subject in a non-intrusive manner while minimizing extraneous acoustical background distractions.

11. A device, as set forth in claim 10, wherein said switching means includes a switching transistor furnishing said modulated signal, and further including an output amplifier receiving and amplifying said modulated signal, said headphone transducer receiving said amplified modulated signal from said output amplifier.

Description

TECHNICAL FIELD

The present invention relates generally to a device for effecting deep relaxation in a subject. More particular, the present invention relates to a device for the induction of brain wave patterns associated with relaxed and meditative states in a human subject, commonly known as a "brain driver".

BACKGROUND ART

It has long been recognized that most mammals and in particular humans exhibit distinct recurring electrical frequencies in their brain wave patterns, each of which is related to separately identifiable physiological states. Brain waves having dominant frequencies from approximately 8-13 Hz, inclusive, are known as Alpha frequency brain waves and are associated with relaxed and meditative states as would occur when a subject has his eyes closed but is conscious and not thinking.

Techniques and devices which attempt to promote natural relaxation may be generally classified as passive or active. Passive devices serve merely to mask out irritating external noises with more pleasant sounds or utilize random or "white noise" to psychologically distract the subject from events which inhibit natural relaxation. Active devices seek to intentionally induce Alpha frequency brain waves in the subject, a phenomena known as "brain driving". Irrespective of the manner in which such brain waves are induced, a subject whose brain waves are principally in the Alpha frequency range will become deeply relaxed and exhibit the same beneficial reduced muscular tension and lowered anxiety and adrenalin levels as are associated with a naturally occurring state of relaxation.

Typical of the numerous passive devices are those which vary the output signal from a "white noise" source and convert the same to an accoustical signal, resulting in pleasant masking sounds. In one device, the white noise source output has its amplitude varied by a saw tooth wave form to produce sounds similar to waves repeatedly breaking in a surf. In another device, the output signal from a "white noise" source has its spectral content and amplitude varied in direct response to a subject's instantaneous dominant brain wave frequency and amplitude, respectively, producing a feedback signal to be utilized by the subject to recognize his present physiological state. All passive devices suffer from a fundamental inadequacy in that they cannot actually induce Alpha frequency brain waves with its associated relaxed and meditative condition.

Currently only three basic techniques for forcing a subject into a state exhibiting Alpha frequency brain waves are known to exist. Perhaps the most widely used is chemical tranquilizers, always subject to potentially grave known and unknown negative side effects or contraindications. The other techniques for "brain driving" involve the use of very bright, quickly flashing lights, direct electrical pulse stimulation of the brain through skin electrodes, or some combination thereof. In either instance, the lights or electrical pulses are synchronized to occur at a rate within the Alpha frequency range, i.e., from about 8 to 14 Hz. However, such flashing lights are not only irritating but may likely initiate a seizure in epileptic individuals. Electrical pulses are not only irritating, but also may produce unknown, deleterious side effects upon other parts of the brain or other neurological activity. Moreover, these devices attempt to very abruptly force the subject from an active and possibly highly emotional state to a highly relaxed and meditative state, thereby greatly increasing the likelihood of failure.

DISCLOSURE OF INVENTION

It is, therefore, an object of the invention to provide a device for the induction of brain wave patterns associated with relaxed and meditative states in a subject in a safe manner without deleterious or irritating side effects or contraindications.

It is a further object of the invention to provide a device for the induction of brain wave patterns associated with relaxed and meditative states in a subject, as above, which gradually induces such state in the subject.

It is yet a further object of the invention, to provide a device for the induction of brain wave patterns associated with relaxed and meditative states in a subject, as above, which utilizes a pleasing sound that is modulated and programmed in such manner as to induce Alpha frequency brain wave patterns only in those brain structures where it naturally occurs.

It is still a further object of the invention to provide a device for the induction of brain wave patterns associated with relaxed and meditative states in a subject, as above, which ultimately terminates all variations in modulation of the sound thereby freeing and encouraging the subject's brain to assume whatever somnolent brain wave patterns occur naturally to the subject.

It is still a further object of the invention to provide a device for the induction of brain wave patterns associated with relaxed and meditative states in a subject, as above, which includes a source of white noise and a circuit for modulating the spectral noise density of the white noise in a manner similar to the brain wave patterns associated with relaxed and meditative states so as to promote the gradual transition to an Alpha frequency brain wave condition and the continuous maintenance of the subject in that condition.

These and other objects and advantages of the present invention over existing prior art forms will become more apparent and fully understood from the following description in conjunction with the accompanying drawings.

In general, a device for the induction of brain wave patterns associated with relaxed and meditative states in a subject comprises a signal generator for generating a white noise signal having a uniform spectral noise density, a modulation circuit for receiving and modulating the white noise signal, and means for receiving the modulated noise signal and coupling it to the subject. The modulation circuit modulates the white noise signal in a manner similar to the brain wave patterns associated with relaxed and meditative states in the subject, thereby actively gradually inducing such state in the subject.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an exemplary device according to the concept of the present invention, and depicts the spectral-noise density modulator schematically.

FIG. 2 is a somewhat schematic representation of the voltage waveforms at various points in the device shown in FIG. 1, and although the various waveforms are in approximate time coordination with each other, they are not necessarily to scale.

PREFERRED EMBODIMENT FOR CARRYING OUT THE INVENTION

FIG. 1 illustrates a device, generally indicated by the numeral 10, for the reduction of stress in an individual by the induction of brain wave patterns associated with relaxed and meditative states. Device 10 broadly includes white noise generator 11, spectrum modulator 12, output amplifier 13, and acoustic transducer 14.

White noise generator 11 may be any conventional noise generator, either of the random or impulsive type, that has a level frequency spectrum over the frequency range of interest. One generator found suitable for use herein included an operational amplifier providing a thermal noise signal and an amplification stage.

Spectrum modulator 12 includes transistor shunt gate 15, ramp generator 16, and voltage control oscillator (hereinafter referred to as VCO) 17. Transistor shunt gate 15 includes a conventional NPN switching transistor 18, a by-pass diode 19, two summing resistors 20 and 21, and two capacitors 22 and 23. Ramp generator 16 may be any conventional ramp generator such as an integrator having a period as detailed hereinbelow and having a maximum voltage compatible with VCO 17 and transistor shunt gate 15. A switch 26 may be provided for resetting ramp generator 15 to its zero point, which for an integrator may be

its maximum voltage of negative polarity, referred to for convenient reference as -V.

VCO 17 may be any of the multitude of well-known astable multivibrators whose output frequency is a function of the voltage of its input signal. The frequency range of the output signal from VCO 17 should be slightly greater than the frequency range of alpha brain wave patterns and preferably should vary linearly from it highest output frequency when ramp generator 16 is at its maximum voltage of negative polarity (-V) to its lowest output frequency when ramp generator 16 is at its maximum voltage of positive polarity (+V). Where the Alpha brain wave frequency range is taken to be from approximately 8 to 13 Hz, inclusive, it is adequate to provide a VCO 17 output signal frequency range from approximately 5 to 14 Hz, inclusive.

Acoustic transducer 14 may be any conventional device for converting the electrical output signal from transistor shunt gate 15 to an audio signal. In order to increase the likelihood of relaxation in the subject, it is, however, highly desirable to provide the least intrusive coupling between the transducer and the subject while minimizing acoustical background distractions. Therefore, it has been found preferable to utilize a conventional headphone transducer having pneumatic tubes 24, 25 adopted to carry the audio signal to each ear of the subject without applying noticeable pressure to the subject's head.

The interconnection of the various elements described above is straightforward. The collector of switching transistor 18 is connected through capacitors 23 and 22, to noise generator 11 and, through capacitor 23 to output amplifier 13, so that both may receive the output signal from noise generator 11. The output signal from ramp generator 16 is received by both VCO 17, and, through resistor 20, the base of switching transistor 18. The output signal from VCO 17 is also received, through resistor 21, by the base of switching transistor 18. The anode of diode 19 is connected to the base of switching transistor 18, and has its cathode connected to ground along with the emitter of switching transistor 18. The output signal from output amplifier 13 is received by acoustic transducer 14.

To better visualize the operation of device 10, five output signal waveforms emanating from the various elements noted below have been illustrated in FIG. 2. Denoted A through D, inclusive, it should be reiterated at this point that these waveforms are coordinated in time, but not necessarily in amplitude. These waveforms respectively represent the output signals from noise generator 11, ramp generator 16, VCO 17, and transistor shunt gate 15.

Noise generator 11 generates a "white noise" output signal A having a "uniform" spectral noise density. In other words, this means that the ratio of the noise output from noise generator 11 within a specific frequency interval to the frequency interval itself is a constant. As shall become more evident hereinafter, it is of no moment to the present invention precisely what this ratio happens to be, it is significant only that it remains constant.

Spectrum modulator 12 receives white noise signal A from noise generator 11 and modulates its spectral noise density in a manner similar to the brain wave patterns associated with relaxed and meditative states. More particularly, spectrum modulator 12 modulates white noise signal A with a variable frequency in the range of frequencies of Alpha brain wave patterns. It has been found to be most effective in inducing a relaxed and meditative state in a subject to begin modulating white noise signal A at a frequency slightly greater than the frequency associated with the Alpha brain wave pattern occurring when the subject is most active, and gradually over a period (T) of minutes reducing the modulation frequency to a frequency slightly less than the frequency associated with the Alpha brain wave pattern occurring when the subject is least active. Upon reaching this lowest modulation frequency, modulation of white noise signal A is terminated, permitting the subject's natural brain wave patterns to become dominant.

A typical operating cycle would begin by the closing of switch 26, resetting ramp generator output signal B to its "zero" voltage -V volts, and forcing VCO output signal C to its highest frequency of 14 Hz. VCO output signal C is mixed with ramp generator output signal B and received by the base of switching transistor 18, causing switching transistor 18 to alternate at the instantaneous frequency of VCO 17 (then 14 Hz) between saturation and cutoff operational states. Diode 19 sets the maximum base-emitter voltage for switching transistor 18.

When operating in a saturated state, switching transistor 18 shunts to ground the higher frequency components of white noise signal A. When operating in a cutoff state, switching transistor 18 permits the full frequency spectrum of white noise signal A to be received by output amplifier 13. The resultant output from spectrum modulator 12 is output signal D shown in FIG. 2.

As time proceeds, the voltage of ramp generator output signal B increases, proportionally decreasing the frequency of VCO output signal C and the modulation frequency of white noise signal A. When the maximum possible positive voltage (+V) of ramp generator output signal B is reached, the frequency of VCO output signal C remains at a constant 5 Hz, and switching transistor 18 remains in a saturated state, causing all modulation of white noise signal A to terminate, leaving only the low frequency components of white noise signal A to be received by output amplifier 13.

Output amplifier 13 receives transistor shunt gate 15 output signal D and amplifies it to a level compatible with acoustical transducer 14, which converts the signal to an audio format suitable for direct listening by the subject. Output amplifier 13 only need be furnished where further amplification is required.

Several modifications to the depicted embodiment may be noted. Perhaps most significant is the fact that other spectrum modulation patterns could be employed herein, although the illustrated continuously decreasing spectral density modulation is highly advantageous in inducing a relaxed and meditative condition in a subject. For example, rather than ramp generator 16 generating a continuously increasing voltage signal, continuously decreasing the frequency of VCO 17, it would be possible to provide periods of constant voltage output alternated with periods of changing voltage output, resulting in differing patterns of spectral modulation. An essentially unlimited number of possible combinations may be effected by simple adjustment of the generator 16 output signal waveform.

It should also be appreciated that the particular transistor shunt gate 15 shown herewith is merely exemplary of numerous equally suitable circuits for switching the noise generator output signal A. Transistor shunt gate 15 permits modulation of the higher frequencies contained in the source signal at rates which corrolates to natural Alpha brain wave pattern frequencies and, in this manner modifies the spectral noise density of the source signal.

Inasmuch as the present invention is subject to many variations, modifications and changes in detail, a number of which have been expressly stated herein, it is intended that all matter described throughout this entire specification or shown in the accompanying drawings be interpreted as illustrative and not in a limiting sense. It should thus be evident that a device constructed according to the concept of the present invention, and equivalent thereto, will accomplish the objects of the present invention and otherwise substantially improve the art of the induction of specific brain wave patterns in a subject.

United States Patent ***4,395,600***
Lundy , et al. **July 26, 1983**

Auditory subliminal message system and method

Abstract

Ambient audio signals from the customer shopping area within a store are sensed and fed to a signal processing circuit that produces a control signal which varies with variations in the amplitude of the sensed audio signals. A control circuit adjusts the amplitude of an auditory subliminal anti-shoplifting message to increase with increasing amplitudes of sensed audio signals and decrease with decreasing amplitudes of sensed audio signals. This amplitude controlled subliminal message may be mixed with background music and transmitted to the shopping area. To reduce distortion of the subliminal message, its amplitude is controlled to increase at a first rate slower than the rate of increase of the amplitude of ambient audio signals from the area. Also, the amplitude of the subliminal message is controlled to decrease at a second rate faster than the first rate with decreasing ambient audio signal amplitudes to minimize the possibility of the subliminal message becoming supraliminal upon rapid declines in ambient audio signal amplitudes in the area. A masking signal is provided with an amplitude which is also controlled in response to the amplitude of sensed ambient audio signals. This masking signal may be combined with the auditory subliminal message to provide a composite signal fed to, and controlled by, the control circuit.

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Claims

We claim:

1. An auditory subliminal message system for an area comprising:

ambient audio signal processing circuit means adapted to receive an input representing ambient audio signals in the area, said ambient signal processing means comprising means for producing a control signal output which continuously varies with variations in the received input and thereby with variations in the ambient audio signals in the area; and

subliminal message control circuit means having a first input adapted to receive an auditory subliminal message signal, said control circuit means having a second input coupled to said ambient signal processing means for receiving said control signal output, and said control circuit means comprising means for continuously adjusting the amplitude of the received auditory subliminal message signal and for producing an adjusted output signal comprising the amplitude adjusted auditory subliminal message signal, the adjusted output signal being adapted for transmission to the area and having an amplitude which varies in response to said control signal so as to increase with increases in amplitude of ambient audio signals in the area and decrease with decreases in amplitude of ambient audio signals in the area.

2. A system according to claim 1 in which said ambient audio signal processing circuit means changes said control signal at one rate with increases in amplitude of ambient audio signals in the area and changes it at a faster rate with decreases in amplitude of ambient audio signals in the area, said control circuit means comprising means responsive to said control signal to produce an adjusted auditory subliminal message output signal which has an amplitude which increases at a first rate with increases in the amplitude of ambient audio signals in the area and which decreases at a second rate faster than the first rate with

decreases in the amplitude of ambient audio signals in the area.

3. An auditory subliminal message system for an area comprising:

audio sensor means for sensing ambient audio signals in the area and for producing an ambient audio output signal representing the volume of the sensed ambient audio signals;

means having an input coupled to the output of said audio sensor means for producing a subliminal message output signal with a volume which follows the volume of the sensed ambient audio signals in the area.

4. A system according to claim 3 in which said last named means includes:

subliminal message source means for providing an auditory subliminal message output signal; and

volume control circuit means having an input coupled to the output of said audio sensor means and an input coupled to the output of said subliminal message source means, said volume control circuit means comprising means for adjusting the volume of the received subliminal message output signal in response to the received ambient audio output signal so as to produce a modified subliminal message output signal which comprises the volume adjusted received subliminal message output signal.

5. A system according to claim 3 in which said last named means comprises means for producing a subliminal message output signal at a volume which increases in response to increases in the volume of sensed ambient audio signals at a rate slower than the rate of increase of the sensed ambient audio signals.

6. A system according to claim 5 in which said last named means comprises means for producing a subliminal message output signal at a volume which decreases in response to decreases in the volume of sensed ambient audio signals at a rate which is faster than the rate the subliminal message output signal increases in response to increases in the volume of sensed ambient audio signals.

7. An auditory subliminal message system for an area comprising:

at least one audio sensor means for sensing ambient audio signals in the area and for producing an ambient audio output signal representing the amplitude of the sensed ambient audio signals;

subliminal message source means for providing an auditory subliminal message output signal;

control circuit means coupled to the output of said audio sensor means and to said subliminal message source means for adjusting the amplitude of the subliminal message output signal so as to follow the amplitude of the sensed ambient audio signals; and

masking signal source means for providing and combining a masking signal having frequency characteristics and an amplitude such that when the masking signal is combined with the amplitude adjusted subliminal message output signal it renders the adjusted subliminal message output signal outside of the conscious recognition range.

8. A system according to claim 7 in which said subliminal message source means comprises means for producing a repetitive auditory subliminal message output signal.

9. A system according to claim 7 in which said subliminal message source means and said masking signal source means comprise means for providing a composite signal which includes the auditory subliminal message output signal as one component and which includes the masking signal as another component; said control circuit means comprising means for adjusting the amplitude of the composite signal so as to follow the amplitude of the sensed ambient audio signals.

10. A system according to claim 9 including system testing means for selectively adjusting the amplitude of the composite signal to bring the masking signal into the conscious recognition range and thereby indicate the system is operating.

11. A system according to claim 7 in which said masking signal source means provides a masking signal having an amplitude which is in the range of approximately 3 db to 15 db greater than the amplitude of the amplitude adjusted subliminal message output signal.

12. A system according to claim 11 in which said masking signal source means provides a masking signal having an amplitude which is approximately 5 db greater than the amplitude of the amplitude adjusted subliminal message output signal.

13. A system according to claim 7 in which said masking signal source means comprises a white noise signal generator.

14. A system according to claim 9 in which said means for providing a composite signal comprises an audio recording playback means for playing back a recording of the composite signal.

15. A system according to claim 9 in which said means for providing a composite signal includes voice synthesizer means for providing the auditory subliminal signal component.

16. A system according to claim 15 in which said means for providing a composite signal includes white noise signal generator means for providing the masking signal component and mixer circuit means for combining the output of said voice synthesizer means and the output of said white noise signal generator means to provide an output from said mixer circuit means which comprises the composite signal.

17. A system according to claim 9 including output circuit means having at least one audio speaker means for transmitting the amplitude adjusted composite signal to the area.

18. A system according to claim 7 in which said control circuit means is also coupled to said masking signal source means and comprises means for adjusting the amplitude of the masking signal so as to follow the amplitude of the sensed ambient audio signals.

19. An auditory subliminal message system for an area comprising:

at least one audio sensor means for sensing ambient audio signals in the area and for producing an ambient audio output signal representing the amplitude of the sensed ambient audio signals;

subliminal message source means for providing an auditory subliminal message output signal;

masking signal source means for providing and combining a masking signal having frequency characteristics and an amplitude such that when the masking signal is combined with the amplitude adjusted subliminal message output signal it renders the adjusted subliminal message output signal outside of the conscious recognition range;

ambient audio signal processing circuit means coupled to the output of said audio sensor means for producing a control signal which varies with variations in the amplitude of the sensed ambient audio signals; amplitude control circuit means coupled to said subliminal message source means, to said masking signal source means and to said ambient audio signal processing circuit means for controlling the amplitude of said auditory subliminal message and the amplitude of said masking signal in response to the control signal from said ambient audio signal processing circuit means such that the amplitudes of said auditory subliminal signal and of said masking signal increase with increasing amplitudes of the sensed ambient audio signals and decrease with decreasing amplitudes of the sensed ambient audio signals; and output circuit means including speaker means for transmitting the amplitude controlled auditory subliminal message output signal and the amplitude controlled masking signal to the area.

20. A system according to claim 19 in which said ambient audio signal processing circuit means includes an audio channel circuit means associated with each said sensor means.

21. A system according to claim 20 including plural audio sensor means and plural audio channel means, each said audio channel means including rectifier circuit means having an input coupled to the output of its associated audio sensor means for receiving and producing a rectified output signal representing the amplitude of the ambient audio signals sensed by the associated audio sensor means, each said audio channel means also including signal shaping circuit means having an input coupled to the output of said rectifier means for producing a shaped output signal which increases at a first rate in response to increases in the rectified output signal which corresponds to increases in the amplitude of the ambient audio signals sensed by the associated audio sensor means, the shaped output signal decreasing at a second rate which is faster than the first rate in response to decreases in the rectified output signal which corresponds to decreases in the amplitude of the ambient audio signals sensed by the associated audio sensor means; and

said system also including averaging circuit means having an input coupled to the outputs of said signal shaping circuit means for receiving and averaging the shaped output signals to produce a control signal comprising the average of the received shaped output signals.

22. A system according to claim 20 including plural audio sensor means and plural audio channel means, each said audio channel means including rectifier circuit means having an input coupled to the output of its associated audio sensor means for receiving and producing a rectified output signal representing the amplitude of the ambient audio signals sensed by the associated audio sensor means;

said system also including averaging circuit means having an input coupled to the outputs of said rectifier circuit means for receiving and averaging the rectified output signals to produce an averaging circuit output signal comprising the average of the received rectified output signals; and

signal shaping circuit means having an input coupled to the output of said averaging circuit means for producing a shaped output signal which increases at a first rate in response to increases in the averaging circuit output signal which corresponds to increases in the amplitude of the sensed ambient audio signals, the shaped output signal decreasing at a second rate which is faster than the first rate in response to decreases in the averaging circuit output signal which correspond to decreases in the amplitude of the sensed ambient audio signals.

23. A system according to claim 21 or 22 in which the first rate is slower than the rate of increase of the sensed ambient audio signals.

24. A system according to claim 19 in which said output circuit means includes means for combining background audio signals, such as music, with the amplitude controlled auditory subliminal signal prior to transmitting this latter signal to the area.

25. A system according to claim 21 in which the control signal comprises a control voltage and in which said amplitude control circuit means comprises a voltage controlled amplifier circuit.

26. A method of reducing shoplifting in a customer area of a store comprising:

sensing ambient audio signals from the area;

providing an auditory anti-shoplifting subliminal message signal; adjusting the amplitude of the subliminal message signal to follow the amplitude of the sensed audio signals; and transmitting the amplitude adjusted subliminal message signal to the area.

27. A method according to claim 26 in which the step of adjusting the amplitude comprises the steps of increasing the amplitude at a first rate with increasing amplitudes of the sensed audio signals and decreasing the amplitude at a second rate faster than the first rate with decreasing amplitudes of the sensed audio signals.

28. A method according to claim 26 or 27 including the steps of providing a masking signal having amplitude and frequency characteristics which when combined with the auditory subliminal message signal renders the subliminal message signal below the level of conscious recognition;

adjusting the amplitude of the masking signal to follow the amplitude of the sensed audio signals; and

transmitting the amplitude adjusted masking signal to the area.

29. A method according to claim 28 in which the step of providing a subliminal message signal comprises the step of providing a composite signal having the auditory subliminal message signal as one component and the masking signal as another component;

the step of adjusting the amplitude comprises the step of adjusting the amplitude of the composite signal to follow the amplitude of the sensed audio signals; and

the step of transmitting comprises the step of transmitting the amplitude adjusted composite signal to the area.

Description

BACKGROUND OF THE INVENTION

The present invention relates to a system and method for providing subliminal auditory signals to an area such as a customer shopping area within a store. More particularly, the invention relates to such a system and method in which the amplitude of the subliminal signal is adjusted in response to the amplitude of ambient audio signals from the customer shopping area.

It has been established that auditory subliminal signals, that is, those presented below the conscious recognition level of the listener, can be used to influence the listener's behavior to some degree. Some early research into visual and auditory subliminal stimulation effects are exemplified in U.S. Pat. Nos. 3,060,795 of Corrigan, et al. and 3,278,676 of Becker.

In addition, Becker is understood to have experimented with the use of auditory subliminal messages to deter shoplifting by retail store customers. Although applicants have not seen or studied Mr. Becker's device, it is believed to combine an auditory subliminal message with background music. However, during non-peak shopping and other times when the store area is exceptionally quiet, the background music signal component in Becker must be much louder than the subliminal signal as otherwise the subliminal signal would be at a level such that it may be consciously recognized by a listener. In addition, as a result of this large difference between the amplitude of the background music and that of the subliminal message signal, the effectiveness of the Becker subliminal message is reduced. Also, Becker is understood to maintain his combined background music and subliminal message at a level sufficiently high enough to enable the music to be heard even under noisy store conditions. However, when the ambient audio signal level drops, such as during non-peak store traffic times, the combined background music and subliminal signal would remain the same and seem overly loud. Thus, Becker is simply not understood to control the amplitude of a subliminal message in response to ambient audio signals from an area.

Accordingly, there is a need for an auditory subliminal message system and method which solves these and other problems.

SUMMARY OF THE INVENTION

The present invention is a method and system for adjusting the amplitude of an auditory subliminal message in response to the amplitude of ambient audio signals from an area to which the subliminal

message is to be transmitted. In accordance with one aspect of the invention, an audio signal processing circuit means receives signals representing the amplitude of audio signals in the area, such as a retail shopping area of a store. This processing circuit means produces a control signal for an amplitude adjustment or control circuit means which adjusts the amplitude or volume of an auditory subliminal signal which is to be transmitted to the area. The amplitude of the auditory subliminal signal is adjusted to increase with increasing sensed ambient audio signals and decrease with decreasing sensed ambient audio signals.

As a more specific aspect of the invention, a masking signal is generated and fed to the area. This masking signal has frequency and amplitude characteristics which cover or render the subliminal signal inperceptible to the conscious recognition level of a listener. In the preferred embodiment, the amplitude of this masking signal is also controlled in response to the sensed ambient audio signals so that its amplitude follows the amplitude of the adjusted subliminal message signal. The masking signal may be combined with the subliminal signal to provide a composite signal having an amplitude controlled by the control circuit in response to the control signal.

As a more specific feature of the invention, to reduce distortion of the subliminal message signal, the processing circuit means produces a control signal which causes the control circuit means to increase the amplitude of the auditory subliminal message signal slowly at a rate slower than the rate of change of the ambient audio signals at times when the ambient audio signals are increasing in magnitude. In addition, at times when the ambient audio signals are decreasing to minimize the possibility of conscious perception of the subliminal message signal, the processing circuit means produces a control signal which causes the control circuit means to decrease the amplitude of the subliminal signal at a fast rate.

It is accordingly one object of the invention to provide an improved auditory subliminal message system and method.

Another object of the invention is to provide an auditory subliminal message having an amplitude which is adjusted in response to ambient noise levels within an area to which the auditory subliminal message is to be transmitted.

A further object of the invention is to provide a method and system which adjusts the amplitude of an auditory subliminal message at one rate with increasing ambient audio signal levels in the area and at another, faster rate with decreasing ambient audio signal levels.

A still further object of the invention is to provide such a method and system in which the amplitude of an auditory subliminal signal is adjusted to rise at a rate slower than the rate of increases in ambient audio signal levels.

Another object of the invention is to provide an auditory subliminal message which is continuously maintained below the conscious perception level.

A further object of the invention is to provide an auditory subliminal message which is maintained below the conscious perception level of listeners in an area and which is adjusted in response to ambient audio signals in the area so as to remain close to the level of conscious perception.

Still another object of the invention is to provide an auditory masking signal for an auditory subliminal message, the masking signal having an amplitude which is adjusted in response to ambient noise levels in an area to which the auditory subliminal message is to be transmitted.

A more specific object of the invention is to provide an auditory subliminal message anti-shoplifting system and method.

These and other objects, features and advantages of the invention will become apparent with reference to the following drawings and description.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing

FIG. 1 is a block diagram of an auditory subliminal message system in accordance with the present invention;

FIG. 2 is a block diagram illustrating one embodiment of an auditory subliminal message signal and masking signal source;

FIG. 3 is a block diagram showing another embodiment of an auditory subliminal message signal and masking signal source;

FIG. 4 is a block diagram showing an alternate ambient audio signal processing circuit; and

FIG. 5 is a detailed circuit schematic diagram of the ambient audio signal processing circuit and other portions of the circuit of FIG. 1.

DETAILED DESCRIPTION

General Description of Preferred Embodiment

It has now been discovered that in an environment with constantly changing ambient audio levels, such as in the shopping area of a store, it is desirable to adjust the amplitude of an auditory subliminal message signal to follow the amplitude of the ambient audio signals. That is, by increasing the amplitude of the auditory subliminal message with increasing ambient audio levels and decreasing the amplitude of the subliminal signal with decreasing ambient audio levels, the subconscious perception of the subliminal message by listeners is improved. This in turn increases the effectiveness of the subliminal message.

Therefore, with reference to FIG. 1, the system includes circuit means for controlling the amplitude of an auditory subliminal message signal in response to the level of ambient sounds in an area 26, such as the customer shopping area within a store, to which the subliminal message signal is to be transmitted. Such circuit means includes an ambient audio signal processing circuit 10 and a control circuit 12. Control circuit 12 is adapted to receive an auditory subliminal message signal input at 14 and processing circuit 10 has at least one input 16 for receiving signals representing the amplitude or volume of ambient audio signals within the area. Processing circuit 10 and control circuit 12 adjust the amplitude of the auditory subliminal message signal received at input 14, in response to the amplitude of ambient audio signals received at input 16, to produce an auditory subliminal message signal output at 18 having an amplitude which varies with variations in the level of ambient audio signals in the area.

The output signal at 18 is fed to an output circuit which, in the illustrated form, includes an output mixer circuit 20 having an input coupled to output 18, a preamplifier and amplifier circuit 22 with an input 21 coupled to the output of mixer circuit 20, and a speaker 24 for transmitting the amplitude adjusted auditory subliminal message signal to area 26. The circuit also may include an optional background auditory signal source 28 which produces music or other background auditory signals which are fed to an input 29 of the output mixer circuit 20. These background signals are combined within mixer circuit 20 with the amplitude controlled subliminal message signal and the combined signal is transmitted by speaker 24 to room 26.

The preferred embodiment of the system also includes at least one audio sensor means, such as microphone 30 positioned within the area 26. Microphone 30 detects ambient audio signals within the area and produces an electrical output signal representing these detected signals. The microphone output is fed to input 16 of ambient audio signal processing circuit 10.

Processing circuit 10 includes an audio channel 32 associated with microphone 30 for modifying the input 16 to produce an audio channel output signal at 34 which varies with variations in the ambient audio signal input at 16, as explained below. Preferably, plural microphones 30, 30a, 30b, 30c, 30d, etc. are provided for

detecting ambient audio signals in various parts of the area 26. For convenience, these microphones may be positioned in the ceiling of the shopping area. A respective audio channel 32a, 32b, 32c and 32d is associated with each of the microphones 30a, 30b, 30c and 30d and produces output signals 34a, 34b, 34c and 34d in the same manner as the audio channel 32. The output signals 34 are averaged by an averaging circuit 36 to produce an output control signal at 38 which varies with variations in the amplitude of ambient audio signals sensed by the microphones throughout the store area 26.

In the embodiment of FIG. 1, each audio channel 32 includes a preamplifier circuit 40 for amplifying the input signal 16, a rectifier circuit 42 for rectifying the amplified input signal and a signal shaping circuit 44 for modifying the rectified ambient audio signal input from microphone 30, as explained below.

In connection with this signal shaping circuit, it has now been discovered that rapid changes of an amplitude of an auditory subliminal signal can distort it to such an extent that it becomes unrecognizable to subconscious perception. Hence, to reduce such distortion and increase the subconscious perceptibility of the subliminal signal, the signal shaping circuit adjusts the control signal to cause the amplitude of the auditory subliminal message signal at a rate which is slower than the rate of increase of ambient audio signals at times when the amplitude of such ambient signals is increasing. However, with sudden drops in the level of ambient audio signals, a slow drop in the amplitude of the subliminal message could lead to conscious perception of this message. This can be extremely disadvantageous in situations wherein it is desired to keep the existence of the subliminal message a secret. Therefore, the signal shaping circuit adjusts the control signal to cause the volume of the auditory subliminal message to drop at a faster rate upon a decrease in the volume of ambient audio signals.

Hence, with this form of signal shaping circuit 44, the control signal output at 38 of the averaging circuit 36 varies at one rate with increasing ambient audio signals and at another faster rate with decreasing ambient audio signals. Furthermore, control circuit 12 is responsive to this varying control signal to produce an amplitude adjusted auditory subliminal message output at 18 which increases at a first rate with increases in ambient audio signals and decreases at a second rate, faster than the first rate, with decreases in ambient audio signals. In addition, to prevent distortion of the subliminal message, the first rate is slower than the rate of increase of the ambient audio signals.

It has also now been discovered that time lags are introduced into an auditory subliminal system. Such time lags are primarily due to the amount of time required by ambient audio signals is travel to microphones and the time required by an amplitude controlled subliminal message to travel from speakers to a listener. Thus, no matter how quickly the system reduces the amplitude of the auditory subliminal message in response to declining ambient sound levels, a reduction in the amplitude of the subliminal message would lag the reduction in volume of ambient sound. Thus, a rapid drop in ambient sound level could momentarily leave the subliminal message signal at a level sufficiently high to be perceived by a listener. In certain applications this would prove extremely disadvantageous.

For example, if an anti-shoplifting subliminal system is used to deter shoplifting in a store, customers may be extremely reluctant to patronize the store if they consciously perceive a normally anti-shoplifting message and hence realize that such a system is in use. Thus, although a store may realize savings due to a reduction in shoplifting, its overall profits may suffer because of customer reluctance to patronize a store wherein such a system is in use. Hence, in such applications it is desirable to maintain the subliminal signal continuously below the conscious perception range of listeners. On the other hand, in other applications such as in connection with a weight loss class in which the listeners realize that an auditory subliminal weight loss message is being transmitted, it is not as critical to continuously maintain the subliminal message below conscious perception levels.

To solve this problem, the preferred embodiment of the system includes means for producing a masking signal which screens the auditory subliminal message and blocks its conscious perception, particularly during times when the volume of ambient noise drops quickly. Thus, as illustrated in FIG. 1, the system includes a subliminal message and masking signal source means 48 which produces the auditory subliminal message signal fed to input 14 of control circuit 12. In addition, source 48 includes means for providing a masking signal with amplitude and frequency characteristics which block conscious perception of the

auditory subliminal message. The masking signal may bypass control circuit 12 and be fed directly to room 26. However, it is preferable that the amplitude of the masking signal also be controlled in response to the amplitude of ambient audio signals. Otherwise, when the room becomes very quiet, the masking signal could be so loud that it is readily perceived and annoying. Also, if the masking signal amplitude remained constant while the subliminal signal amplitude dropped in response to drops in ambient sound levels, the amplitude of the masking signal would become so large relative to that of the subliminal message, that subconscious perception of the subliminal message is impaired.

Although a separate control circuit may be provided for controlling the amplitude of the masking signals, preferably the masking signal is combined with the auditory subliminal message signal and the resulting composite signal is fed to input 14 of control circuit 12. As illustrated in FIG. 1, control circuit 12 may include a voltage control amplifier circuit 39 for adjusting the output 18 in response to the control signal input 38.

As shown in FIG. 2, subliminal message and masking signal source 48 may comprise a means such as a tape recorder for playing back a recording of a composite auditory subliminal message and masking signal. In an alternate form illustrated in FIG. 3, the subliminal message and masking signal source 48 may comprise a voice synthesizer circuit 50 which produces an auditory subliminal component of the composite subliminal and masking signals. One suitable voice synthesizer circuit 50 comprises a commercially available "Digitalker" kit produced by National Semiconductor Company. This kit includes a sixteen kilobite, eight bit memory chip No. MM52116 and a speech processor chip designated SPC. In addition, a masking signal circuit 52 is provided for producing the masking signal. This circuit may take various forms and comprise a white noise signal generator circuit such as a random noise oscillator with an internal shift register. One suitable generator is available from Radio Shack and designated random events generator chip No. S2688/MM5837. The masking signal circuit and voice synthesizer circuit outputs are fed to a commercially available mixer amplifier circuit 54, in which they are combined. The mixer circuit output comprises the composite auditory signal which is fed to input 14 of the control circuit 12.

As previously mentioned, the masking signal has frequency and amplitude components which make the auditory subliminal message signal incapable of conscious recognition by a listener. More specifically, the masking signal has frequency components which overlay the frequency components of the auditory subliminal message signal. In addition, the amplitude of the masking signal is slightly higher than the amplitude of the auditory subliminal message signal. More specifically, it has now been discovered that preferred results are obtained when the amplitude of the masking signal is continuously maintained approximately within the range of 3 db to 15 db above the amplitude of the subliminal message signal. Furthermore, that the best results occur when the masking signal is approximately 5 db above the amplitude of the auditory subliminal message signal. That is, with such relative amplitudes of the masking signal to the auditory subliminal message signal, a temporary screen is provided for the subliminal message at times, such as during rapid declines in ambient noise levels, when the subliminal message may otherwise become supraliminal. Also, with such relative amplitudes, the masking signal provides a satisfactory screen for the subliminal message without impairing satisfactory subconscious perception of the auditory subliminal message. It should be noted that with such relative amplitudes of the masking signal and subliminal message signal, the masking signal typically may not block conscious perception of the subliminal signal in a situation where the composite subliminal message and masking signal are at a high amplitude in relation to the volume of ambient audio signals. However, such conditions are prevented by controlling the amplitude of the composite signal in response to ambient audio signals, as explained above.

FIG. 4 illustrates an alternate ambient audio signal processing circuit. Components of this circuit which are similar to those of the FIG. 1 form of processing circuit have numbers incremented by two hundred over the corresponding numbers in FIG. 1. Hence, these components will not be described in detail. Unlike the FIG. 1 form of processing circuit, the audio channels of the FIG. 4 embodiment do not include the signal shaping circuit. Instead, the output of the respective rectifier circuits are averaged by an averaging circuit 236 prior to signal shaping by a signal shaping circuit 244 in the manner explained above.

DETAILED CIRCUIT DESCRIPTION

With reference to FIG. 5, a four-channel audio signal processing circuit is illustrated. Since each of the illustrated channels is identical, only the upper channel will be described in detail.

The audio channel includes series connected preamplifier circuit 40, rectifier circuit 42, and signal shaping circuit 44. The input 16 to the channel is obtained from the microphone 30 (FIG. 1) and thus fluctuates in response to changes in ambient audio signals detected by the microphone. Input 16 and hence the microphone output is fed to preamplifier circuit 40. More specifically, this input is coupled by a 0.1 microfarad capacitor 58 through a one kilohm gain establishing resistor 60 to the inverting input of an operational amplifier 62. The output of amplifier 62 is connected through a one megohm feedback resistor 64 to its inverting input. The gain of amplifier 62 is established by the ratio of resistors 64 and 60 and, with these particular resistors is set at approximately one thousand. Also, a positive biasing voltage V is fed through a two megohm biasing resistor 66 to the noninverting input of amplifier 62. With the circuit components utilized in the FIG. 5 circuit, the positive biasing voltage is six volts and a negative biasing voltage is at negative six volts. One suitable amplifier 62 comprises one amplifier section of an LM3900 quad Norton operational amplifier. When connected as described above, amplifier 62 inverts and amplifies the input signal at 16.

To convert the input at 16 to a direct current signal, 0.1 microfarad capacitor 68 couples the output of amplifier 62 to the inverting input of an amplifier 70 connected as an amplifying, inverting, precision rectifier. Rectifier circuit 42 produces an output signal comprising a positive half-cycle inverted and amplified version of the input signal. More specifically, the output of amplifier 70 is connected to the anode of a diode 74 having its cathode connected through a one megohm feedback resistor 76 to the inverting input of amplifier 70. Thus, the positive half-cycles of the output signal from amplifier 70 are coupled through diode 74 and resistor 76 to the inverting input of amplifier 70. In contrast, the negative half-cycle output signals from amplifier 70 are blocked by diode 74. However, because the output of amplifier 70 is connected to the cathode of a diode 72 having its anode coupled to the inverting input of amplifier 70, these negative going half cycles are coupled through diode 72 to the inverting input of amplifier 70. The output of rectifier 42 is taken at the cathode of diode 74 and comprises a positive representation of the input signal 16 and hence of the amplitude of ambient audio signals detected by microphone 30. A suitable amplifier for accomplishing this rectification comprises one amplifier section of a type 324 quad operational amplifier.

The rectified output signal from rectifier circuit 42 is fed to signal shaping circuit 44. That is, the output of the rectifier circuit is fed to a resistor-capacitor network. This network comprises a ten kilohm resistor 78 coupled between the output of rectifier 42 and the noninverting input of an operational amplifier 80, a one microfarad capacitor 88 which couples the noninverting input of amplifier 80 to ground, and a one hundred kilohm resistor 86 in parallel with capacitor 88. This network has a charging time constant of approximately 0.01 seconds and discharging time constant of approximately 0.1 seconds. Amplifier 80 may comprise one amplifier section of a type 324 quad operational amplifier and has its output coupled directly through a feedback loop to its noninverting input so that the amplifier acts as a voltage follower. The output of amplifier 80 drives another resistor-capacitor network including a five hundred kilohm resistor 82 and a ten microfarad capacitor 90. The time constant of this latter resistor-capacitor is approximately five seconds. Also, a diode 84, having a turn-on voltage of approximately 0.7 volts, has its anode connected to the contact between resistor 82 and capacitor 90 and its cathode connected to the noninverting input of amplifier 80. The positive side of capacitor 90 is coupled through a one hundred kilohm resistor 92 to the output 34 of the audio channel. This output 34 is then fed to averaging circuit 36 as explained below. For reasons explained above, signal shaping circuit 44 operates in the following manner to produce an output on line 34 which increases at one rate with increasing sensed ambient audio signals and which decreases at a rate faster than said one rate with decreases in the sensed audio signals. Furthermore, because of the delays within the signal shaping circuit 44 resulting from charging time of the resistor-capacitor networks, the output signal on line 34 will increase at a slower rate than the rate of increase of ambient noise signals. This slows the rate of change of the audio subliminal signal and thereby minimizes rapid amplitude fluctuations therein and resulting distortions. That is, as the amplitude of ambient audio signals increases, the signal reaching capacitor 90 also increases. However, because of the relatively long charging time constant of the resistor-capacitor network including capacitor 90, capacitor 90 charges slowly. Hence, under those conditions the output on line 34 comprises a slowly rising DC signal. Furthermore, because the voltage at the anode of diode 84 is greater than or equal to the voltage at its cathode, diode 84 is nonconducting. In contrast, upon a sudden decrease in the amplitude of the sensed ambient audio signals, the input to operational amplifier 80 quickly decreases. As a result, the voltage at the cathode of diode 84 drops below the voltage at the anode of this diode sufficiently to cause the diode to conduct. While conducting, diode 84 establishes a short circuit between the positive side of capacitor 90, through resistor 86 and to ground so that capacitor 90 rapidly discharges. Therefore, the output signal at 34 drops rapidly and at a rate much faster than the rate at which the output 34 rose with increases of the amplitude of the ambient audio signals. Of course, by adjusting the time constants of the resistor-capacitor circuits within shaping circuit 44, the rate of change of the output 34 in response to changes in ambient audio signals can be adjusted as desired.

The outputs of the audio channels are fed to averaging circuit 36. More specifically, resistor 92 and a similar resistor in each of the other audio channels couple the DC outputs from these channels to the inverting input of an operational amplifier 94 connected to average the signals received at its inverting input. Amplifier 94 may comprise a type 741 operational amplifier. The noninverting input of this amplifier is grounded and a twenty-five kilohm feedback resistor 96 couples the output of amplifier 94 to its inverting input. In addition, a ten kilohm current limiting resistor 98 couples the output of amplifier 94, which comprises the control signal 38, to control circuit 12. More specifically, with this particular circuit, control signal 38 comprises a varying direct current signal. Resistor 96 is set at one-quarter the value of the input resistors 92 so that the gain of the averaging amplifier 94 is established at 0.25. In the event only one microphone is used to detect ambient audio signals, then averaging, of course, is not performed.

Control circuit 12 controls the amplitude of the composite auditory subliminal message and masking signal received at its input 14 in response to the control signal on line 38 and thereby in response to changes in ambient sound levels within room 26. More specifically, the control signal on line 38 is used as a gain control for an amplifier 102 of circuit 39. Amplifier 102 may comrise a type CA3080A operational transconductance amplifier connected as a voltage controlled amplifier. The control signal on line 38 is fed to the control signal input .sup.I ABC of amplifier 102. Amplifier 102 is conducted in a conventional manner as a single supply operational amplifier. Also, the positive reference voltage is fed through a voltage divider network including a forty-seven kilohm resistor 106 and forty-seven kilohm resistor 110 to ground. The three-volt signal available from this divider is supplied to the noninverting input of amplifier 102. A ten microfarad capacitor 108 couples this latter input to ground to remove stray alternating current signals at this input. In addition, the composite subliminal auditory message signal and masking signal is fed to input 14 of voltage control amplifier circuit 39. That is, these signals are coupled through a ten microfarad capacitor 104 to the inverting input of amplifier 102. The output of amplifier 102 is fed to one side of a ten kilohm potentiometer 112 having its other side coupled to ground through resistor 110. The output of circuit 39 is taken from potentiometer 112 and, as explained above, comprises a composite auditory subliminal message signal and masking signal having an amplitude adjusted in response to ambient audio signals within area 26. The wiper arm of potentiometer 112 also permits adjustment of the amplitude of the voltage controlled composite auditory subliminal signal and masking signal. Hence, this amplitude can be selectively adjusted to make the masking signal component more clearly consciously perceptible to provide an indication that the system is operational.

The gain controlled output signal of circuit 39 is connected through a one hundred kilohm resistor 114 to the inverting input of an operational amplifier 116 within output mixer circuit 20. Amplifier 116 may comprise a type 741 operational amplifier connected as an inverting mixer. Any optional background audio signals, such as music, may be fed to input 29 of output mixer circuit 20. This input is coupled by a ten microfarad coupling capacitor 124 in series with a one hundred kilohm input resistor 122 to the inverting input of amplifier 116. A one hundred kilohm feedback resistor is also coupled between the output of amplifier 116 and its inverting input. Since resistors 114, 118 and 122 are all equal, the gain of the amplifier 116 is established at one. The output of amplifier 116 is coupled through a ten microfarad coupling capacitor 120 to preamplifier and amplifier circuit 22 (FIG. 1) and hence to the speaker 24 located in the area 26.

In a specific anti-shoplifting application, an auditory subliminal message signal designed to encourage honesty is provided. One such signal comprises the phrase "I am honest, I will not steal". This auditory subliminal message signal is combined with a white noise masking signal to provide a composite signal input to the control circuit 12. The amplitude of this composite signal is then adjusted within control circuit 12, as explained above, in response to changes in the amplitude of ambient audio signals detected within the shopping area of a store. The amplitude controlled composite signal is then transmitted to the shopping area so that the subliminal message is subconsciously perceived by individuals within the store.

It has now been experimentally determined that, although shoplifting and theft are not completely eliminated, significant reductions in these losses have resulted in such an application of the system of this invention.

Having illustrated and described the principles of our invention with reference to several preferred embodiments, it should be apparent to those persons skilled in the art that such embodiments may be modified in arrangement and detail without departing from such principles. We claim as our invention all such modifications as come within the true spirit and scope of the following claims.

United States Patent ***4,717,343***
Densky **January 5, 1988**

Method of changing a person's behavior

Abstract

A method of conditioning a person's unconscious mind in order to effect a desired change in the person's behavior which does not require the services of a trained therapist. Instead the person to be treated views a program of video pictures appearing on a screen. The program as viewed by the person's unconscious mind acts to condition the person's thought patterns in a manner which alters that person's behavior in a positive way.

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Claims

I claim:

1. A method of relieving a person of an undesirable habit by having that person view a program of pictures projected onto a screen, said program including the following sequence:

(a) a bright, clear first picture in color filling the screen and designed to cause a stressful thought in the mind of the person for approximately three seconds,

(b) then causing that first picture to gradually become blurred and smaller and become only black and white and finally shrink to a pinpoint at the center of the screen and disappear over a period of approximately six seconds,

(c) then out of the center of the screen causing a second picture to appear which is originally blurred and in black and white and as the second picture gets larger it becomes colored, clear and bright during a period of approximately six seconds until it fills the entire screen, said picture designed to cause a relaxing throught and in its largest size being held on the screen for a period of approximately three seconds,

(d) then causing the screen to go blank white for a period of approximately five seconds,

(e) then repeating the foregoing sequence of pictures (a) through (d) several times, and

(f) then speeding up the foregoing sequence of pictures (a) through (d) by 50% and repeating the foregoing sequence of pictures several times except that at the end of each sequence the screen goes blank white for approximately five seconds.

2. A method as set forth in claim 1 in which the first picture is one which stimulates in the mind of the person viewing the program an undesirable behavioral response and the second picture is one which stimulates a desired response.

3. A method of relieving a person of an undesirable habit by having that person view a program of pictures projected onto a screen,

said program including a first picture showing an undesirable habit of the person viewing the program, and a second picture showing either a repulsive act or a life-threatening consequence of the habit shown in the first picture, and

creating an automatic connection between the aforesaid two pictures in the conscious and unconscious mind of the person viewing the program by showing the two pictures in the following sequence:

(a) the first picture is shown bright, clearly focused and in color for about three seconds;

(b) the second picture is shown bright, clearly focused and in color for about three seconds;

(c) the foregoing sequence of the first and second pictures each viewed for three seconds is repeated three times;

(d) the first picture is shown for one second;

(e) the second picture is shown for one second;

(f) the sequence of the first and second pictures each viewed for one second is repeated nine times;

(g) the first picture is displayed for 1/24th of a second;

(h) the second picture is displayed for 1/24th of a second; and

(i) the sequence of the first and second pictures each viewed for 1/24th of a second is repeated approximately 200 times during a period of about 18 seconds.

4. A method as set forth in claim 1 followed by a program of pictures projected onto the screen which includes a first picture showing an undesirable habit of the person viewing the program, and a second picture showing either a repulsive act or a life-threatening consequence of the habit shown in the first picture, and creating an automatic connection between the aforesaid two pictures in the conscious and unconscious mind of the person viewing the program by showing the two pictures in the following sequence:

(a) the first picture is shown bright, clearly focused and in color for about three seconds;

(b) the second picture is shown bright, clearly focused and in color for about three seconds;

(c) the foregoing sequence of the first and second pictures each view for three seconds is repeated three times;

(d) the first picture is shown for one second;

(e) the second picture is shown for one second;

(f) the sequence of the first and second pictures each viewed for one second is repeated nine times;

(g) the first picture is displayed for 1/24th of a second;

(h) the second picture is displayed for 1/24th of a second; and

(i) the sequence of the first and second pictures each viewed for 1/24th of a second is repeated approximately 200 times during a period of about 18 seconds.

5. A method of relieving a person of an undesirable habit by having the person view a program of pictures projected on a screen consisting of a first picture which stimulates in the mind of the person viewing the program an undesirable behavioral response and a second picture which stimulates a desired response, said pictures being presented in the following sequence:

(a) a bright, clear first picture in color filling the screen and designed to cause a stressful thought in the mind of the person for approximately three seconds,

(b) then causing that first picture to gradually become blurred and smaller and become only black and white and finally shrink to a pin point at the center of the screen and disappear over a period of approximately six seconds,

(c) then out of the center of the screen causing a second picture to appear which is originally blurred and in black and white and as the second picture gets larger it becomes colored, clear and bright during a period of approximately six seconds until it fills the entire screen, said picture designed to cause a relaxing thought and in its largest size being held on the screen for a period of approximately three seconds,

(d) then causing the screen to go blank white for a period of approximately five seconds,

(e) then repeating the foregoing sequence of pictures (a) through (d) several times,

(f) then speeding the foregoing sequence of piotures (a) through (d) by 50% and repeating the foregoing sequence of pictures several times except that at the end of each sequence the screen goes blank white for approximately five seconds.

6. A method of relieving a person of an undesirable habit by having the person view a program of pictures projected on a screen consisting of a first picture which stimulates in the mind of the person viewing the program an undesirable behavioral response and a second picture which stimulates a desired response, said pictures being presented in the following sequence:

the first picture appears on the screen in bright color focused sharply and as large as possible, and this picture is held on the screen a few seconds,

if the first picture is a movie, have the movie go still and the picture gradually recede,

as it gradually recedes, the picture goes from color to black and white,

as the picture continues to recede, the picture blurs,

the black and white blurred first picture disappears by receding into a spot on the screen,

slowly the second picture appears from the same spot on the screen where the first picture disappeared, said second picture being small, still, blurred and in black and white, and gradually over a few seconds grows larger and becomes sharply focused,

after a few more seconds the second picture gets larger and appears in color,

after a few more seconds the second picture fills the entire screen in bright color,

if the second picture is part of a movie, activate the movie and hold it on the screen for a few seconds,

make the screen go blank white for several seconds,

repeat the foregoing sequence of views about four times,

repeat the foregoing views several times more but with their original lapsed time cut by 50% and each time followed by the screen going blank white for about five seconds,

repeat the foregoing views of the first picture but with their elapsed time cut to about six frames,

repeat the foregoing views of the second picture but with their elapsed time cut to about six frames,

have the screen go blank white for about five seconds,

repeat several times the six frames of the first picture followed by the six frame viewing of the second picture followed by a five second interlude of blank white, and

hold the second picture on the screen about ten seconds.

7. The method set forth in claim 6 followed by a program of pictures projected onto the screen which includes a first picture showing an undesirable habit of the person viewing the program and a second picture showing either a repulsive act or a life-threatening consequence of the habit shown in the first picture, and

creating an automatic connection between the aforesaid two pictures in the conscious and unconscious mind of the person viewing the program by showing the two pictures in the following sequence:

(a) the first picture is shown bright, clearly focused and in color for about three seconds;

(b) the second picture is shown bright, clearly focused and in color for about three seconds;

(c) the foregoing sequence of the first and second pictures each viewed for three seconds is repeated three times;

(d) the first picture is shown for one second;

(e) the second picture is shown for one second;

(f) the sequence of the first and second pictures each viewed for one second is repeated nine times;

(g) the first picture is displayed for 1/24th of a second;

(h) the second picture is displayed for 1/24th of a second; and

(i) the sequence of the first and second pictures each viewed for 1/24th of a second is repeated approximately 200 times during a period of about 18 seconds.

Description

BACKGROUND OF THE INVENTION

The present invention relates to methods for conditioning a person's unconscious thought patterns by having the person view a program of video pictures projected upon a screen in order to alter that person's behavior.

It is well established in medicine and science that the human mind operates on two planes, the conscious and the unconscious. That part of the human mind used for reasoning and communicating with full awareness by the individual and which also controls voluntary behavior such as talking and walking is called the conscious mind. The unconscious mind, sometimes referred to as the subconscious, controls those functions which take place without the person's awareness such as heartbeat, breathing, glandular action, and such involuntary reactions as appetite, tension and pain.

Hypnosis was one of the first techniques used to reach a person's unconscious mind. In the late 1800's hypnosis was used to trigger the release of the endorphins, an opiate-like substance manufactured and stored within the brain, to serve as anesthesia during surgery. More recently, hypnosis has been used to effect appetite control, smoking abatement, reduction of stress and depression, and painless childbirth. During the first half of the 1900's Dr. Milton Erickson introduced the use of structured linguistic patterns in hypnotic therapy.

In the early 1970's Richard Bandler and John Grindler pioneered neuro-linguistic programming in which the therapist auditorially (by voice) tells the patient to complete a certain mental exercise in his mind's eye in order to bring about behavioral change at the unconscious and conscious levels of the patient's mind.

Both hypnosis and neuro-linguistic programming are methods of conditioning a person's thought processes through sounds transmitted by voice.

Another method of affecting an individual's unconscious thought processes is subliminal suggestion. Audio subliminals consist of a human voice repeating auditory suggestions over and over, and the voice is "covered over" by a sound such as ocean waves which is the only sound the conscious mind hears. But the unconscious hears the voiced suggestions. Video subliminals inject written messages (such as "buy popcorn") at a rate of about one frame per second into a moving picture film. There are 24 frames per second in the standard movie or video and thus the subliminal message registers only on the unconscious mind. One suggested use of video subliminal suggestion is set forth in U.S. Pat. No. 3,278,676 granted Oct. 11, 1966.

Suggestions have also been made to use visual displays projected upon a screen as an addition to audio signals, electric shock signals or other sensory messages to assist a person to build up an aversion to an undesirable habit. One such suggestion is set forth in U.S. Pat. No. 3,782,006 granted Jan. 1, 1974.

SUMMARY OF THE INVENTION

Most prior methods intended to reach a person's unconscious mind in order to effect a desired change in the person's habits require a trained therapist--a hypnotist or psychologist--to administer the program. Thus such methods are both expensive and limited by the number of specially trained therapists available to administer the programs.

I have invented a unique method for conditioning a person's unconscious mind in order to effect a desired change in the person's behavior which does not require a trained therapist. Instead, the person to be treated views a program of video pictures projected upon a screen. Although the pictures appearing on the screen are viewed by the person's conscious as well as unconscious mind, the program's images as viewed act to condition the person's unconscious thought patterns in a way which serves to alter that person's behavior.

Since it is usually a picture or image within a person's mind that creates the behavior and feeling a person will experience, my method programs the person's mind so that certain undesirable mental images in that person's conscious and/or unconscious mind (at the time of treatment and thereafter) will be automatically exchanged in the mind for a desirable mental image. When the mind thus exchanges mental images that person will experience a positive change in feelings and behavior.

My method of video programming uses two related but different techniques that I have named the Flash and the Chop, which are preferably viewed in sequence by the person being programmed.

The Flash is designed to set up new stimulus-reponse patterns in the brain. The person viewing the sequences of the Flash has his or her mind programmed to automatically replace a specific undesirable image when it appears with a desirable image. For example, should a stressful thought or mental image come into the person's mind, it will trigger a relaxing thought or a mental image of a relaxing scene.

By lengthy experimentation, I have determined the time of exposure and sequence of the scenes which comprise the Flash and which give it its power to program the human mind. The exact number of times the Flash is repeated will depend upon the nature of the program.

Basically, the sequence of views comprising the Flash includes two different pictures which I have named the cue picture and the outcome picture. The cue picture is a picture or image which may be either still or moving and which stimulates in the mind of the viewer an undesirable behavioral response. The outcome picture triggers a desired response.

The Flash comprises the following sequence of views:

1. Start with the cue picture in bright color, focused sharply and as large as possible. Hold the cue picture on the screen for a few seconds.

2. If the cue picture is a movie, have the movie go still and have the picture slowly recede (move away) gradually appearing smaller.

3. After a few seconds of the picture moving away, have the picture go from color to black and white.

4. After a few more seconds of the picture moving away, blur the picture.

5. After a few more seconds, the black and white blurred cue picture disappears by receding into the center of the screen.

6. Slowly bring the outcome picture into view from the same spot where the cue picture disappeared. The picture is still, small, blurred and in black and white but gradually gets larger and becomes sharply focused.

7. After a few more seconds, the picture gets larger and appears in color.

8. After a few more seconds, the picture fills the entire screen in bright color.

9. If the outcome picture is part of a movie, activate the movie and hold it on the screen for a few seconds.

10. Make the screen go blank white for about 5 seconds.

11. Repeat views 1 through 10 about four times.

12. Repeat views 1 through 9 about four times but with their original lapsed time cut by 50% and each time followed by the screen going blank white for about 5 seconds.

13. Repeat views 1 through 5 but with their elapsed time cut to about 6 frames.

14. Repeat views 6 through 9 but with their elapsed time cut to about 6 frames.

15. Blank white screen for about 5 seconds.

16. Repeat steps 13 through 15 several times.

17. Repeat views 1 through 5 but cut their elapsed time to about 3 frames.

18 Repeat views 6 through 9 but cut their elapsed time to about 6 frames.

19. Blank white screen for about 5 seconds.

20. Repeat steps 17 through 19 several times.

21. Finally, hold outcome picture on the screen for about 10 seconds.

In contrast to the Flash as just described, the Chop is a method of alternate viewing of two preferably moving scenes, the first showing a undesirable behavior pattern or habit of the viewer and the second showing a repulsive act or a life-threatening consequence of the first scene, to create an automatic connection between the two scenes in the conscious and unconscious mind of the viewer.

As the result of lengthy experimentation, I have determined a most effective sequence and timing of the two pictures of the Chop which give it the power to permanently program a person's mind and alter that person's habits in a desirable manner.

The Chop consists of the following sequence of viewing the two pictures described above:

1. The undesirable habit will be pictured bright and clearly focused, in color and moving or still, whichever best depicts the undesirable habit most effectively. The picture will remain on the screen about 3 seconds in order to affix in the mind of the viewer the view to be altered.

2. The repulsive scene or the scene of the life-threatening consequence of the undesirable habit preferably moving is flashed upon the screen in bright color, clearly focused in order to alter the viewer's perception of the first picture. This second picture remains on the screen for about 3 seconds.

3. The sequence of views 1 and 2 are repeated at about 3-second intervals several times.

4. View 1 will be displayed for about one second.

5. View 2 will be displayed for about one second.

6. Steps 4 and 5 will be repeated several times.

7. View 1 will be displayed for about 1/24th of a second.

8. View 2 will be displayed for about 1/24th of a second.

9. Steps 7 and 8 will be repeated several times.

The foregoing sequence of views will be most effective when the Chop is followed by one or more "Chop scenes" which repeat the first picture but the second picture is replaced by another repulsive or life-threatening picture.

I have found excellent results are achieved by having the person view in one session of about one-half hour a program consisting first of several different Flash sequences followed by several Chop scenes each with a different second picture.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

I have used a preferred embodiment of my method of conditioning a person's unconscious mind to effect a desired change in the person's behavior. The preferred embodiment which I call Neuro-Vision.TM. has been successfully used to cause several dozens of habitual smokers to give up their smoking habit.

The only treatment these habitual smokers underwent was to view a program lasting approximately 30 minutes displayed upon a screen consisting of six different Flash scenes followed by five successive Chop scenes as hereinafter described. No preliminary or subsequent treatment by a hypnotist, psychologist or other trained therapist was required.

The six Flash scenes of my Neuro-Vision.TM. program are viewed in the following order:

Flash Scene 1: The cue picture consists of the words STRESS, PROBLEMS and WORRY listed one above the other in large red block letters on a bright white background. The outcome picture consists of the words PEACE, SECURITY and TRANQUILITY listed one above the other in large blue block letters on a bright white background.

Flash Scene 2: The cue picture consists of the words STRESS, PROBLEMS and WORRY listed one above the other in large red block letters on a bright white background. The outcome picture consists of a palm tree blowing in a gentle breeze at sunset on a sandy beach.

Flash Scene 3: The cue picture is viewed with the camera as the eyes of a person viewing a burning cigarette in his hand resting on a table which also contains an ashtray and a cup of coffee and the picture also includes a portion of a newspaper being read by the person. The outcome picture is essentially the same as the cue picture but without the burning cigarette and the ashtray, thus picturing a comfortable non-smoker reading his newspaper and drinking a cup of coffee.

Flash Scene 4: The cue picture is viewed with the camera as the eyes of a person viewing a burning cigarette in his hand resting on a table top containing an ashtray, cans of beer and poker chips with two other people at the table smoking and playing poker. The outcome picture is essentially the same as the cue picture but the person's hand has no cigarette and no ashtray near him; his side of the table is clean as he plays cards while the other two players are still smoking.

Flash Scene 5: The cue picture is viewed with the camera as the eyes of a person driving a car viewing his hands on the steering wheel with a burning cigarette in one hand. The cue picture is a side view of a comfortable non-smoker driving his car.

Flash Scene 6: The cue picture is viewed with the camera as the eyes of a person viewing his hand holding a burning cigarette as he watches a television program in the background. The outcome picture is a profile view of a comfortable non-smoker watching television.

Each of the Flash Scenes 1 through 6 is displayed in the following sequence:

1. Hold the cue picture on the screen for three seconds.
2. If the cue picture is a movie, have the movie go still and have the picture slowly recede and gradually get smaller.
3. After two seconds of the picture moving away, have the picture turn from color to black and white.
4. After two seconds, blur the picture.
5. After three more seconds the black and white blurred cue picture disappears by receding into the center of the screen.
6. Slowly bring the outcome picture into view from the center of the screen. The picture is still, small, blurred and in black and white but over a two second interval the picture becomes clear and grows larger.
7. For two more seconds the picture gets larger and turns into color.
8. Within two more seconds the picture fills the screen in bright color.
9. The outcome picture turns into a movie for four seconds.
10. The screen goes blank white for five seconds.
11. Repeat views 1 through 10 four times.
12. Repeat views 1 through 9 four times but with their elapsed time cut by 50% and each time followed by the screen going blank white for five seconds.
13. Repeat views 1 through 5 but with their elapsed time cut to six frames.
14. Repeat vies 6 through 9 but with their elapsed time cut to six frames.
15. Blank white the screen for five seconds.
16. Repeat steps 13 through 15 four times.
17. Repeat views 1 through 5 but cut their elapsed time to three frames.
18. Repeat views 6 through 9 but cut their elapsed time to six frames.
19. Blank white the screen for five seconds.
20. Repeat steps 17 through 19 four times.
21. Hold the outcome picture on the screen for ten seconds.

Following these six Flash scenes are five Chop scenes in each of which the first picture is a moving picture of a burning cigarette in bright color, sharply focused and filling the entire screen. And in each of the five Chop scenes the second picture is also a moving picture in color, sharply focused and filling the entire screen.

In Chop Scene 1 the second picture is a close-up of a person vomiting into an open toilet bowl.

In Chop Scene 2 the second picture is a close up of human excrement dropping into an open toilet bowl.

In Chop Scene 3 the second picture is detailed view of a caesarean section operation or the removal of a diseased lung.

In Chop Scene 4 the second picture is a person whose face is blurred sitting in a wheelchair and coughing.

In Chop Scene 5 the second picture is a mouse eating cheese.

Each of Chop Scenes 1 through 5 are displayed in the following sequence:

1. The first picture (always a burning cigarette) is displayed for three seconds.

2. The second picture is displayed for three seconds.

3. The sequence of views 1 and 2 is repeated three times.

4. The first picture is displayed for one second.

5. The second picture is displayed for one second.

6. The sequence of views 4 and 5 is repeated nine times.

7. The first picture is displayed for 1/24th of a second.

8. The second picture is displayed for 1/24th of a second.

9. The sequence of views 7 and 8 is repeated approximately 200 times or for about 18 seconds.

All display times listed above may be varied and the exact number of times the scenes are repeated may also be varied without departing from the scope of my method for conditioning a person's unconscious mind. Those psychologists, hypnotists and other therapists skilled in the art will be able to make changes in the Flash and Chop scenes for use in fields other than smoking abatement without departing from my method of programing a person's mind. It is to be understood that despite the foregoing description of the preferred embodiment of my invention called Neuro-Vision.TM., the scope of my invention is defined only by the appended claims.

United States Patent ***4,777,529***
Schultz , et al. **October 11, 1988**

Auditory subliminal programming system

Abstract

An auditory subliminal programming system includes a subliminal message encoder that generates fixed frequency security tones and combines them with a subliminal message signal to produce an encoded subliminal message signal which is recorded on audio tape or the like. A corresponding subliminal decoder/mixer is connected as part of a user's conventional stereo system and receives as inputs an audio program selected by the user and the encoded subliminal message. The decoder/mixer filters the security tones, if present, from the subliminal message and combines the message signals with selected low frequency signals associated with enhanced relaxation and concentration to produce a composite auditory subliminal signal. The decoder/mixer combines the composite subliminal signal with the selected audio program signals to form composite signals only if it detects the presence of the security tones in the subliminal message signal. The decoder/mixer outputs the composite signal to the audio inputs of a conventional audio amplifier where it is amplified and broadcast by conventional audio speakers.

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Claims

We claim:

1. A subliminal decoder/mixer for use in an auditory subliminal programming system, comprising:

means for receiving at least one audio program signal and at least one subliminal message signal;

means responsive to the instantaneous amplitude of said audio program signal for rapidly varying the amplitude of said subliminal message signal; to maintain said signal at a selected consciously inaudible level relative to the level of said audio program signal; and

means for combining said audio program signal and said subliminal message signal to produce at least one composite signal having an audio program component and a subliminal message component.

2. The subliminal decoder/mixer of claim 1 wherein said means for varying the amplitude of said subliminal message signal comprises:

rectifier means for generating a control signal indicative of the instantaneous absolute amplitude of said audio program signal; and

amplifier means responsive to said control signal for amplifying said subliminal message signal with gain that varies as a function of said control signal.

3. The subliminal decoder/mixer of claim 1 further comprising:

signal generator means for generating at least one signal having a selected frequency; and

means for combining said signal with said subliminal message signal to form a composite subliminal message signal.

4. The auditory subliminal programming system of claim 1 wherein said subliminal decoder/mixer means further comprises:

signal generator means for generating selected subsonic frequency signals; and

means for combining said signals with said subliminal message signal to form a composite subliminal message signal.

5. A subliminal decoder/mixer for use in an auditory subliminal programming system, comprising:

means for receiving at least one audio program signal and at least one subliminal message signal;

means for combining said audio program signal and said subliminal message signal to produce at least one composite signal having an audio program component and a subliminal message component, the amplitude of the subliminal message component relative to the amplitude of the audio program component being such that only the audio program component is consciously audible;

means for detecting at least one predetermined security code in said subliminal message signal; and

means responsive to said means for detecting for preventing said subliminal message signals from being combined with said audio program signal unless said at least one predetermined security code is detected.

6. The subliminal decoder/mixer of claim 5 wherein said at least one security code comprises at least one tone signal having selected frequency.

7. The subliminal decoder/mixer of claim 5 further comprising:

signal generator means for generating at least one signal having a selected frequency; and

means for combining said signal with said subliminal message signal to form a composite subliminal message signal.

8. An auditory subliminal programming system, comprising:

audio program source means for generating at least one audio program signal;

subliminal message source means for generating at least one subliminal message signal;

subliminal decoder/mixer means for procesing said audio program signal and said subliminal message signal, said decoder/mixer means comprising:

means for receiving said audio program signal and said subliminal message signal;

means responsive to the instantaneous amplitude of said audio program signal for rapidly varying the amplitude of said subliminal message signal to maintain said signal at a selected consciously inaudible level relative to the level of said audio program signal; and

means for combining said audio program and subliminal message signals to produce at least one composite signal having an audio program component and a subliminal message component;

audio amplifier means for receiving and amplifying said at least one composite signal; and

audio speaker means for broadcasting said at least one composite signal.

9. The auditory subliminal programming system of claim 8 wherein said means for varying the amplitude of said subliminal message signal comprises:

rectifier means for generating a control signal indicative of the instantaneous absolute amplitude of said audio program signal; and

amplifier means responsive to said control signal for amplifying said subliminal message signal with gain that varies as a function of said control signal.

10. An auditory subliminal programming system, comprising:

audio program source means for generating at least one audio program signal;

subliminal message source means for generating at least one subliminal message signal;

subliminal decoder/mixer means for processing said audio program signal and said subliminal message signal, said decoder/mixer means comprising:

means for receiving said audio program signal and said subliminal message signal;

means for combining said audio program and subliminal message signals to produce at least one composite signal having an audio program component and a subliminal message component, the amplitude of the subliminal message component relative to the amplitude of the audio program component being such that only the audio program component is consciously audible; means for detecting at least one predetermined security code in said subliminal message signal; and

means responsive to said means for detecting for preventing said subliminal message signal from being combined with said audio program signal unless said at least one predetermined security code is detected;

audio amplifier means for receiving and amplifying said at least one composite signal; and

audio speaker means for broadcasting said at least one composite signal.

11. The auditory subliminal programming system of claim 10 wherein said subliminal decoder/mixer means further comprises:

signal generator means for generating at least one signal having selected frequency; and

means for combining said signal with said subliminal message signal to form a composite subliminal message signal.

12. The auditory subliminal programming system of claim 10 wherein said at least one predetermined security code comprises at least one tone signal having selected frequency.

13. An auditory subliminal programming system, comprising:

subliminal message encoder means for combining a subliminal message with at least one predetermined security code to produce an encoded subliminal message; and

subliminal decoder/mixer means for receiving a subliminal message and an audio program, said decoder/mixer comprising decoding means for detecting whether said subliminal message is encoded with said predetermined security code, and mixing means responsive to said decoding means for combining said subliminal message with said audio program to produce at least one composite signal having a consciously audible audio program component and a subconsciously audible subliminal message component only if said decoding means detects said security code.

14. The auditory subliminal programming system of claim 13 wherein said subliminal encoder means comprises at least one oscillator means for generating at least one said security code comprising a tone signal haveing selected frequency.

15. A subliminal message encoder system for use in an auditory subliminal programming system, comprising:

means for generating at least one subliminal message signal;

means for generating at least one security code;

combining means for combining said at least one security code and said subliminal message signal to produce an encoded subliminal message signal; and recording means for recording said encoded subliminal message signal.

16. An audio-video subliminal programming system, comprising:

audio-video program source means for generating audio and video program signals;

subliminal message source means for generating at least one auditory subliminal message signal;

subliminal decoder/mixer means for processing said audio and video program signals and said subliminal message signal, said decoder/mixer means comprising:

means for receiving said audio and video program signals and said subliminal message signal;

means responsive to the instantaneous amplitude of said audio program signal for rapidly varying the amplitude of said subliminal message signal to maintain said signal at a selected consciously inaudible level relative to the level of said audio program signal;

means for combining said audio program signal and said subliminal message signal to produce at least one composite signal having an audio program component and a subliminal message component; and

modulator means for modulating said video program signal for reception by a television video display means;

audio amplifier means for receiving and amplifying said at least one composite signal;

audio speaker means for broadcasting said at least one composite signal; and

television video display means for receiving and displaying the modulated video program signal.

17. The audio-video subliminal programming system of claim 16 wherein said means for varying the amplitude of said subliminal message signal comprises:

rectifier means for generating control signals indicative of the instantaneous absolute amplitude of said audio program signal; and

amplifier means responsive to said control signal for amplifying said subliminal message signal with gain that varies as a function of said control signal.

18. The audio-video subliminal programming system of claim 16 wherein said subliminal decoder/mixer means further comprises:

signal generator means for generating at least one signal having selected frequency; and

means for combining said signal with said subliminal message signal to form a composite subliminal message signal.

19. An audio-video subliminal programming system, comprising:

audio-video program source means for generating audio and video program signals;

subliminal message source means for generating at least one auditory subliminal message signal;

subliminal decoder/mixer means for processing said audio and video program signals and said subliminal message signal, said decoder/mixer means comprising:

means for receiving said audio and video program signals and said subliminal message signal;

means for combining said audio program signal and said subliminal message signal to produce at least one composite signal having an audio program component and a subliminal message component, the amplitude of the subliminal message component relative to the amplitude of the audio program component being such that only the audio program component is consciously audible;

means for detecting at least one predetermined security code in said subliminal message signal;

means responsive to said means for detecting for preventing said subliminal message signal from being combined with said audio program signal unless said at least one predetermined security code is detected;

and modulator means for modulating said video program signal for reception and display by a television video display means;

audio amplifier means for receiving and amplifying said at least one composite signal;

audio speaker means for broadcasting said at least one composite signal; and

television video display means for receiving and displaying the modulated video program signal.

20. The audio-video subliminal programming system of claim 19 wherein said at least one predetermined security code comprises at least one tone signal having selected frequency.

21. The audio-video subliminal programming system of claim 19 wherein said subliminal decoder/mixer means further comprises:

signal generator means for generating at least one signal having selected frequency; and

means for combining said signal with said subliminal message signal to form a composite subliminal message signal.

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to systems for generating auditory subliminal messages. More particularly, the invention relates to an auditory subliminal programming system that includes security coding and decoding and improved automatic gain control of the subliminal message signal. The programming system of the invention is particularly well adapted for use in self-improvement programs.

2. Statement of Related Art

It has long been thought that subliminal programming has the capability to influence the behavioral patterns of listeners. Corrigan et al. U.S. Pat. No. 3,060,795 and Becker U.S. Pat. No. 3,278,676 are examples of early work in this area.

One application of auditory subliminal programming to influence the behavior of listeners has been in the area of anti-theft systems. Lundy et al. U.S. Pat. No. 4,395,600 discloses an anti-shoplifting system in which subliminal anti-shoplifting messages are mixed with audio program signals such as background music, and with a masking signal. The combined signal is then broadcast via loudspeakers to various areas of a store. In order to ensure that the subliminal message is broadcast at a sufficient level to be physically (although not concipously) audible, Lundy et al. varies the amplitude of the subliminal signal as a function of the level of ambient noise in the store. However, in order to ensure that the subliminal message does not become supraliminal, i.e., consciously audible, during a sharp drop in the ambient noise level, Lundy et al. also uses a masking signal that quickly responds to changes in the ambient noise level to mask the subliminal message and prevent such an occurrence. The amplitude of the audio program signal i.e., the background music, is separately controlled independently of the ambient noise level.

It is also though that auditory and/or visual stimulation at certain frequencies enhances the relaxation, awareness, and control of the person being stimulated. See, for example, Gorges U.S. Pat. No. 4,315,502. The use of such stimulation in conjunction with auditory subliminal programming is desirable to further enhance the programming. However, insofar as the applicant is aware, no system combining auditory subliminal programming with such stimulation has heretofore been developed.

In particular, an area in which auditory subliminal programming alone or in combination with such other stimulation can be quite effective and beneficial is the area of self-improvement programming. For example, auditory subliminal programming can be used to help the listener stop smoking, lose weight, improve problem solving techniques, and the like.

In the past, tapes or other audio storage media having pre-recorded subliminal self-improvement messages mixed with pre-recorded audio programs such as musical programs have been available. The listener purchased the tapes and played them through his own home stereo, for example, to obtain the desired subliminal programming. However, this proved unsatisfactory to users primarily because they had no control over the musical selections provided and because the musical selections could not be changed.

Known prior art systems, such as the Lundy et al. system also have various drawbacks and lack certain features that have made them unsatisfactory for use in the personal self-improvement programming area. For instance, although it is desirable for the level of the subliminal message to track the higher level of the audio program, thereby optimizing the effect of the programming, it is unsatisfactory to do so by sensing the ambient noise level in a location such as the user's living or family room. In addition, the known systems do not include the very desirable feature of built-in security in order to inhibit unauthorized and possibly damaging use of the subliminal programming.

In view of the foregoing drawbacks and deficiencies of the prior art, it is an object of the present invention to provide an improved auditory subliminal programming system which is particularly well adapted for use in personal self-improvement programming.

It is another object of the invention to provide such a system which combines auditory subliminal programming with auditory stimulation at frequencies which enhance the relaxation, awareness and control of the listener for enhanced learning and retention.

It is a further object of the invention to provide such a system which includes built-in security measures which automatically prevent the use of unauthorized subliminal program material.

It is still another object of the invention to provide such a system wherein the quality of the composite signal containing the audio program and subliminal programming signals is enhanced by automatically controlling the relative level of the subliminal programming signal as a direct function of the amplitude of the audio program signal.

SUMMARY OF THE INVENTION

The foregoing objects and attendant advantages are obtained by providing a subliminal decoder/mixer that receives audio program signals and subliminal message signals, automatically varies the amplitude of the subliminal message signals as a function of the amplitude of the audio program signals, and combines the signals into a composite signal in which only the audio program component is consciously audible.

With respect to another aspect of the invention, the decoder/mixer detects whether at least one predetermined security code is present in the subliminal message signals and prevents combination of the audio program signals and subliminal message signals unless such code is detected.

With respect to still another aspect of the invention, the decoder/mixer combines the subliminal message signal with at least one signal having selected frequency to produce composite subliminal signals.

A subliminal message encoder system is also provided that generates at least one predetermined security code, combines the code with subliminal message signals generated by an audio source and records the encoded subliminal message signals.

With respect to yet another aspect, the decoder/mixer is combined with an audio program source, a subliminal message source, an audio amplifier and audio speakers to provide an auditory subliminal programming system.

In another variation, the decoder/mixer is combined with an audio-video program source, a composite video signal modulator, and a television video display to provide an audio-video subliminal programming system.

BRIEF DESCRIPTION OF THE DRAWING

The novel features that are believed to be characteristic of the invention are set forth in the appended claims. The invention itself, along with the foregoing objects and attendant advantages thereof, will be best understood by reference to the following detailed description of the presently preferred embodiments thereof, taken in conjunction with the drawing, in which:

FIG. 1 is a block diagram illustrating a presently preferred subliminal decoder/mixer, which embodies various novel features of the invention, together with related audio components;

FIG. 2 is an electrical schematic diagram illustrating the details of the subliminal decoder/mixer of FIG. 1;

FIG. 3 is a block diagram illustrating a preferred subliminal message encoder which embodies various novel features of the invention, together with related audio components; and

FIG. 4 is a block diagram illustrating an alternative embodiment of the subliminal decoder/mixer of FIGS. 1 and 2 which is adapted for use with a video cassette recorder and television.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

Referring to FIG. 1 of the drawing, an audio program source 10 such as a conventional tape deck, compact disc, or phonograph generates stereo music or other audio program signals selected by the user on left and right audio outputs. These signals are conducted to left and right audio inputs of a subliminal decoder/mixer 25 on lines 15 and 20 respectively.

A subliminal message source 30, which is typically also a tape deck, compact disc player, or other audio source generates a pre-determined subliminal message signal which is transmitted to a subliminal signal input of the subliminal decoder/mixer 25 on a line 35. The subliminal decoder/mixer 25 decodes the subliminal message signal and detects whether it contains two selected pre-recorded security tones. The subliminal decoder/mixer 25 filters the tones, if present, out of the subliminal message signal and mixes the subliminal message signal with the left and right audio program signals only if both tones are present. The subliminal decoder/mixer 25 also controls the level of the subliminal message signal as a function of the level of the audio program signal, mixes in two subliminal low frequency signals, and outputs the resulting composite signals on left and right audio output channels respectively.

The composite signals on the left and right audio output channels are transmitted to the left and right audio input channels of a conventional stereo amplifier 50 on lines 40 and 45 respectively. The amplifier 50 amplifies the composite signals and outputs them on lines 55 and 65 respectively to conventional left 60 and right 70 audio speakers. The listener consciously hears only the audio program he has selected, but subconsciously also receives the subliminal programming message and the subsonic frequency stimulation. If the user attempts to use an unauthorized subliminal message which does not contain both security tones, the decoder/mixer 25 detects the absence of the tones and does not mix the unauthorized message with the audio program.

FIG. 2 is an electrical schematic diagram which illustrates the details of the subliminal decoder/mixer 25 of FIG. 1. The decoder/mixer 25 has three inputs: a subliminal program signal input on line 35, a left audio signal input on line 15, and a right audio signal input on line 20. Power is supplied to the components by any conventional power supply (not shown) that is capable of full wave rectifying and filtering a 60 Hz AC power signal and providing +/-12 V and +/-5 V DC operating voltages therefrom.

An RC network comprised of resistor 155 connected between line 35 and ground and a series capacitor 156 couples line 35 to the input of a conventional audio input amplifier 160, which is suitably a conventional negative feedback operational amplifier. The output of the amplifier 160 is connected by line 162 to the signal input of a first notch filter 175. The output of the first notch filter 175 is coupled to the input of a second notch filter 180 through an RC network comprised of a resistor 177 connected between the output of the notch filter 175 and ground, and a series capacitor 178. The output of the second notch filter 180 is coupled to one input of a conventional summing amplifier 185 through an RC network comprised of a resistor 182 connected between the output of the second notch filter 180 and ground, and a series capacitor 184. The notch filters 175 and 180 may be either digital or analog filters, one tuned to each security tone frequency. A suitable digital notch filter, for example, is the MF10 notch filter manufactured by National Semiconductor Corp.

The output of the amplifier 160 is also connected by line 162 to the input of a security tone detect/decode unit 170. The output of the security tone detect/decode unit 170 is connected by a line 172 to the respective control terminals of a pair of transmission gates 195 and 200 respectively which are connected between lines 142 and 147 respectively and ground. The security tone detect/decode unit 170 is preferably comprised of two parallel phase locked loops (PLL's) (not shown) each tuned to one of the security tones. Line 162 is connected to the signal inputs of both PLL's and the tone detect signal outputs of the PLL's are gated together so that the output signal of the security tone detect/decode unit 170 on line 172 is low only if both security tones are present. The PLL's are suitably NE567 PLL's manufactured by a number of companies including Signetics, National Semiconductor, and Motorola.

A signal generator 190 preferably generates 1 Hz and 12 Hz TTL output pulses on lines 192 and 194 respectively. Lines 192 and 194 are connected to inputs of the summing amplifier 185. The signal generator 190 also preferably generates tuning frequency pulses which correspond to the frequencies of the selected security tones and outputs them to the notch filters 175 and 180 on lines 193 and 191 respectively. The signal generator 190 is preferably comprised of a conventional oscillator (not shown) having its output connected to one or more conventional counters (not shown) which count down the oscillator signals to provide the output signals on lines 191-194 having the desired frequencies. This technique is well known to those skilled in the art.

The output of the summing amplifier 185 is connected by lines 186 and 187 tpo the signal inputs of voltage controlled amplifiers 140 and 145 respectively. The signal outputs of the voltage controlled amplifiers 140 and 145 are connected by lines 141 and 146 respectively to inputs of conventional summing amplifiers 120 and 125 respectively.

An RC network comprised of resistor 112 connected between left audio input line 15 and ground and series capacitor 114 couples line 15 to the input of a conventional audio input amplifier 116. Likewise, an RC network comprised of a resistor 113 connected between the right audio input line 20 and ground, and a series capacitor 115 couples line 20 to the input of a conventional audio input amplifier 117. Audio input amplifiers 116 and 117 may also be conventional negative feedback operational amplifiers. The outputs of the audio input amplifiers 116 and 117 are connected by lines 118 and 119 respectively to the signal inputs of conventional precision rectifiers 130 and 135 respectively, and to signal

inputs of the summing amplifiers 120 and 125 respectively. The outputs of the precision rectifiers 130 and 135 are connected by lines 142 and 147 respectively to the control terminals of the voltage controlled amplifiers 140 and 145 respectively and to signal inputs of the transmission gates 195 and 200 respectively. The outputs of the summing amplifiers 120 and 125 are coupled through series capacitors 150 and 152 respectively to left and right audio output lines 40 and 45 respectively.

Many suitable precision rectifiers are known to those skilled in the art. One such rectifier which utilizes a two-stage operational amplifier arrangement and which is suitable for use is illustrated and described in Roberge, Operational Amplifiers Theory and Practice, 458-460, John Wiley & Sons Inc. (1975). It is preferred, however, that in the illustrated rectifier circuit, the transistor in the negative feedback path of the first stage amplifier be replaced by a diode and that the fixed resistor in the negative feedback path of the second stage amplifier be replaced by a variable resistor to provide gain control. Suitable voltage controlled amplifiers are LM1035 amplifiers manufactured by National Semiconductor Corp.

FIG. 3 illustrates a presently preferred subliminal message encoding arrangement for use with the decoder/mixer 25 of FIGS. 1 and 2. A subliminal message encoder 80 includes a first oscillator 85, a second oscillator 90, and a summing amplifier 100. The first and second oscillators 85 and 90 respectively generate at their outputs first and second security tones having predetermined fixed frequencies. The outputs of the first and second oscillators 85 and 90 are connected by lines 88 and 92 respectively to signal inputs of a conventional summing amplifier 100. The output of the summing amplifier 100 is connected by a line 105 preferably to a signal input of a tape recorder, compact disc recorder or other audio recording device. An audio source 95, which may be a person speaking through a microphone, or a tape recorder or speech synthesizer or the like, generates at its output subliminal message signals that will eventually be broadcast to the listener. The output of the audio source 95 is connected by a line 97 to a signal input of the summing amplifier 100.

The use and operation of the preferred auditory subliminal programming system will now be described. Initially the manufacturer of the subliminal message encoder and the subliminal decoder/mixer 25 determines the number and frequency of security tones that will be used. In the preferred embodiment, two tones are used. During manufacturing, the manufacturer tunes the PLL's of the detect/decode unit 170 and the notch filters 175 and 180 to the selected frequencies, and sets the oscillators 85 and 90 to the selected frequencies. The manufacturer uses the subliminal message encoder to produce tapes, compact disks or the like with the subliminal message and the security tones encoded thereon. Since only the manufacturer knows the tones selected, it retains control over the content of the subliminal programming which will be allowed to pass through the decoder/mixer 25.

Persons desiring to receive particular subliminal programming must obtain a subliminal decoder/mixer 25 and the tapes or other audio media containing the desired programming from the manufacturer. The user can verify the contents of the tapes or other media by playing them on a tape deck, compact disc player or other suitable audio reproduction equipment and listening to their contents. To use the subliminal decoder/mixer 25, the user plugs the left and right audio output jacks of his tape deck, compact disc player or other audio program source into the left and right audio inputs of the decoder/mixer 25. The user connects the left and right audio outputs of the decoder/mixer 25 to the left and right audio inputs of his stereo or audio amplifier. The user also connects an output of another tape deck or other suitable audio reproduction equipment which will be the subliminal message source to the subliminal signal input of the decoder/mixer 25. The user then plays whatever musical or other audio programs he selects on the tape deck connected to the audio inputs of the decoder/mixer 25, and the subliminal program material on the tape deck or other audio source connected to the subliminal signal input of the decoder/mixer 25. The user may control the volume of the audio program using the volume control provided on the tape deck and the decoder/mixer 25 automatically adjusts the level of the subliminal message signal as a function of the level of the audio program signals.

Referring to the details of the decoder/mixer 25 illustrated in FIG. 2, the RC networks comprised of resistors 112,113 and capacitors 114,115 AC couple the left and right audio program signals to the inputs of the audio input amplifiers 116 and 117 respectively. The audio input amplifiers 116 and 117 amplify the left and right audio signals and output the amplified signals to the summing amplifiers 120 and 125 on lines 118 and 119 respectively. Assuming that the subliminal message source 30 is not activated so that there is no subliminal message signal on line 35, the left and right audio signals pass through summing amplifiers 120 and 125 and are output on lines 40 and 45 unchanged. The gains of the audio input amplifiers 116 and 117 and the summing amplifiers 120 and 125 are preferably adjusted to provide unity gain to the left and right audio signals.

When a subliminal message signal is present on line 35, it is AC coupled to the input of the audio input amplifier 160 through the RC network comprised of resistor 155 and capacitor 156. The signal is amplified and output on line 162 to the series notch filters 175 and 180.

The series notch filters 175 and 180 remove the security tone frequencies from the subliminal message signal before it is input to the summing amplifier 185. The summing amplifier 185 sums the filtered subliminal message signal with the

1 Hz and 12 Hz stimulation signals generated by the signal generator 190. The 12 Hz signal component assists the listener in generating alpha brain waves which increase awareness. The 1 Hz component reinforces relaxation and concentration. If desired, either or both signals can also be transmitted through light emitting diodes (LED's) to provide visual as well as auditory stimulation.

In order to maintain the subliminal message at an optimum level with respect to the level of the audio program, the voltage controlled amplifiers 140 and 145 control the amplitude of the subliminal signal output by the summing amplifier 185 with gain that varies as a function of the instantaneous amplitude of the audio signals. The precision rectifiers 130 and 135 generate unipolar signals with amplitudes the same as the instantaneous absolute amplitudes of the left and right audio signals. These signals are scaled and used to control the gains of the voltage controlled amplifiers 140 and 145.

The variably amplified subliminal signals are then summed with the left and right audio signals by summing amplifiers 120 and 125 and the composite signals are AC coupled to the outputs 40 and 45 by capacitors 150 and 152 respectively. The inputs to the summing amplifiers 120 and 125 from the voltage controlled amplifiers 140 and 145 are scaled with respect to the left and right audio signal inputs so that the subliminal signals are continuously maintained at a consciously inaudible level of preferably about -30 dB with respect to the levels of the audio signals.

The security tone detect/decode unit 170 also receives the amplified message signal on line 162 and inputs the signal to the two tuned PLL's. If, and only if, the error signal outputs of both PLL's are low, indicating that both security tones are present, the gate control signal output by the detect/decode unit 170 on line 172 is high. A high gate control signal renders the gates 195 and 200 non-conductive. A low signal energizes the gates, which then shunt the control signals from the precision rectifiers 130 and 135 on lines 142 and 147 respectively to ground. This disables the voltage controlled amplifiers 140 and 145 from passing the subliminal signals output by the summing amplifier 185 on lines 186 and 187 and thus prevents the subliminal message signal from being mixed with the left and right audio signals. Accordingly, only the left and right audio signals are output on the left and right audio output lines 40 and 45.
FIG. 4 illustrates an alternative preferred embodiment of the subliminal decoder/mixer 25 which is adapted for use with an audio-video program source such as a video cassette recorder (VCR) 205 and an audio-video output device such as a television 29, for example. In this embodiment, the subliminal decoder/mixer 25 contains the same circuitry as illustrated in FIG. 2 and described above. The left and right audio signal inputs of the subliminal decoder/mixer 25 are connected to the left and right audio outputs 15 and 20 respectively of the VCR. The left and right audio outputs of the subliminal decoder/mixer 25 are input to the left and right audio inputs of television 29 if it is adapted to receive stereo and the signals are broadcast by left and right television speakers 32 and 33. If the television 29 is not stereo compatible, either the right or left audio output of the subliminal decoder/mixer 25 is connected to the monaural audio input of the television 29. If no such connection is provided, it is necessary to use a separate audio amplifier and speaker. In addition, the subliminal decoder/mixer 25 also contains a conventional RF modulator 26 which receives the composite video output signal of the VCR 205 on a line 22. The RF modulator 26 converts the composite signal to a radio frequency signal suitable for display preferably on channel 3 or 4 of the television 29 in a manner well known to those skilled in the art, and outputs the signal to the television on line 28. Alternatively, if the VCR contains its own RF modulator or if the television 29 is adapted to receive the VCR composite video signal, the VCR video signal may be connected directly to the video input of the television 29 on a line 24, for example. Thus, in the alternative embodiment of FIG. 4, the listener may watch a favorite program, for example, while at the same time obtaining the benefits of auditory subliminal programming.

What have been described are certain aspects of auditory subliminal programming systems which constitute presently preferred embodiments of the invention. It is understood that the foregoing description and accompanying illustrations are merely exemplary and are in no way intended to limit the scope of the invention, which is defined solely by the appended claims and their equivalents. Various changes and modifications to the preferred embodiments will be apparent to those skilled in the art. Such changes and modifications may include, but are not limited to: the use of different security arrangements such as pseudo-random codes and corresponding detectors; the addition or deletion of signal components from the composite output signals; the use of various different types of audio program source and subliminal message source equipment such as tape decks, speech synthesizers, live input, phonographs, and the like; and the use of different output devices such as headphones or the like. Moreover, various analog components of the preferred embodiment can be replaced by equivalent digital components and vice versa. Such changes and modifications can be made without departing from the spirit and scope of the invention. Accordingly it is intended that all such changes and modifications be covered by the appended claims and equivalents.

United States Patent ***4,834,701***
Masaki **May 30, 1989**

Apparatus for inducing frequency reduction in brain wave

Abstract

Frequency reduction in human brain wave is inducible by allowing human brain to perceive 4-16 hertz beat sound. Such beat sound can be easily produced with an apparatus, comprising at least one sound source generating a set of low-frequency signals different each other in frequency by 4-16 hertz. Electroencephalographic study revealed that the beat sound is effective to reduce beta-rhythm into alpha-rhythm, as well as to retain alpha-rhythm.

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Attorney, Agent or Firm: Browdy and Neimark

Claims

I claim:

1. An apparatus for inducing frequency reduction of human brain wave, comprising:

(a) means for generating a first low-frequency signal which is higher in frequency than the range of 4 to 16 hertz;

(b) means for generating a second low-frequency signal which is higher in frequency than the range of 4 to 16 hertz and is different in frequency by 4 to 16 hertz from the first signal;

(c) means for sounding the first- and second signals to generate a beat signal of the frequency of 4 to 16 hertz.

2. The apparatus in accordance with claim 1, wherein the frequency of the first signal is 120 to 180 hertz.

3. The apparatus in accordance with claim 1, wherein either or both of said generating means comprises a means for generating a low-frequency signal and a means for lowering the frequency of the signal.

4. The apparatus in accordance with claim 3, wherein said frequency lowering means is coupled with the sounding means through a waveform-modifier.

5. The apparatus in accordance with claim 3, wherein said frequency lowering means is a decade counter.

6. The apparatus in accordance with claim 1, wherein said sounding means is at least one earphone or loudspeaker.

7. The apparatus in accordance with claim 1, wherein said generating means essentially consists of a linear integrated circuit, capacitance, and resistance.

8. An apparatus for inducing frequency reduction of brain waves of human subject, comprising:

(a) first means for generating a first low-frequency signal which is higher in frequency than the range of 4 to 16 hertz;

(b) second means for generating a second low-frequency signal which is higher in frequency than the range of 4 to 16 hertz and is different by 4 to 16 hertz from said first low-frequency signal; and

(c) means for sounding said first- and second-low frequency signals to generate a beat signal of the frequency of 4 to 16 hertz;

whereby upon perceiving said beat signal by the human brain the ongoing state of brain wave is shifted to alpha-rhythm.

9. The apparatus of claim 8, wherein at least one of said first and second generating means comprises a third means for generating a third low-frequency signal and a means for lowering the frequency of said third low-frequency signal to produce a fourth low-frequency signal.

10. The apparatus of claim 9, wherein said means for lowering said third low-frequency signal is coupled with said means for sounding through a waveform-modifier.

11. The apparatus of claim 10, wherein said means for lowering comprises a decade counter.
12. The apparatus of claim 8, wherein said means for sounding is coupled to at least one ear of the human subject.

13. The apparatus of claim 8, wherein each of said means for generating a first- and a second- low frequency signal comprises linear integrated amplifier means, capacitor means, and resistor means.

Description

FIELD OF THE INVENTION

The present invention relates to an apparatus to induce frequency reduction in human brain wave.

DESCRIPTION OF THE PRIOR ART

The human brain wave produced when the five sensory organs are in action is called as "beta-rhythm", a brain wave of 15 hertz or higher, which is reduced to the "alpha-rhythm", a brain wave of 7 to 14 hertz, by mental relaxation. One may exhibit an amazing ability when one's brain wave is in alpha-rhythm. In such state, a great ability may be exhibited in learning, researching, and making invention.

So far no effective means to induce frequency reduction in human brain wave was proposed.

SUMMARY OF THE INVENTION

Accordingly, one general object of the invention is to provide an apparatus to induce frequency reduction in human brain wave. Still more specific object of the invention is to provide an apparatus to allow human brain to perceive a beat sound within a prescribed frequency range. These and other objects as may become apparent hereafter have been attained with an apparatus, comprising means for generating a pair of low-frequency signals; said signals being different in frequency by 4-16 hertz.

BRIEF DESCRIPTION OF THE DRAWING

The present invention will hereinafter be explained with reference to the accompanying drawings:

FIG. 1 show a basic structure of an apparatus according to the invention;
FIG. 2 shows another basic structure using single sound source;
FIG. 3 shows a circuit diagram of an oscillator feasible in the invention;
FIG. 4 shows a circuit diagram of an apparatus feasible to generate a correct frequency difference;
FIG. 5 shows a circuit diagram wherein decade counters are used;
FIG. 6 shows the frequency of human brain waves; and
FIG. 7 shows a waveform chart illustrating frequency lowering operation of decade counter.
In the Figures, F indicates oscillator; SP, loudspeaker; IC, linear integrated circuit; C, capacitance; R, resistance; A, frequency lowering-circuit; B, waveform-modifier; D, decade counter; and S, switch.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a basic structure of an apparatus according to the invention, wherein the outputs of first- and second-oscillators F.sub.1 and F.sub.2 are sounded with loudspeakers SP.sub.1 and SP.sub.2 respectively. The ears perceive their frequency difference as beat. Human brain wave can be reduced to alpha-rhythm by employing a beat frequency approximate or equal to alpha-rhythm.

FIG. 2 shows an example wherein the outputs of first- and second-oscillators F.sub.1 and F.sub.2 are sounded with single loudspeaker SP.

FIG. 3 illustrates an oscillator circuit, essentially consisting of linear integrated circuit IC, capacitance C and resistance R, feasible in first- and second-oscillators F.sub.1 and F.sub.2. The oscillation frequency f is expressed by f=1/.kappa.RC, where .kappa. is the constant. In the apparatus according to the invention, the oscillation frequency f is generally set to 120-180 hertz.

FIG. 4 shows a means for fixing the frequency difference in order to obtain a stabilized beat. For example, 900 hertz fundamental frequency, produced by oscillator F, is applied to frequency lowering-circuits A.sub.1, A.sub.2 and A.sub.3 to obtain signal with one-ninth, one-eighth or one-seventh of the fundamental frequency, i.e. 100, 112.5 and 128 hertz, respectively. These signals are changed by waveform-modifiers B.sub.1, B.sub.2 and B.sub.3 into more audible signals, and then used to generate a beat sound corresponding to either frequency difference of 112.5-100=12.5 (hertz) or 128-112.5=15.5 (hertz).

FIG. 5 shows an example wherein fundamental frequency f produced by oscillator F is lowered by decade counter F. Decade counter F is arranged to produce single synchronous signals at output terminals 9, 8, 7 and 6 for every ninth-, eighth-, seventh- or sixth-cycles of the fundamental frequency. For example, when oscillator F is supposed to generate 900 hertz signal, then 100 hertz signal appears at output terminal 9 of decade counter D.sub.1. Similarly, output terminal 8 of decade counter D.sub.2 is applied with 112.5 hertz signal; terminal 7, 128.5 hertz signal; and terminal 6, 150 hertz signal. By turning an output terminal 9 of decade counter D.sub.1 and output terminal of 8 of decade counter D.sub.2 with switches S.sub.1 and S.sub.2, a 12.5 hertz beat sound is produced, while by using output terminal 9 of decade counter D.sub.1 and output terminal 7 of decade counter D.sub.2 a 28.5 hertz beat is sounded. A beat sound with a desirable frequency, obtained by turning on any two output terminals with switches S.sub.1 and S.sub.2, is changed with waveform-modifiers B.sub.1 and B.sub.2 into a more audible signal, and then sounded by loudspeakers SP.sub.1 and SP.sub.2.
FIG. 6 shows the frequency of human brain waves: It can be seen that the frequency of human brain wave produced when the five sensory organs are in action is 15 hertz or higher, but shiftable to alpha-rhythm, i.e. 7-14 hertz, by mental relaxation.
FIG. 7 shows the operations of decade counter D. When successive signals 0, 1, 2, . . . , and 16 come into decade counters D.sub.1 and D.sub.2 in a manner as shown with chart "P", for example, seventh- and eighth-signal 7 and 8 produce single pulses at decade counters D.sub.1 and D.sub.2 respectively to back them to the first state for the subsequent counting. By using these as synchronous signal, sine or other suitable waveform can be desirably generated, followed by modification into a more audible waveform with waveform-modifier B. An electroencephalographic study using volunteers confirmed that 4-16 hertz beat sound is most effective to lower the frequency of human brain wave to 8-14 hertz alpha-rhythm. I found that such beat sound is also effective to retain alpha-rhythm, as well as to bring human brain wave from either "theta-rhythm" or "delta-rhythm" into alpha-rhythm.
Having described the present invention as related to the embodiments shown in the accompanying drawings, it is my intention that the invention is not limited by any of the details of description, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

United States Patent ***5,151,080***
Bick **September 29, 1992**

Method and apparatus for inducing and establishing a changed state of consciousness

Abstract

An electroacoustic device includes a sound generator as well as a system for producing synthetic human speech, connected to a modulation stage for superimposing the output signals thereof. The superimposed output signals are applied via an amplifier stage to one of a headphone system or loudspeaker system.

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Attorney, Agent or Firm: Spencer, Frank & Schneider

Claims

I claim:

1. A method for inducing and establishing a deepened state of consciousness in a human that is physically and psychically relaxed or changed by employing electroacoustic means for creating and generating electromagnetic sound signals and for producing electronically altered and synthetic human speech signals, the method comprising:

generating said sound signals;

producing said synthetic human speech signals;

superimposing said sound signals and said synthetic human speech signals to produce a superimposed signal; and

conveying said superimposed signal to the ears of a human by way of one of headphones and loudspeakers.

2. The method as defined in claim 1, wherein the sound signals comprise noise signals which simulate the sound of crashing waves and the superimposing is performed by modulating said synthetic human speech signals so that said synthetic human speech signals are, at least partially, scarcely understandable.

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method and apparatus for inducing and establishing a deepened state of in a human that is physically and psychically (hypnotically) relaxed or changed by employing electroacoustic means.

2. Background Information

Psychogenic-therapy methods in the form of suggestive treatment with therapeutic and prophylactic character are gaining more and more in importance because there exists a very high probability of positively influencing the subconscious mind. Through this treatment, carried out in a deepened physical and psychical (hypnotical) state of relaxation--which is in itself already of great therapeutic effect--negative mental (disturbing) factors, which are fixed in the subconscious mind and evoke (subconsciously) misguided behavior, are replaced suggestively by positive, mental-motivating elements.

In spite of the necessity of individual, different treatment for executing the aforementioned exchange, it is, in order to relieve the treating therapist, both unavoidable and possible to induce and establish at least the deepened state of consciousness that is physically and psychically (hypnotically) relaxed or changed by employing electroacoustic auxiliary means.

The applicant has already described an apparatus in this connection for carrying out hypnotherapy, with which the physician conducting the therapy is able to reach simultaneously via sound carrier or microphone several patients wearing headphones, and exercise a suggestive influence on them for inducing and deepening the hypnosis and for the subsequent return out of the hypnosis.

In this connection, it was pointed out that certain sounds, in particular the rushing of the sea, i.e., the crashing of waves, had a very high sedative effect. To be able to utilize this, the control part of the aforementioned apparatus is provided with a suitable sound generator in order to bring the rushing of the sea alone by itself as well as superimposed, on the headphones for group and individual suggestion.

It is true that all this does relieve the therapist as regards previous individual methods of induction, such as the fascination method and the fixation method, but the effectiveness on the individuals remains very different, which demands in the end no lesser expenditure of time.

In the meantime, however, the results of years of scientific research by the inventor have revealed possibilities of essentially accelerating and deepening the induction and establishment of a deepened state of consciousness that is physically and psychically relaxed or changed.

From the findings of the inventor, upon inducing the condition of hypnosis a sinking of the activity of the left (with right-handers) half of the brain (fatigue effect) takes place, i.e. a damping of understanding and sense; and the censor becomes inattentive due to threshold tiring or distraction; which, on the other hand, results in the restriction of the consciousness on the left side, as restriction of the control of the censors; the sinking of the brain activity on the left hemisphere means, hence, a kind of dazed feeling, sleepiness, even inattentiveness on the part of the censor (C. H. Bick, Hypnoanalyse, in Laux/Schubert, Klinische Hypnose, Centaurus-Verlagsgesellshaft, Pfafferweiler); the inventor has set himself the task of creating a method of the aforementioned kind which is suitable for accelerating and deepening the induction and establishment of the deepened physical and psychical state of relaxation in accordance with the foregoing findings.

SUMMARY OF THE INVENTION

This is achieved according to the invention in that the electromagnetic sound signal as well as the output signal of a system for producing synthetic human speech are conveyed, each other superimposed, to the human ear by way of headphones or loudspeakers.

In this connection, it is of advantage that the sound signals simulate the rushing of waves, upon which the speech signals are modulated into a form that is at least partially, no longer understandable.

Essentially, therefore, the rushing of the waves sound is in the foreground, out of which only rudimentary, incomprehensible or scarcely understandable words are audible. These seemingly nonsensical stimulation signals and word information lead, in the left half of the brain, hence, in the rational area, to a comparatively very fast, apparent tiring or switch-off process with, among other things, strongly reduced sense, logic and control, through which, in a kind of switching, the right half of the brain is now to a large degree receptive to suggestion.

Further, the present invention relates to an apparatus for executing the method, which distinguishes itself according to the invention in that the electroacoustic means for inducing and establishing a changed state of consciousness comprises a sound generator as well as a system for producing synthetic human speech, which are connected to a modulation stage disposed downstream for superimposing the output signals thereof; said output signals being applied via amplifier means to a headphone system or loudspeaker system.

In a preferred embodiment of the invention, the system for generating synthetic human speech is a vocoder for coding speech and producing a robot voice.

BRIEF DESCRIPTION OF THE DRAWING

The drawing shows a block diagram of an embodiment in accordance with the invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

An embodiment for executing the method according to the invention will now be described in more detail with reference to the accompanying block diagram.

The apparatus for inducing and establishing a deepened state of consciousness that is physically and psychically relaxed or changed shown in the block diagram comprises a sound generator 1, with the rushing of the sea, preferably swelling up-and-down, being generated on the output 1' thereof; as well as a vocoder 2, with speech, introduced via a microphone 7, appearing coded like an incomprehensible or scarcely understandable robot voice on the output 2' thereof.

Both outputs 1' and 2' are adjacent to a modulation stage 3, which permits the rushing of the sea and the robot voice to be superimposed; a superimposed output signal being capable of being fed via a preferably adjustable amplifier stage 6 to a headphone system 4 or a loudspeaker system 5 having one or more headphones or loudspeakers, respectively.

Preferably, a sound-recording and sound-reproduction unit 8 is inserted between amplifier stage 6 and playback systems 4 or 5, which permit both the superimposed output signal for inducing and establishing the hypnotic state as well as the subsequent, normally-spoken suggestive information, to be recorded, stored and played back, for instance by means of a recording tape as carrier means.

Recorder tapes produced in such manner can then be individually and repeatedly employed.

Also, the apparatus according to the invention can be developed as a multistage station.

Vocoder, sound generator, modulation stage and amplifier stage can also be combined into a compact apparatus.

The specified apparatus is suitable for essentially accelerating and deepening the induction and establishment of a deepened state of consciousness that is physically and psychically relaxed and changed by the seemingly nonsensical stimulation signals and word information that is fed to the ear, and leads in the left half of the brain to a comparatively very fast threshold tiring or switch-off process with, among other things, strongly reduced sense, logic and control, and the right half of the brain being thereby to a large degree receptive to suggestive information and instruction.

United States Patent ***5,159,703***
Lowery **October 27, 1992**

Silent subliminal presentation system

Abstract

A silent communications system in which nonaural carriers, in the very low or very high audio frequency range or in the adjacent ultrasonic frequency spectrum, are amplitude or frequency modulated with the desired intelligence and propagated acoustically or vibrationally, for inducement into the brain, typically through the use of loudspeakers, earphones or piezoelectric transducers. The modulated carriers may be transmitted directly in real time or may be conveniently recorded and stored on mechanical, magnetic or optical media for delayed or repeated transmission to the listener.

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Field of Search: 455/46,47,66,109,110,42-43 381/73.1,105,124 358/141-143 600/28 128/420.5 380/38

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Claims

What is claimed:

1. A silent communications system, comprising:

(a) amplitude modulated carrier means for generating signals located in non-aural portions of the audio and in the lower portion of the ultrasonic frequency spectrum said signals modulated with information to be perceived by a listener's brain and,

(b) acoustic and ultrasonic transducer means for propagating said signals, for inducement into the brain, of the listener, and,

(c) recording means for storing said modulated signals on mechanical, magnetic and optical media for delayed or repeated transmissions to the listener.

2. A silent communications system, comprising:

(a) frequency modulated carrier means for generating signals located in non-aural portions of the audio and in the lower portion of the ultrasonic frequency spectrum, said signals modulated with information to be perceived by a listener's brain, and;

(b) acoustic and ultrasonic transducer means for propagating said signals, for inducement into the brain of the listener, and;

(c) recording means for storing said modulated signals on mechanical, magnetic and optical media for delayed or repeated transmissions to the listener.

3. A silent communications system, comprising:

(a) a combination of amplitude and frequency modulated carrier means for generating signals located in non-aural portions of the audio and in the lower portion of the ultrasonic frequency spectrum, said signals modulated with information to be perceived by a listener's brain, and

(b) acoustic and ultrasonic transducer means for propagating said signals, for inducement into the brain of the listener;

(c) recording means for storing said modulated signals on mechanical, magnetic and optical media for delayed or repeated transmissions to the listener.

Description

BACKGROUND--FIELD OF THE INVENTION

This invention relates in general to electronic audio signal processing and, in particular, to subliminal presentation techniques.

BACKGROUND--DESCRIPTION OF PRIOR ART

Subliminal learning enjoys wide use today and subliminal tapes are being manufactured by a number of companies in the United States alone. Several decades of scientific study indicate that subliminal messages can influence a human's attitudes and behavior. Subliminal, in these discussions, can be defined as "below the threshold of audibility to the conscious mind." To be effective however, the subliminally transmitted information (called affirmations by those in the profession) must be presented to the listener's ear in such a fashion that they can be perceived and "decoded" by the listener's subconscious mind. We are referring to audio information in this discussion, however, information could be inputted into the subject's subconscious mind through any of the body's sensors, such as touch, smell, sight or hearing. As an example, early development work in the subliminal field utilized motion pictures and slide projections as the medium. Early research into visual and auditory subliminal stimulation effects is exemplified by U.S. Pat. Nos. 3,060,795 of Corrigan, et al. and 3,278,676 of Becker. U.S. Pat. No. 4,395,600 of Lundy and Tyler is representative of later developments in today's subliminal message techniques.

The majority of the audio subliminal tapes available today are prepared using one basic technique. That is, the verbal affirmations are mixed with, and recorded at a lower level than, a "foreground" of music or sounds of ocean surf or a bubbling mountain brook or other similar "masking" sounds. The affirmations are generally recorded 5 decibels (db) or so below the "foreground" programming and regenerative automatic gain control is usually applied to permit the affirmations to change their recorded amplitude in direct proportion to the short term averaged amplitude of the continually varying "foreground" material. In other words, the volume of the affirmations will follow or track the volume changes of the "foreground" programming, but at a lower volume level. Circuit provisions are also usually included to "gate" the affirmations off when the music amplitude is low or zero. This insures that the affirmations cannot be heard during quiet program periods. Thus, today's subliminal affirmations can be characterized as being "masked" by music or other sounds, of constantly changing amplitude and of being reduced or cut off entirely during periods of low or quiet "foreground" programming.

One of the principal and most widely objected to deficiencies in available subliminal tape presentation techniques is that the presence of the "foreground" material is intrusive to both the listener and to anyone else in the immediate area. No matter what "foreground" material is chosen, the fact remains that this material can be heard by anyone within its range and presents a definite distraction to other activities such as conversation, thought, desire to listen to other programming such as radio or television, need to concentrate, etc. Additionally, and because the tapes are used repeatedly by the same listener, any "foreground" music or material eventually becomes monotonously tiring to that listener.

It is the purpose of the following described invention to eliminate or greatly reduce all of the above deficiencies. Although its application to the magnetic tape medium is described in the following discussion, the technique is equally applicable to most other desired transmission mediums, such as Compact Disc, videocassettes, digital tape recorders, Public Address (PA) systems, background music installations, computer software programs, random access memory (RAM), read only memory (ROM), "live", real time applications and other mediums now in existence or to be developed in the future.

Implemented on tape cassettes, for example, the subliminal presentation described here is inaudible i.e., high audio or ultrasonic frequencies, the affirmations are presented at a constant, high amplitude level, and they occupy their own "clear channel", non-masked frequency allocations. If desired, the previously described "foreground" music or other material can be added to the tape through use of an audio mixer. The "silent" recordings are inaudible to the user or by others present and are therefore very effective for use during periods of sleep or when in the presence of others. Additionally, the basic requirements of subliminal stimulation are met. That is, the affirmations are efficiently transmitted to the ear and, while undetected by the conscious mind, are perceived by and efficiently decoded by the subconscious mind.

OBJECTS OF THE INVENTION

Accordingly, several objects and advantages of my invention are:

(a) to provide a technique for producing a subliminal presentation which is inaudible to the listeners(s), yet is perceived and demodulated (decoded) by the ear for use by the subconscious mind.

(b) to provide a technique for transmitting inaudible subliminal information to the listener(s) at a constant, high level of signal strength and on a clear band of frequencies.

(c) to provide a technique for producing inaudible subliminal presentations to which music or other "foreground" programming may be added, if desired.

Still further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, the first digit of each component number also refers to the figure number where that component can be located.

FIG. 1 represents the block diagram of a suitable system which will generate a frequency modulated (FM) signal at 14,500 Hz.

FIG. 2 represents an approximation of the frequency response curve of the human ear and the signal decoding process.

FIG. 3 represents the block diagram of a suitable system which will generate a single sideband, suppressed carrier, amplitude modulated (AM) signal at 14,500 Hz.

REFERENCE NUMERALS IN DRAWINGS

11 microphone or other audio input signal	14 low distortion audio oscillator
12 audio preamplifier if required	15 high pass or band pass audio filter
13 frequency modulation circuit	16 output to tape recorder or other device
21 point on low freq end response curve	25 midpoint on curve between points 23 and 24
22 point on low freq end of ear response curve	26 speaker output of FIG. 1 to ear
23 point on high freq end of ear response curve	27 demodulated subliminal audio inputted to ear
24 point on high freq end of ear response curve	31 microphone
32 speech amplifier	33 balanced modulator
34 carrier oscillator (455 KHz)	35 filter
36 mixer	37 heterodyne oscillator (469.5 KHz)
38 bandpass filter	39 output signal

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Please refer now to FIG. 1 and FIG. 2, which are drawings of a preferred implementation of the invention.

The principle of operation of the silent subliminal presentation system is as follows:

An audio signal in the upper frequency region of the audio spectrum (for example, 14,500 Hz) is modulated with the desired information. The type of modulation may be any type suitable for subliminal applications; frequency modulation (FM), phase modulation (PM), upper single sideband with suppressed carrier, amplitude modulation (AM), tone modulation, etc.

For broadest application, the high audio frequency selected as the carrier frequency must meet two basic criteria:

(1) be high enough in the audio spectrum that its presence to the human ear is essentially unnoticed or undetectable (without the listener being informed that the signal is actually present) and,

(2) be low enough in the audio spectrum that it (and its modulation content) can produce a useful output power from home entertainment type cassette or reel-to-reel magnetic recorders.

This would also include, of course, small portable and automobile tape decks.

Alternatively, the output of the system can be fed directly into an audio amplifier and its speaker/earphone system, Public Address system, etc.

FIG. 1 provides the block diagram of an example of a system capable of generating the desired silent frequency modulated carrier.

The modulation information is inputted into the microphone 11. Other suitable input devices may be substituted for microphone 11, such as a tape recorder or a radio. The microphone 11 is connected to the preamplifier 12 and should have provisions for adjusting its gain in order that the optimum modulation index can be set in the frequency modulator 13. The frequency modulator 13 modulates the frequency of oscillator 14 which has been adjusted for an output of 14,500 Hz as described above. The output of oscillator 14 is fed through a suitable bandpass filter 15 into the tape recorder or directly into a suitable amplifier/speaker system. It is the purpose of the bandpass filter to remove or attenuate audible products of the modulation process in order to maintain as audibly silent an output as practical.

On the receiving end, FIG. 2 represents an approximate and idealized frequency response curve of the human ear. The frequency modulated carrier (centered at 14,500 Hz), as generated above and played through a tape recorder or amplifier/speaker system, is shown on FIG. 2 as speaker output 26, impinging upon the upper slope of the ear's response curve at point 25. The frequency modulated excursions of the speaker output 26 swing between points 23 and 24 on the ear's upper response curve. Because the response curve between points 23 and 25 is relatively linear, this action results in a relatively linear demodulation of the original modulation intelligence, which is passed on subliminally to the inner ear. The amplitude of the demodulated output is not high enough to be detected by the conscious mind but is sufficient in amplitude to be detected by the subconscious mind. In the field of communications engineering design, the above demodulation process in known as slope detection and was used in early FM receiver design. In those receivers, the response curve was formed by the action of a tuned (inductive/capacitance) circuit. In our case, the response curve is formed by the natural response curve of the human ear. The same slope detection technique can be performed at the low frequency end of the human ear response curve. This region is indicated on FIG. 2 as between points 21 and 22. This region, however, has a much smaller available bandwidth and is therefore more restricted as to the amount of information that can be transmitted in an inaudible manner.

In practice, the listener adjusts the volume control of the tape recorder or amplifier to a level just below that at which the listener hears an audible sound or noise from the speaker of the tape recorder. If the recording process is properly done, a spectrum analyzer or a calibrated sound level meter will reveal a strong signal emanating from the tape recorder speaker. A calibrated sound level meter, at a distance of 1 meter (with C weighting and referenced to the standard of 0.0002 micro bar) will typically indicate a silent power output of from 60 to 70 decibels. This is equivalent to the audio power of a loud conversation, yet, in the described system, is inaudible or unnoticed by the listener.

FIG. 3 illustrates a system which generates a suitable amplitude modulated (AM) signal, instead of the frequency modulated (FM) system described above. The output is a modulated, single sideband (SSB), suppressed carrier (AM) signal at 14,500 Hz.

The block diagram represents a common scheme for generating an SSB signal and will be briefly described.

The desired subliminal information is spoken into microphone 31. This signal is amplified by speech amplifier 32 and injected into one port of balanced modulator 33. A continuous wave signal of 455 KHz is generated by carrier oscillator 34 and is injected into the second port of balanced modulator 33. The output of balanced modulator 33 is a double sideband, suppressed carrier signal at 455 KHz. This signal is fed through filter 35, causing one of the two sidebands to be removed. This signal is fed into one port of mixer 36. A continuous wave signal at a frequency of 469.5 KHz from hetrodyne oscillator 37 is fed into the other port of mixer 36, resulting in an output of the original subliminal audio information but translated 14,500 Hz higher in frequency. The bandpass filter 38 attenuates signals and noise outside of the frequencies of interest. The amplitude modulated audio output signal is shown as output 39.

Thus, as stated earlier, my invention provides a new system for subliminal presentations which is:

(a) silent,

(b) outputs a constant, high level modulated signal and,

(c) occupies a band of clear channel frequencies.

The foregoing description of the preferred embodiment of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Many modifications and variations are possible in light of the above discussions. It is intended that the scope of the invention be limited not only by this detailed description, but rather by the claims appended hereto.

Description

The present invention relates to behaviour modification in human subjects, and particularly, but not exclusively, to performance enhancement.

There are many situations in which the enhancement of human performance is important or desirable. For instance, many sportsmen wish to be able to enhance their performance in order to achieve greater success, but without making use of performance-enhancing drugs or other artificial aids which would infringe rules applicable to their sport or activity. Other desirable types of behaviour modification include overcoming phobias, fear, stress, road rage, insomnia, hypochondria and the like.

The present invention provides a method of behaviour modification of a human subject, in which a visualisation programme is undertaken by the subject under ***hypnosis*** and in association with a perceptible stimulation provided by stimulation means, the visualisation programme being so arranged as to enable the subject thereafter, in response to the perceptible stimulation, to visualise modified behaviour.

Preferably the method enhances performance.

The stimulation means is preferably adapted to be activated by the subject, and may be portable. Preferably the stimulation means may be carried or worn by the subject. The stimulation means may provide a stimulation which is perceptible by a part of the subject's body against which the stimulation means is worn or by which the stimulation means is carried or activated. The stimulation means may provide tactile or audible stimulation, such as noise, vibration, mechanical pulses or heat, or any other form of perceptible stimulation, such as trans-dermal, visual, smell, inhalation etc.

The ***hypnosis*** may be self-induced or induced externally.

Preferably the visualisation programme includes an induction phase to induce ***hypnosis,*** and one or more of the following components:

an ego boosting phase in which the subject is motivated;

a visualisation phase in which modified behaviour is visualised;

an anchoring phase in which a visualisation is anchored to the aforesaid perceptible stimulation; and

a trial phase in which the stimulation means is activated while under ***hypnosis*** to recreate a visualisation previously imparted.

Preferably the visualisation programme is pre-recorded, such as by audio or video recording.

The invention also provides stimulation apparatus for use in a method of modifying the behaviour of a human subject, comprising attachment means by which the apparatus may be attached to the body of the subject, and stimulation means operable to provide a stimulation which is perceptible to the subject.

The stimulation means is preferably adapted to be activated by the subject, and may be portable. Preferably the stimulation means may be carried or worn by the subject. The stimulation means may provide a stimulation which is perceptible by a part of the subject's body against which the stimulation means is worn or by which the stimulation means is carried or activated. The stimulation means may provide tactile or audible stimulation, such as noise, vibration, mechanical pulses or heat.

Preferably the stimulation means are mechanical or electrical and may be powered by electrical, mechanical, chemical or solar power means.

The attachment means may comprise a strap and/or adhesive means.

The invention also provides apparatus for behaviour modification, such as performance enhancement, comprising a pre-recorded visualisation programme which, in use, induces ***hypnosis*** in a human subject, and stimulation means operable to provide a perceptible stimulation to the human subject, the visualisation programme being so arranged as to enable the subject thereafter, in response to the perceptible stimulation, to visualise modified behaviour.

Preferably the stimulation means is in accordance with one or more definitions of the preceding aspects of the invention.

Preferably the visualisation programme includes an induction phase to induce ***hypnosis,*** and one or more of the following components:

an ego boosting phase in which the subject is motivated;

a visualisation phase in which modified behaviour is visualised;

an anchoring phase in which a visualisation is anchored to the aforesaid perceptible stimulation; and

a trial phase in which the stimulation means is activated while under ***hypnosis*** to recreate a visualisation previously imparted.

In a further aspect, the invention provides a method of using the apparatus of any of the definitions of the previous aspect of the invention, in which a subject plays back the pre-recorded visualisation programme while exposed to operation of the stimulation means, and wherein the stimulation means is operated by choice by the subject after the visualisation programme has been completed, to re-create, in response to the perceptible stimulation, a visualisation of modified behaviour.

Examples of the present invention will now be described in more detail, by way of example only and with reference to the accompanying drawings, in which:

FIG. 1 is a schematic diagram showing a subject under ***hypnosis*** in accordance with the invention; and

FIG. 2 is a schematic drawing of a stimulation means for use in accordance with the invention.

FIG. 1 shows a human subject 10 undergoing ***hypnosis*** in accordance with the present invention. The ***hypnosis*** may be self-induced or externally induced. The subject 10 is in a relaxed state, shown as lying down, preferably in quiet surroundings which may have subdued lighting. The subject 10 is near a machine 12 which can play back a video or audio recording shown schematically as a cassette 14. The cassette 14 is placed into the machine 12 (indicated schematically by the arrow 16) and the programme pre-recorded on the tape is then played back. It is to be appreciated that the recording medium could be any convenient medium, including software, tape, optical or other storage medium.

During playback, the subject 10 is exposed to operation of stimulation apparatus 18 shown generally in FIG. 2. The apparatus 18 has attachment means 20, shown as a strap, by which the apparatus may be attached to the body of the subject 10, such as by strapping the apparatus around the wrist of the subject. The strap 20 carries a capsule 22, preferably sealed against ingress of water, dirt etc. for longevity. Within the capsule 22, there is a power source 24 such as a battery, solar cell, chemical cell or electrical or mechanical power source. This may be renewable or not according to the desired longevity of the device and the capacity of the power source. It is envisaged that a small battery could provide adequate power for many months of normal use, in which case it is envisaged that replenishing the battery would not be necessary, but arrangements could be made for replacing the battery or replenished the power source, if appropriate.

The source 24 provides power for an actuator 26 which provides a tactile or audible stimulation to the subject 10 when actuated. The actuator 26 may provide noise, vibration, mechanical pulses or heat, for instance. By virtue of the strap 20 holding the capsule 22 against the wrist (or other part) of the subject's body, the stimulation provided by the actuator 26 will be perceptible primarily by that part of the subject's body against which the apparatus 18 is worn (with the exception of an audible stimulation).

The capsule 22 also contains a control member 28, such as an electrical switch, operable from outside the capsule 22, such as by finger pressure. When the control 28 is operated, the power source 24 is allowed to operate the actuator 26 to provide the stimulation.

In one alternative, the stimulation may be perceptible by the part of the body by which the control 28 is activated. For instance, a finger pressing on the control 28 may feel a vibration from the actuator 26. Any form of tactile, audio, trans-dermal, visual, smell, inhalation or other stimulation could be used.

The programme pre-recorded on a tape 14 consists of a visualisation programme which includes an induction phase in which ***hypnosis*** is induced in the subject, and then further components chosen to create a visualisation programme which enables the subject thereafter (i.e. after completion of the programme) and in response to the perceptible stimulation, to visualise modified behaviour, such as enhanced performance.

In more detail, an example of the visualisation programme would first induce ***hypnosis,*** and then take the subject through a sequence of phases including an ego boosting phase in which the user is challenged or motivated to better performance (or modified behaviour such as alleviation of a phobia, fear, stress or other condition) and in which the subject is taught that enhanced performance (or modified behaviour) will be achieved by activation of the stimulation device 18.

The programme then has a visualisation phase in which the subject is encouraged to visualise the improved performance (or modified behaviour) sought, such as a better golf shot, snooker shot, tennis game etc. During this visualisation phase, an anchoring phase occurs in which the subject is instructed to activate the device 18 in order to anchor the visualisation to the perception of stimulation from the apparatus 18. By virtue of the ***hypnosis,*** this anchoring imparts in the subject a link between perception of the stimulation and the visualisation, and hence between the stimulation and the modified behaviour or enhanced performance.

There then follows a trial phase in which the stimulation device 18 is activated (while the subject remains under ***hypnosis***) to re-create the visualisation previously imparted.

Finally, the subject is brought back out of ***hypnosis***.

Thereafter, the subject wears the device 18 whenever the activity is being undertaken (such as, during all future golf games). When faced with a difficult situation in which enhanced performance is required, the subject operates the control 28 to provide the stimulation from the actuator 26. By virtue of the connection imparted under ***hypnosis,*** the subject will respond to this stimulation by visualising the required enhanced performance, such as a better golf shot, and is then more likely to achieve a better golf shot than would otherwise be the case. The subject does not require any other external assistance in order to re-create this visualisation.

Appendix 1 below sets out in detail an example script for a visualisation programme for use in the manner described.

It is envisaged that the device 18 could be built around devices, known in themselves, which have hitherto been used for producing sound-emitting greetings cards and the like. While primarily intended to produce sound, it is envisaged that commercially known capsules of this nature could be programmed to produce vibration or other mechanical stimulation.

It will be apparent that many variations in the apparatus could be made without departing from the scope of the present invention. In particular, any alternative form of actuation which produces a tactile or audible stimulation could be used, as could any convenient, economic or otherwise appropriate power source and control device. The apparatus could be packaged in order to be worn or attached to any convenient part of the body, although the wrist is preferred. A strap is convenient for attachment to the wrist, but alternatively, or in addition, adhesive securing could be used.

The visualisation programme can be used to enhance performance in any of a wide range of skills and activities, such as sports, pastimes, business or other skills. Although described primarily in relation to performance enhancement in a specific skill, the programme can also be used for general behaviour modification, such as overcoming phobias, fears, stress, road rage, insomnia, hypochondria etc.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

US 6,024,700 *System and Method for Detecting a thought and generating a control instruction in response thereto*

United States Patent ***6,024,700***
Nemirovski , et al. **February 15, 2000**

System and method for detecting a thought and generating a control instruction in response thereto

Abstract

A method of detecting a thought and generating a control instruction corresponding to the thought includes detecting the thought by monitoring air pressure near a human ear when a user is thinking. In addition, the method includes providing a control instruction corresponding to the detected thought. A system for detecting a thought and generating a control instruction corresponding to the thought is also disclosed and includes a pressure sensor for sensing a pressure near a human ear when a user is thinking, wherein the sensor produces an electrical signal corresponding to the pressure. A processor processes the electrical signal to detect the thought, generates the control instruction in response to the detection, and sends a control instruction to an output peripheral which provides an output control function corresponding to the control instruction.

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Claims

What is claimed is:

1. A method of detecting a thought and generating a control instruction corresponding to the thought, comprising the steps of:

detecting the thought by monitoring air pressure near a human ear when the human is thinking the thought; and

providing a control instruction corresponding to the detected thought.

2. The method of claim 1, wherein detecting the thought comprises the steps of:

placing a pressure sensor near the ear;

monitoring the air pressure with the pressure sensor;

converting detected air pressure changes to an electrical signal; and

processing the electrical signal to detect the thought.

3. The method of claim 2, wherein processing the electrical signal comprises the steps of:

converting the electrical signal to digital signal data;

processing the digital signal data to detect a presence of the thought; and

analyzing the processed digital signal data to determine the appropriate control instruction corresponding to the thought.

4. The method of claim 3, wherein processing the digital signal data comprises the steps of:

converting the digital signal data from a time domain to a frequency domain; and

processing the frequency domain data to distinguish between noise and the thought.

5. The method of claim 3, wherein processing the digital signal data comprises the steps of:

(a) separating the data into a plurality of data segments;

(b) analyzing a first data segment for the detection of a thought;

(c) analyzing a next data segment for the detection of a thought;

(d) analyzing all the analyzed data segments together for the detection of a thought; and

(e) repeating steps (c) and (d) until all the data segments are analyzed.

6. The method of claim 3, wherein processing the digital signal data comprises the steps of:

(a) selecting a segment of the digital signal data corresponding to a time window;
(b) converting a portion of the data segment from a time domain to a frequency domain;
(c) calculating a power spectrum for the converted data portion;
(d) calculating integrals of the power spectrum of the converted data portion for a plurality of frequency ranges;
(e) calculating a plurality of signal-to-noise ratios using the converted data portion integrals and integrals for a power spectrum of a noise signal for the plurality of frequency ranges;
(f) selecting a subset of the converted data portion integrals based on the signal-to-noise ratios; and
(g) evaluating the subset of converted data portion integrals to detect a presence of the thought.

7. The method of claim 6, further comprising the steps of: selecting another segment of the digital signal data corresponding to another time window, wherein the time windows partially overlap; and repeating the steps of (b)-(g) until a thought is detected or all the digital signal data has been evaluated.

8. The method of claim 6, wherein selecting a subset of the converted data portion integrals comprises the steps of:
comparing the signal-to-noise ratios for each of the frequency ranges to a predetermined threshold value;
selecting the converted data portion integrals corresponding to the frequency ranges if the signal-to-noise ratios are greater than the predetermined threshold value; and using the selected subset of converted data portion integrals for subsequent analysis.

9. The method of claim 8, further comprising the steps of comparing a number of the converted data portion integrals in the selected subset to a threshold value; and disregarding the portion of data if the number falls below a threshold value.

10. The method of claim 6, wherein evaluating the subset of integrals comprises the steps of correlating the subset of integrals with a plurality of integral sets corresponding to a plurality of thoughts; and selecting one of the plurality of thoughts as the detected thought if the correlation between the subset of integrals and the integral set corresponding the one of the plurality of thoughts is greater than a predetermined threshold.

11. The method of claim 10, wherein the integral sets corresponding to the plurality of thoughts are generated by a user via a thought calibration process.

12. The method of claim 11, wherein the thought calibration process comprises the steps of:

(a) placing the air pressure sensor near the ear of a human;
(b) having the human think a particular thought at least one time;
(c) recording the air pressure during the thinking process; and
(d) generating a set of integrals corresponding to the particular thought for subsequent correlation.

13. The method of claim 12, comprising repeating steps (a)-(d) for a plurality of thoughts, thereby generating a set of integrals for a plurality of thoughts.

14. The method of claim 1, wherein monitoring the air pressure comprises the steps of: placing a microphone near the ear; and converting a change in air pressure to an analog electrical signal using the microphone.

15. A system for detecting a thought and generating a control instruction corresponding to the thought, comprising a pressure sensor for sensing a pressure near a human ear when the human is thinking the thought, wherein the sensor produces an electrical signal corresponding to the pressure; a processor for processing the electrical signal to detect the thought and generating the control instruction in response to the detection; and an output peripheral for receiving the control instruction from the processor and providing an output corresponding to the control instruction.

16. The system of claim 15, further comprising an analog to digital converter for converting an analog signal from the pressure sensor into a digital signal for subsequent processing by the processor.

17. The system of claim 15, wherein the pressure sensor comprises a microphone.

18. The system of claim 17, wherein the microphone is affixed near the human ear with an attachment means and substantially isolated from external pressure noise.

19. The system of claim 15, wherein the output peripheral is at least one of a display, a robot, a mechanical apparatus, a medical device and a game.

20. A method of detecting a thought, comprising detecting the thought by monitoring air pressure near a human ear.

Description

FIELD OF THE INVENTION

The present invention generally relates to detecting mental activities such as thoughts using a sensor and providing system control functions in response to the detected mental activities. More particularly, the present invention detects thoughts by analyzing changes in air pressure near the human ear and processing the collected data to determine a proper control functionality corresponding to the thought.

BACKGROUND OF THE INVENTION

For many years attempts have been made to decipher one's thoughts using the bio-electric signals that are produced by the body involuntarily in response to the thoughts or emotions. Traditional biofeedback techniques have focused on measuring the conductivity and electrical sensitivity of the skin using, for example, galvanic skin response (GSR) and electrodermal reflex (EDR). The prior art techniques, however, are slow since the body chemistry which impacts the above physical characteristics does not change quickly. The slow electro-chemical response results in a delay of several seconds in detecting the thought or emotion. Such limitations have therefore suffered from lacking a real-time response functionality required or desired in many control function environments.

One exemplary solution to the above problems in the prior art uses a sensor sleeve that fits over the human finger. The sensor appears to utilize a pair of electrodes for generating a current through the finger and also irradiates the skin with ultraviolet (UV) light to detect heart beat activity (e.g., the pulse), temperature (e.g., changes in resistivity), blood pulse volume and composite neural activity. The prior art sensor system processes the plurality of detected parameters as a series of electrical signals produced by the thoughts. The sensor technology, however, suffers from a variety of performance and other limitations. For example, the technology still is slow since the detected body parameters such as blood pulse volume and body temperature still are rather slow, thereby prohibiting a real-time type control functionality. In addition, the sensor is only capable of binary type control functionality such as ON/OFF, STOP/GO or UP/DOWN. Since many types of control systems require more than two control states, the above prior art solution is ineffective. Lastly, the sensor is not passive, but rather actively invades the human body with current and other electrical stimulus and irradiates the body with radiation such as ultraviolet light which have uncertain health and environmental impacts. Due to such uncertainty, many individuals are reticent to utilize the technology.

Therefore there is a need in the art for a system and a method for detecting thoughts and providing a control function in response to the detection in real-time. In addition, there is a need in the art for a system and method in which the detection of thoughts is accomplished with a passive sensor which does not output a voltage or radiation to detect a parameter, and lastly a system and method which provides a variety of control functions.

SUMMARY OF THE INVENTION

The present invention relates to a system and a method of detecting thoughts and providing one or more control instructions in response to the detection which corresponds to the thought. The invention includes a passive monitoring of air pressure near the human ear. The air pressure information is collected and processed to detect the presence of a thought and determine the type of thought conveyed. Once determined, a control instruction is provided which corresponds to the thought to effectuate a system control functionality.

According to one aspect of the present invention, the air pressure is monitored and collected by a pressure transducer such as a microphone which is located near the human ear. The microphone produces an analog electrical signal which corresponds to the sensed changes in air pressure with respect to time. According to the present invention, a person's thoughts provide changes in air pressure near the ear which are substantially unique for each of a plurality of thoughts. Thus, the detected changes in air pressure are used to detect the presence and the type of thought.

According to another aspect of the present invention, analog electrical signals, which are produced by the pressure sensor in response to the monitored air pressure, are converted into digital signal data, processed and analyzed to detect the presence and type of thought. According to one exemplary embodiment of the invention, the digital signal data is converted from the time domain to the frequency domain to separate data relating to a thought from noise. The data corresponding to a detected thought is then further processed and correlated with a plurality of data sets corresponding to particular thoughts to determine the type of thought. Subsequently, a control instruction is provided for effectuating a control function which corresponds to the detected thought.

According to yet another aspect of the present invention, a plurality of data sets corresponding to particular thoughts are constructed in conjunction with a calibration or practice mode. In such a mode, a person places the pressure sensor near their ear and thinks a particular thought while substantially concurrently indicating the type of thought manually (e.g., pushing a button or manipulating a joystick to indicate a particular function such as a jump or kick) one or more times to provide an exemplary thought signature for subsequent correlation. Preferably, the practice mode continues a plurality of times for each type of thought required for the control application. For each set of collected data for a given thought, statistical models may be used to characterize a typical thought signature in terms of its average and its standard deviation at various points in the data set which may then be subsequently used in the correlation analysis.

According to still another aspect of the present invention, a system for detecting thoughts and providing one or more control instructions in response thereto includes a pressure sensor which detects changes in air pressure near the ear. The pressure sensor may include a transducer such as a microphone which translates the changes in air pressure to an electrical signal which is processed using a system processor. The processor performs various forms of signal processing to detect a thought, determine the type of thought, and provide one or more control instructions to an output peripheral for effectuating the desired control function. Thus the output peripheral may include one or more of a vast array of peripherals such as a display, a medical device, industrial equipment, etc. The system of the present invention is unique since the human ear, traditionally viewed as an input device for processing sound waves or air pressure changes for conversion into sound by the human brain, is utilized and monitored as an output device to generate air pressure changes due to thoughts produced in the brain. The air pressure changes caused in the ear are therefore used as bio-signals and are processed to detect the occurrence and the type of thoughts for use in control functions.

In accordance with the present invention, the changes in air pressure near the ear occur and are detected quickly to thereby provide a substantially real-time control system. In addition, since the changes in air pressure are substantially unique for various thoughts, multiple control functions are available as opposed to the binary control capability of the prior art. Lastly, the pressure sensor is passive and therefore does not raise any potential health and/or environmental concerns.

To the accomplishment of the foregoing and related ends, the invention comprises the features hereinafter fully described and particularly pointed out in the claims. The following description and the annexed drawings set forth in detail certain illustrative embodiments of the invention. These embodiments are indicative, however, of but a few of the various ways in which the principles of the invention may be employed. Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the drawings.

Although the invention is shown and described with respect to the embodiments below, it is obvious that equivalents and modifications will occur to others skilled in the art upon the reading and understanding of the specification. The present invention includes all such equivalents and modifications, and is limited only by the scope of the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block level diagram illustrating a system by which a thought is detected and used to provide a control function which corresponds to the detected thought according to the present invention;

FIG. 2a is an environmental view of a user having a pressure sensor located near their ear which is in electrical communication with a processor coupled to a display according to the present invention;

FIG. 2b is an enlarged view of a portion of FIG. 2a illustrating in greater detail the pressure sensor monitoring air pressure near the ear according to one aspect of the present invention;

FIG. 2c is a pictorial representation of a wave in air, representing a plurality of longitudinal, molecular density changes according to the present invention;

FIG. 2d is a graph illustrating an exemplary electrical signal produced by a transducer associated with the pressure sensor which indicates changes in air pressure at a location local to the pressure sensor according to the present invention;

FIG. 3 is a flow chart diagram illustrating a method of detecting a thought and providing a control instruction in response to the detected thought according to the present invention;

FIG. 4 is a flow chart diagram illustrating a method of monitoring the air pressure according to the present invention;

FIG. 5 is a flow chart diagram illustrating a method of processing an electrical signal corresponding to the air pressure for detecting a thought;

FIG. 6 is a graph illustrating the conversion of an analog electrical signal to digital signal data according to the present invention;

FIG. 7 is a flow chart diagram illustrating a method of analyzing the digital signal data according to the present invention;

FIG. 8 is a graph illustrating a method of analyzing the digital signal data with the flow chart of FIG. 7 according to the present invention;

FIG. 9 is a flow chart diagram illustrating a method of processing the digital signal data according to the present invention;

FIG. 10 is a flow chart diagram illustrating a method of processing the digital signal data according to the present invention;

FIG. 11 is a graph illustrating the selection of a time window corresponding to a digital signal data segment according to the present invention;

FIG. 12 is a graph illustrating an exemplary frequency domain representation of the digital signal data segment of FIG. 11 according to the present invention;

FIG. 13 is a graph illustrating a power spectrum of the frequency domain representation of FIG. 12 according to the present invention;

FIG. 14 is a graph illustrating integrals of the power spectrum of FIG. 13 for a plurality of frequency ranges according to the present invention;

FIG. 15 is a flow chart illustrating a method of selecting a subset of data signal integrals based on signal-to-noise ratios according to the present invention;

FIG. 16 is a graph illustrating a selected subset of the power spectrum integrals of FIG. 14 based on signal-to-noise ratios according to the present invention;

FIG. 17 is a flow chart diagram illustrating a method of using the subset of data signal integrals to detect the presence and type of thought according to the present invention;

FIG. 18 is a graph illustrating signal-to-noise ratios for a plurality of frequency ranges for two data sets for purposes of correlation of the two data sets.

DETAILED DESCRIPTION OF THE INVENTION

The following is a detailed description of the present invention made in conjunction with the attached Figures, wherein like reference numerals will refer to like elements throughout. The present invention relates to a system and a method of detecting thoughts and providing one or more control instructions in response to the detection. Whereas prior art technologies relied upon the analysis of slow, electro-chemical reactions in the body to detect thoughts or emotions, the present invention monitors changes in air pressure near the human ear which occur nearly instantaneously in response to a thought to provide a substantially real-time detection and control system. In addition, the monitoring of the air pressure is passive and thus avoids potential health and/or environmental concerns related to subjecting the body to electrical signals and radiation. Furthermore, the changes in air pressure uniquely correspond to one of a variety of thoughts (e.g., have unique signal signatures) which allows a plurality of different thoughts to be detected and distinguished for a system requiring multiple control functions.

According to one aspect of the present invention, a system for detecting a thought and providing a corresponding control instruction in response to the detection includes a pressure sensor which is positioned near the ear of the user. The sensor is in electrical communication with processing circuitry and senses changes in air pressure near the ear due to the user's thoughts and converts the air pressure changes into an electrical signal. The electrical signal is then processed by the circuitry to detect the presence and the type of thought within the electrical signal and provide a control instruction which corresponds to the particular thought to an output peripheral for execution of the control instruction to effectuate a control function. Exemplary control functions may include, but are not limited to: controlling a video game display, controlling a piece of medical equipment such as a wheelchair, and controlling computer functions to effectuate a handless mouse.

According to another aspect of the present invention, a method of detecting a thought and providing a control instruction corresponding to the thought is provided. Thoughts are monitored by monitoring the air pressure wherein the air pressure changes near the ear correspond to thoughts and noise. The method includes converting the air pressure data to an analog electrical signal which is subsequently converted into digital signal data for further processing. Data signal processing is implemented to analyze the data and separate noise from thought data to thereby detect the presence of a thought. Further processing is then used to determine the type of thought detected and provide one or more control instructions to an output peripheral for execution of the appropriate control functions.

In a preferred embodiment of the present invention, the pressure sensor and transducer includes a microphone and the data signal processing includes conversion of data segments into the frequency domain to distinguish data relating to a thought from noise. Once a thought is detected, further data processing includes correlation between the signal data in the frequency domain to a plurality of frequency domain data sets. If a resulting correlation coefficient exceeds a predetermined threshold, the type of thought is determined and one or more control instructions which correspond to the thought are retrieved from a memory and sent to an output peripheral for execution of the instructions, thereby providing system control functionality.

Turning now to the Figures, a detailed description of the invention follows. FIG. 1 is a block level diagram which illustrates a system 10 for detecting a thought and providing one or more control instructions which correspond to the detected thought. The system 10 includes a pressure sensor 12 coupled to processing circuitry 14 including an analog-to-digital (A/D) converter 16, such as a PCI9118HG data acquisition card manufactured by Adlink Technology or a DAQi250 data acquisition card manufactured by Ines Company Gmbh in Germany, for converting an analog signal into digital signal data. The processing circuitry 14 also includes a processor 18 for receiving the digital signal data from the A/D converter 16 and performing various signal processing functions on the digital signal data to detect the presence of a thought and determine the type of thought. The system 10 also includes an output peripheral 20 coupled to the processor 18 for executing one or more control instructions provided by the processor 18 which correspond to the detected thought.

The system 10 is illustrated within an exemplary environmental context in FIG. 2a. In FIG. 2a, a user 22 has the pressure sensor 12 located near the ear 24 by locating the pressure sensor 12 within a pair of headphones 26. The headphones 26 preferably provide two functions: (1) they locate the pressure sensor 12 near the ear in a relatively fixed position, and (2) they provide a modest amount of external sound insulation, thereby lessening the amount of external noise detected by the pressure sensor 12. When the user 22 thinks a particular thought, a change in air pressure occurs in or near the ear 24, wherein the air pressure change uniquely identifies the thought. The change in air pressure is detected by the pressure sensor 12 and preferably converts the detected air pressure into an analog electrical signal for subsequent processing by the circuitry 14. In FIG. 2a, the exemplary output peripheral 20 is illustrated as a display which carries out the control instruction (e.g., executing a punch or a kick in a video game).

The positional relationship between the pressure sensor 12 and the ear 24 is illustrated in greater detail in FIG. 2b. The pressure sensor 12 includes a housing 28 such as a headphone housing which has a sensor, preferably a microphone 30, affixed thereon. The manner in which the microphone 30 is attached to the housing 28 may vary in order to adjust the distance at which the microphone 30 is from the ear 24. Preferably, the microphone 30 is near the ear 24, for example, within about 1 inch to 2 inches, depending upon the sensitivity of the microphone, however, other distances may also be used and are contemplated as falling within the scope of the present invention. More preferably, the microphone 30 is located comfortably within the ear 24 or as close as possible to the ear to receive the air pressure changes at an increased intensity level. In FIG. 2b neither the shape nor the position of the microphone 30 is drawn to scale, but rather is merely illustrated in this manner for the sake of clarity.

In a preferred embodiment of the present invention, the microphone 30 has a sensitivity of at least about 47 mV/Pa (millivolts per pascal) and even more preferably a sensitivity of about 100 mV/Pa or more with a frequency range of about 10 Hz to about 800 Hz. One exemplary microphone which may be used is the Model 4190 microphone manufactured by Bruel & Kjaer in Denmark. Alternatively, however, other types of microphone or other type pressure sensor may by used and each such alternative is contemplated as falling within the scope of the present invention. Using the Model 4190 microphone the analog output signal is about 400 mV peak-to-peak. The amplitude of the output signal, however, depends upon the amplitude coefficient of the electronics and the position of the microphone with respect to the ear and thus may vary substantially.

It is not certain what physical, chemical or neural mechanism causes or generates the changes in air pressure in or near the ear in response to various thoughts. It is hypothesized that various thoughts have varying intensities which cause involuntary muscle contractions or movements on a microscopic level in or near the ear, which generate pressure changes in or near the ear due to the compression of the air local to the ear. Nevertheless, regardless of the exact physical, chemical or neural mechanism, empirical testing has confirmed that thoughts generate small pressure changes in or near the ear of the person having the thoughts and that the air pressure changes have substantially their own signature and are thus substantially unique for each type of thought. Consequently, the air pressure changes can be monitored near the ear and used to detect the presence and type of thoughts of a user.

The present invention uses the term "changes in air pressure" near the ear in its most broad sense to characterize the parameter being measured. Changes in air pressure may alternatively be characterized as sound waves. As is well known by those skilled in the art, a sound wave is a longitudinal wave in which "pushes" are communicated from molecule to molecule within the medium (which in this preferred embodiment is air). The restoring force for such a wave is due to the pressure of the air; wherever the density of molecules is higher than normal, the pressure also is higher than normal and pushes the molecules apart. FIG. 2c illustrates an exemplary sound wave 40 in air, and consists of a plurality of alternating zones 42 of low and high molecular density 42a and 42b, respectively. The varying molecular density results in changes in air pressure having a particular frequency as the sound wave propagates. In addition, as is well known by those skilled in the art, as a sound wave spreads out from its source, its intensity falls off because as the area of the wave grows larger, the total energy is constant. Therefore the energy per unit area decreases with the inverse square of the distance. Consequently, it is desirable to have the microphone 30 sufficiently close to the ear 24 so that the intensity level of the air pressure changes will be larger and thus easier to detect over any noise.

The frequency range at which sound waves are audible is about 20 Hz to about 20 KHz, however, the present invention is not concerned with whether the air pressure changes are audible since the microphone 30 is sufficiently sensitive and has a frequency detection range which is sufficient to detect air pressure changes at high or low frequencies. In a preferred embodiment of the invention, a frequency range of about 10 Hz to about 800 Hz is focused upon since it has been determined via empirical testing that sufficient data is available within that frequency range to detect and identify a thought. Alternatively, however, any frequency range may be monitored and such variations are contemplated as falling within the scope of the present invention.

The pressure sensor 12 (preferably including the microphone 30) monitors the changes in air pressure and converts the pressure data to an analog electrical signal 50, as illustrated in FIG. 2d. Note that in the signal 50 there are at least two signal components, a high frequency component 52 and a low frequency component 54. In addition, other frequencies may also exist within the electrical signal 50 and the present invention preferably analyzes the various signal frequencies in the subsequent data processing performed by the processor 18, which will be described in greater detail below.

A method 100 for carrying out the present invention is disclosed in FIG. 3. The method 100 includes detecting a thought by monitoring a change in air pressure caused by one's thoughts at step 102. Once the thought is detected at step 102, one or more control instructions which correspond to the detected thought is provided to an output peripheral at step 104 to effectuate the desired control function.

The preferred method of detecting a thought (step 102) is provided in FIG. 4. A pressure sensor such as the one disclosed in conjunction with FIGS. 1 and 2a-2d is placed near the ear of the user who's thoughts are to be detected at step 120. According to a preferred embodiment of the present invention, air pressure changes near the ear occur in response to thoughts and thus the pressure sensor is placed near the ear at step 120. Alternatively, however, since thoughts may result in pressure changes at or near other parts of the body, it is contemplated that in alternative embodiments of the present invention the pressure sensor may be located on or near other parts of the body and any detection of thoughts by analyzing changes in air pressure is contemplated as falling within the scope of the present invention.

The air pressure near the ear is monitored with the sensor at step 122 and is converted to an electrical signal at step 124 for subsequent analysis. After conversion into an electrical signal at step 124, the electrical signal is analyzed to detect a thought at step 126. Although it is conceivable that the thought may be detected at step 126 simply by analyzing the signal corresponding to changes in air pressure without additional data processing, it is preferable that the thought detection process of step 126 include data processing in conjunction with the signal analysis.

A method of analyzing and processing the electrical signal which corresponds to the monitored pressure is illustrated in FIG. 5. The electrical signal, which is an analog signal as illustrated in FIG. 2d, is converted into a digital signal at step 140, as illustrated in FIG. 6. As is well known by those skilled in the art, an analog signal may be converted into a digital signal by sampling the analog signal at a selected frequency and identifying the signal amplitude at each sampling point. Each sampled data point is then saved as a digital word in a memory and used for further analysis. In FIG. 6, a sampled analog signal is illustrated in which the dotted line illustrates the exemplary analog signal for a particular time period and the plurality of points on the dotted line represent sampled amplitude values which are saved in the memory. It is desirable that the sampling frequency be sufficient to capture enough data points to adequately represent the analog signal. Preferably, the sampling rate of the present invention is 32 KHz and the total signal time length to be analyzed is 2048 mSec. Alternatively, however, other sampling rates and data acquisition time frames may be utilized and such variations are contemplated as falling within the scope of the present invention.

Once the analog signal has been converted into digital signal data at step 140, the digital data is analyzed and processed by, for example, a signal processor to detect the presence of a thought at step 142. Preferably, the analysis and processing of the data is performed in a plurality of segments, as illustrated in FIGS. 7 and 8. As illustrated in FIG. 7, a first data segment is analyzed at step 144, followed by the analysis of a second data segment at step 146. Once various data segments have been analyzed separately, the data segments are analyzed together at step 148. If all the data segments have not yet been analyzed at step 150, the method 142 returns to step 146 and the next data segment is analyzed, after which all previous segments are then analyzed together at step 148. The process continues until all the data segments have been analyzed at step 150, thus allowing a conclusion to be generated using the analyzed data segments at step 152.

The data segment analysis may be seen graphically in FIG. 8, wherein digital signal data 154 is illustrated as being continuous for the sake of simplicity. The total length of data for analysis is preferably separated into 64 segments that are each 32 mSec in length. Note that the signal 154 contains both a high frequency component 155 and a low frequency component 156. Since data relating to a thought potentially may be found in either component or the thought data may span multiple data segments, it is preferred that the data segments be analyzed separately as well as together. Thus, at step 144 of FIG. 7, the first data segment is analyzed (region 157), at

step 146 the second data segment is then analyzed (region 158) and at step 148 both data segments are analyzed together (region 159). The process then continues for all the data segments; consequently, the data analysis of the present invention preferably analyzes both the high frequency and low frequency signals to detect the thought since empirical testing has shown that signals of interest typically fall in the range of about 10 Hz to about 800 Hz.

Returning back to FIG. 5, once the data considered to be thought data has been found in the pressure data at step 142, subsequent analysis is performed to determine the type of the detected thought at step 160. Preferably, such analysis includes correlation between the detected signal and a plurality of stored data sets which correspond to pre-identified thoughts. If the detected signal data correlates within a predetermined amount (typically identified by a correlation coefficient) with one of the stored data sets, the type of thought has been determined and one or more control instructions which correspond to that particular thought may then be retrieved and sent to the output peripheral to provide the desired control function. Alternatively, however, other techniques may be utilized to identify the thought type once the thought is detected and any such technique is contemplated as falling within the scope of the present invention.

One exemplary method of analyzing the digital signal in data segments is illustrated in FIG. 9. For each data segment of 32 mSec, the data is converted from the time domain to the frequency domain at step 170 using, for example, a Fast Fourier Transform (FFT) as is well known by those skilled in the art. As is well known, a time domain signal f(t) is linked with the frequency domain f(.omega.) according to the following equation:

F(f(t))=.intg.f(t)e.sup.-j.omega.t dt=f(j.omega.),

wherein F(f(t)) is a traditional Fourier transform. As is well known by those skilled in the art, a Fast Fourier Transform is related to the traditional Fourier transform since the Fast Fourier Transform is an efficient algorithm for computing discrete Fourier transforms. After the digital signal data is converted into the frequency domain via the Fast Fourier Transform, the frequency domain data is processed to distinguish data relating to thoughts from noise data at step 172. As is well known by those skilled in the art, the separation of data from noise is often simplified in the frequency domain because unlike noise, the data signal has some physical characteristics. Though the data signal in the time domain has an amplitude which is less than the noise, the data signal has a greater amplitude than the noise in the frequency domain. Therefore the Fast Fourier Transform is a typical method for noise separation.

The details surrounding the data processing of the digital signal data may be accomplished through a variety of data processing techniques as is well known by those skilled in the art and any data processing methodology is contemplated as falling within the scope of the present invention. Although many different data processing methodologies may be employed, the preferred methodology is disclosed below in conjunction with the following method.

According to a preferred embodiment of the present invention, the data processing of step 142 of FIG. 5 is illustrated in detail in FIG. 10. As discussed in conjunction with FIGS. 7 and 8, the digital signal data having a total acquisition time length of 2048 mSec is separated into a plurality of data segments. For each data segment 180 being 32 mSec long, as illustrated in FIG. 11, a time window 182 corresponding to a portion of the data segment 180 is selected at step 200. According to a preferred embodiment of the present invention, the time window 182 is 16 mSec long and therefore constitutes one-half of the data segment. The data of the data segment portion within the time window 182 is then converted from the time domain into the frequency domain at step 202 using, for example, FFT techniques, thus resulting in a frequency spectrum 203 as illustrated in FIG. 12. Note that the details of FIG. 12 do not necessarily coincide with the digital signal of FIG. 11, but rather is provided simply for the sake of clarity. As illustrated in FIG. 12, f.sub.MIN is related to the total time of signal acquisition (in this particular embodiment is 2048 mSec and thus f.sub.MIN is equal to 0.5 Hz) and f.sub.MAX is equal to the Nyquist frequency which may vary, but in this particular example is equal to 16 KHz.

The frequency domain data of FIG. 12 is then further processed by calculating the power spectrum 204 for the converted data portion at step 20, which is illustrated graphically in FIG. 13. As is well known by those skilled in the art, the power spectrum may be determined by calculating the square of the frequency spectrum data.

The power spectrum 204 of FIG. 13 is then further processed by summing the power amplitudes within a plurality of frequency ranges which are preferably defined during a calibration process for each thought, wherein calibration is a process of applying the method in the situation when a user is tuning the system for each thought. Experimentally, it has been found that the number of ranges may vary between 20 to 50 and the frequency ranges need not be of equal length. For example, for the thought "kick", twenty-six (26) frequency ranges were used as follows:

Range 1: 41.7-44.2 Hz *Range 10: 174.9-176.3 Hz* *Range 19: 464.9-469.7 Hz* *Range 2: 58.5-60.1 Hz*
Range 11: 208.7-211.7 Hz *Range 20: 481.5-483.2 Hz* *Range 3: 72.5-76.8 Hz* *Range 12: 216.4-219.8 Hz*
Range 21: 601.3-604.9 Hz *Range 4: 96.2-98.9 Hz* *Range 13: 271.6-274.1 Hz* *Range 22: 621.7-625.6 Hz*
Range 5: 99.8-104.4 Hz *Range 14: 292.2-296.0 Hz* *Range 23: 638.5-640.0 Hz* *Range 6: 115.5-118.6 Hz*
Range 15: 305.3-310.6 Hz *Range 24: 672.8-673.9 Hz* *Range 7: 125.3-126.1 Hz* *Range 16: 374.2-374.9 Hz*
Range 25: 712.0-717.3 Hz *Range 8: 128.5-132.9 Hz* *Range 17: 392.7-395.0 Hz* *Range 26: 762.2-765.5 Hz*
Range 9: 151.1-153.5 Hz *Range 18: 450.1-452.5 Hz*

For each separate range the power spectrum data within the range is utilized to calculate an integral 207 of the power spectrum at step 206 which effectively comprises a sum of the power amplitudes for each data point within each a particular frequency range. Exemplary integrals 207 for each range are illustrated graphically in FIG. 14. Note that in FIG. 14, only six frequency ranges are illustrated for purposes of clarity. Preferably, however, 20 to 50 such ranges will exist, although other numbers of frequency ranges are contemplated as falling within the scope of the present invention.

Once the integrals 207 for the signal data are calculated at step 206, noise data is used to calculate signal-to-noise ratios (S/N) for each of the frequency ranges at step 208 of FIG. 10. Noise data is preferably acquired by monitoring air pressure data using the pressure sensor before thoughts are detected. Then, the recorded noise data is converted into the frequency domain, a noise power spectrum is generated and noise integrals are calculated for the plurality of frequency ranges in a manner similar to the signal data as discussed above. The integrals 207 of the signal data (S) and the noise data integrals (N) (not shown) are used to calculate the signal-to-noise ratio (S/N) for each frequency range using the formula:

S/N=(S-N)/N.times.100%.

Once the signal-to-noise ratio (S/N) for each frequency range is calculated, the ratio is compared to a predetermined threshold (preferably the threshold is equal to 20% which was determined empirically) and the comparison is used to select a subset of the data signal integrals 207 at step 210 for further analysis.

The preferred method by which the subset of data signal integrals is selected is illustrated in FIG. 15. A variable "i" is initialized to correspond to the first frequency range in the plurality of frequency ranges at step 230. For the first frequency range (i=1), the signal-to-noise ratio (S/N) is compared to the predetermined threshold at step 232. If the ratio (S/N) exceeds the threshold (YES), the data signal integral for that frequency range is included in a signal integral subset at step 234 and the variable "i" is incremented to correspond to the next frequency range at step 236. The variable "i" is then compared to a number representing the total number of pre-calibrated frequency ranges which are determined empirically at step 238. If the signal-to-noise ratios (S/N) for each of the frequency ranges have not yet been evaluated (NO) at step 238, the signal-to-noise ratio (S/N) for the next frequency range is evaluated at step 232.

If at step 232, the signal-to-noise ratio (S/N) of a particular frequency range is not greater than the threshold (NO), the data signal integral corresponding to that particular frequency range is not included in the subset of data signal integrals at step 240. After all the frequency ranges have been analyzed (YES at step 238), a subset of data signal integral 241 having a signal-to-noise ratio (S/N) greater than the predetermined threshold exist, as illustrated in FIG. 16. The number of integrals in the subset are then counted and it is determined whether the subset is large enough to pursue subsequent analysis at step 250 of FIG. 10. For example, if the number of frequency ranges is six (6) and the subset containing high enough signal-to-noise ratios (S/N) is four (4) as illustrated in FIG. 16, then 66% of the data signal integrals 207 are in the subset. This percentage is then compared to a predetermined threshold (preferably 70% which was established experimentally) and if the threshold is not exceeded, then a conclusion is made that not enough data exists to continue the analysis. In this particular example, since 66%<70%, the subset of integrals is not large enough for further analysis and the detection process for that data sample is discontinued.

Returning back to FIG. 10, once the subset of data signal integrals are selected at step 210 (and the number of integrals is sufficient to continue), the subset of integrals 241 is used to detect the presence of a thought at step 250. Once step 250 is complete, a determination is made at step 252 to determine whether a thought has been detected. If the query is answered in the affirmative (YES) (e.g., a sufficient number of data signal integrals exist within the subset) the method 142 moves on to continue the analysis at step 254 where the time window 182 illustrated in FIG. 11 is moved to correspond to a different data segment portion. Preferably the time window 182 (being 16 mSec wide) is shifted 1 mSec to the right and the steps 202-250 of FIG. 10 are repeated again for the new data segment portion. The reason that the process continues at steps 252 and 254 even though a thought has been detected is that the data segment portion that was analyzed in steps 202-250 is only 16 mSec long and more data signal information corresponding to the detected thought may exist in the next neighboring data segment portion (or even in the next 32 mSec data

segment). Thus the method 142 continues steps 202-250 until a thought is no longer detected at step 252 (NO) and the next query at step 256 (whether a thought previously was detected is answered in the affirmative (YES)). If a thought had previously been determined at step 252 and is no longer detected, then the method 142 concludes that all the thought data has been detected at step 258 and the method can then proceed to determine the type of thought at step 160 of FIG. 5.

If at step 252 it is determined that a thought has not been detected (NO) and a thought had not been previously detected at step 256, then the method 142 continues its detection process by proceeding to step 254, wherein the time window 182 is preferably shifted to the right with a 1 mSec increment to again begin the process in steps 202-250 of detecting a thought.

Once the detection of the thought has been completed at step 258, the type of thought is determined at step 160 of FIG. 5, wherein a preferred method for accomplishing the determination is illustrated in FIGS. 17 and 18. In FIG. 17 the type of thought is determined by correlating the data associated with the subset of data signal integrals corresponding to a detected thought to a set of calibrated data stored in a memory, wherein each of the data sets corresponds to a particular, pre-identified thought at step 260. The correlation is preferably determined as illustrated in FIG. 18, wherein the signal-to-noise ratios (S/N) for each frequency range (f.sub.1, f.sub.2, . . . f.sub.n) is plotted on the Y-axis. In addition, each of the signal-to-noise ratios (S/N) of the data sets are similarly plotted. Thus, as graphically illustrated in FIG. 18, a correlation between the two data sets can be calculated using, for example, the Pearson correlation which is as follows:

p(x,y)={.SIGMA.(x-avg(x))(y-avg(y))/(.SIGMA.(x-avg.sup.2 (x)).sup.1/2)(.SIGMA.(y-avg.sup.2 (y)).sup.1/2),

wherein p(x,y) is the correlation coefficient and avg(x) is .SIGMA.x.sub.i (for i=1-N and N is the number of frequency ranges). Alternatively, however, other correlation methodologies may also be utilized and each such correlation technique is contemplated as falling within the scope of the present invention.

The correlation coefficient is determined using the detected thought data and each of the stored data sets (which serve as thought signature templates) and compared to a correlation threshold at step 262, which preferably is 50%, although other thresholds may be used. In addition, the threshold may be programmable or user-defined to "tune" the sensitivity of the system. For example, the correlation threshold may be increased if the system is to be tuned for a user-specific application (analogous to speaker dependent voice recognition) while the correlation coefficient may be lowered for use with a plurality of users (analogous to speaker independent voice recognition) as desired. If at step 262 the correlation coefficient for each correlated data set is less than the threshold (NO), then no thought is detected at step 266. If, however, one of the stored data sets does sufficiently correlate with the detected thought at step 262, the type of thought is detected at step 264 and one or more control instructions corresponding to the type of detected thought can then be provided (preferably by retrieving the instructions using a look up table) to effectuate the desired control function.

Although the invention has been shown and described with respect to a certain preferred embodiment or embodiments, it is obvious that equivalent alterations and modifications will occur to others skilled in the art upon the reading and understanding of this specification and the annexed drawings. In particular regard to the various functions performed by the above described components (assemblies, devices, circuits, etc.), the terms (including a reference to a "means") used to describe such components are intended to correspond, unless otherwise indicated, to any component which performs the specified function of the described component (i.e., that is functionally equivalent), even though not structurally equivalent to the disclosed structure which performs the function in the herein illustrated exemplary embodiments of the invention. In addition, while a particular feature of the invention may have been disclosed with respect to only one of several embodiments, such feature may be combined with one or more other features of the other embodiments as may be desired and advantageous for any given or particular application.

United States Patent ***6,219,657***
Hatayama **April 17, 2001**

Device and method for creation of emotions

Abstract

A device and a method for creation of emotions are provided for an interface of information, such as an artificial agent and a personified agent, intervened between a human being (i.e., user) and an electronic apparatus. For instance, an emotion creating device is configured by a neural network, a behavior determination engine and a feature determination engine. The neural network inputs user information representing conditions of the user and apparatus information, representing conditions of the apparatus, so as to produce emotional states. Herein, a present set of emotional states are produced in consideration of a previous set of emotional states. The emotional states represent prescribed emotions such as pleasure, anger, sadness and surprise. The behavior determination engine refers to a behavior determination database using the user information and the emotional states of the neural network so as to determine a behavior of the interface. The feature determination engine refers to a database using the emotional states of the neural network to determine a feature of the interface, which corresponds to a facial feature.

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Claims

What is claimed is:

1. An emotion creating device, provided for an interface of information between a user and an electronic apparatus, comprising:

a neural network for inputting user information, apparatus information and a present set of emotional states so as to output a next set of emotional states;

a behavior determination engine for inputting the user information and the emotional states of the neural network so as to determine a behavior of an interface; and

a feature determination engine for inputting the emotional states of the neural network to determine a feature of the interface.

2. An emotion creating device as defined in claim 1 wherein the user information corresponds to a number of times of blinking detected by a camera, loudness of voice and a voice interval detected by a mike, a pulse rate detected by a sensor, an intensity of key depression given from a keyboard and a using time given from a mouse, while the apparatus information corresponds to an internal temperature detected by the sensor and a using time measured by a timer, so that the neural network outputs the emotional states which correspond to pleasure, anger, sadness and surprise.

3. An emotion creating device as defined in claim 1 wherein the behavior determination engine comprises

input detection information processing means for detecting the user information, which corresponds to a number of times of blinking detected by a camera, loudness of voice and a voice interval detected by a mike, a pulse rate detected by a sensor, an intensity of key depression given from a keyboard and a using time given from a mouse, to output processed information,

a behavior determination database having a table representing correspondence between the processed information, the emotional states and the behavior of the interface, and

behavior determination means for performing searching on the behavior determination database by inputting the processed information from the input detection information processing means as well as the emotional states of the neural network which correspond to emotions of pleasure, anger, sadness and surprise, thus determining the behavior of the interface.

4. An emotion creating device as defined in claim 1 wherein the feature determination engine comprises

an eye data database for storing eye data,

eye data production means for referring to the eye data database to produce the eye data corresponding to the emotional states of the neural network,

a nose data database for storing nose data,

nose data production means for referring to the nose data database to produce the nose data corresponding to the emotional states of the neural network,

a mouth data database for storing mouth data,

mouth data production means for referring to the mouth data database to produce the mouth data corresponding to the emotional states of the neural network,

a color data database for storing color data,

color data production means for referring to the color data database to produce the color data corresponding to the emotional states of the neural network, and

feature data production means for producing the features of the interface based on the eye data, the nose data, the mouth data and the color data which are produced by the eye data production means, the nose data production means, the mouth data production means and the color data production means respectively.

5. A machine-readable recording media storing a program which causes a computer to perform an emotion creating method comprising:

actualizing a neural network for inputting user information, apparatus information and a present set of emotional states to output a next set of emotional states;

actualizing a behavior determination engine for inputting the user information and the emotional states of the neural network to determine a behavior of an interface; and

actualizing a feature determination engine for inputting the emotional states of the neural network to determine features of the interface.

6. An emotion creating device comprising:

a neural network for inputting user information representing conditions of a user and apparatus information representing conditions of an electronic apparatus so as to produce emotional states corresponding to prescribed emotions, wherein the neural network producing a present set of emotional states in consideration of a previous set of emotional states;

a behavior determination engine for referring to a behavior determination database using the user information and the emotional states of the neural network so as to determine a behavior of an interface; and

a feature determination engine for referring to a database using the emotional states of the neural network so as to determine a feature of the interface.

7. An emotion creating device as defined in claim 6 wherein the conditions of the user correspond to a number of times of blinking, loudness of voice, a voice interval, a pulse rate, an intensity of key depression and a first using time that the user accesses the electronic apparatus, while the conditions of the electronic apparatus correspond to an internal temperature and a second using time that the electronic apparatus is used.

8. An emotion creating device as defined in claim 6 wherein the prescribed emotions correspond to pleasure, anger, sadness and surprise respectively.

9. An emotion creating device as defined in claim 6 wherein the interface corresponds to an artificial agent or a personified agent.

10. An emotion creating device as defined in claim 6 wherein the emotional states of the neural network are represented using coordinate values on a four-dimensional coordinate system whose axes respectively correspond to intensities of the prescribed emotions.

11. An emotion creating device as defined in claim 6 wherein the feature of the interface correspond to a facial feature.

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to devices and methods for creation of motions in electronic apparatuses containing interfaces such as the artificial life and artificial agent. This application is based on patent application No. Hei 9-78918 filed in Japan, the content of which is incorporated herein by reference.

2. Prior Art

Recently, electronic apparatuses such as the home electronic apparatuses and office automation apparatuses are designed to have multi functions and complicated configurations. As for the electronic apparatus which is designed to have multi functions, the recent technology realizes a human interface which is capable of increasing an efficiency to handle the apparatus. For example, the recent technology provides the bar code input system and voice input/output system. Conventionally, complicated manual operations are required to input instructions to the apparatus. Those manual operations are replaced by simple button operations. Combinations of the simple button operations are replaced by "collective" bar code inputs. Then, the advanced apparatus is capable of accepting the voice instructions using the natural language which the user

is familiar with. Progresses are made on responses from the apparatuses. Previously, the apparatus merely executes the instructions. Nowadays, the apparatus is capable of sending a response showing acceptance of the instruction(s). In the case of the reservation of videotape recording on the videotape recorder, for example, when the user accomplishes the reservation of videotape recording, the videotape recorder automatically indicates a videotape recording reservation mark on a certain section relating to a timer display of a video display screen thereof. At completion of the reservation, a television set connected to the videotape recorder visually displays a string of symbols (or characters) or natural language for declaring acceptance of the reservation on a screen thereof. In addition, the natural language is vocalized so that a speaker of the television set produces human voices representing a short sentence as follows:

"Reservation is completed (or accepted)".
Nowadays, the technology is developed to gradually actualize a simplified interface whose operation is simplified as described above. Now, engineers tend to pay an attention to the method to simulate the operation of the interface as if a personified agent performs the operation. Such personification will make the user to increase his or her expectation to the interface. However, too much increased expectation may cause dissatisfaction of the user against the present level of the interface which the user may not please so much. To eliminate such dissatisfaction of the user against the interface, the paper of Japanese Patent Laid-Open Publication No. 6-12401 provides a new technology which tries to bring (simulated) emotions in the personified agent.

According to the conventional personified agent described above, the emotions are realized by changing one parameter with respect to a single situation or by changing multiple parameters independently with respect to a single situation. For this reason, if the effects given from the external are unchanged, an amount of variations of the emotions should be directly (or univocally) determined, regardless of the present emotional situation. So, as compared with the "actual" biological variations of the emotions, the personified agent is subjected to "unnatural" variations of the emotions.

In addition, the conventional personified agent is designed to accept only the pre-defined situations given from the external. So, the conventional personified agent does not change emotions in response to the non-defined situation(s). For this reason, the conventional personified agent lacks diversity in variations of the emotions.

Another method is provided to control the personified agent using random numbers for variations of the emotions. However, such a method may produce emotions whose variations are unnatural (or strange).

SUMMARY OF THE INVENTION

It is an object of the invention to provide a device and a method for creation of emotions, which are capable of creating emotions whose variations are natural and biological.

A device and a method for creation of emotions according to this invention are provided for an interface of information, such as an artificial agent and a personified agent, intervened between a human being (i.e., user) and an electronic apparatus.

According to one aspect of the invention, an emotion creating device is configured by a neural network, a behavior determination engine and a feature determination engine. The neural network inputs user information, representing conditions of the user, and apparatus information, representing conditions of the apparatus, so as to produce emotional states. Herein, a present set of emotional states are produced in consideration of a previous set of emotional states. The emotional states represent prescribed emotions such as pleasure, anger, sadness and surprise. The behavior determination engine refers to a behavior determination database using the user information and the emotional states of the neural network so as to determine a behavior of the interface. The feature determination engine refers to a database using the emotional states of the neural network to determine a feature of the interface, which corresponds to a facial feature.

According to another aspect of the invention, an emotion creating method is actualized using programs which are run by a computer to realize functions of the emotion creating device. Herein, the programs and data are stored in a recording media.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the subject invention will become more fully apparent as the following description is read in light of the attached drawings wherein:

FIG. 1 is a block diagram showing a configuration of an emotion creating device in accordance with an example of the embodiment of the invention;
FIG. 2 shows an internal configuration of a neural network containing an input layer, an intermediate layer and an output layer;
FIG. 3 shows an example of data used for the learning of the neural network;
FIG. 4 shows an example of an emotion map which is formed in response to emotional states of the neural network;
FIG. 5 is a block diagram showing an internal structure of a behavior determination engine provided inside of the emotion creating device of FIG. 1;
FIG. 6 is a flowchart showing content of processing of an input detection information processing block shown in FIG. 5;
FIG. 7 shows an example of content of a behavior determination database shown in FIG. 5;
FIG. 8 is a flowchart showing content of processing of a behavior determination block shown in FIG. 5;
FIG. 9 is a block diagram showing an outline of a feature determination engine provided inside of the emotion creating device of FIG. 1;
FIG. 10 shows an example of a data storage format for storing data in a database shown in FIG. 9;
FIG. 11 is a flowchart showing a method to produce an emotion value from emotional states in FIG. 9;
FIG. 12 shows an example of a method to determine a facial feature in accordance with the feature determination engine; and
FIG. 13 is a block diagram showing a modified example of the emotion creating device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is a block diagram showing an example of a configuration of an emotion creating device in accordance with the preferred embodiment of the invention. Herein, the emotion creating device of the present example is mainly configured by a neural network 8, a behavior determination engine 10 and a feature determination engine 11.

The configuration shown in FIG. 1 is designed in consideration of the situation where the emotion creating device is connected to a personal computer. As inputs of data from a user to the emotion creating device, there are provided a camera 1, a microphone (or mike) 2, a sensor 3, a keyboard 4 and a mouse 5. Herein, the camera 1, the mike 2 and the sensor 3 are provided to obtain analog-variation-type information of the user (hereinafter, simply referred to as analog variation information). Concretely speaking, the analog variation information corresponds to the gaze and look picked up by the camera 1, the skin temperature and pulse rate sensed by the sensor 3 as well as the voice and other sound(s) picked up by the mike 2. In addition, information which is variable with stream (hereinafter, simply referred to as streaming information) is defined by programs. The streaming information corresponds to the shout voice and tut of the user against the mistake of the interface as well as the user's response against the output of the apparatus and histroy of the user's response. Two kinds of the information described above are transmitted to the emotion creating device by using any of the camera 1, the mike 2, the keyboard 4 and the mouse 5. Hereinafter, the analog variation information and streaming information are given a general term of "user information". On the other hand, time-series information which is variable in the apparatus (hereinafter, simply referred to as apparatus information) corresponds to an apparatus temperature I.sub.6 detected by an internal sensor 6 and a using time I.sub.7 to use the personal computer, which is measured by a timer 7.

FIG. 2 shows the details of the neural network 8, which is configured by three layers, i.e., an input layer, an intermediate layer and an output layer. As pieces of the user information input to the neural network 8, there are provided "a number of times of blinking" Io detected by the camera 1, "loudness of voice" I.sub.1 and "voice interval" I.sub.2 both detected by the mike 2, "pulse rate" I.sub.3 detected by the sensor 3, "intensity of key depression" I.sub.4 obtained from the keyboard 4 and "using time" I.sub.5 to use the personal computer one time, which is obtained from the mouse 5. As pieces of the apparatus information, there are provided "internal temperature" I.sub.6 detected by the internal sensor 6 and "using time" I.sub.7 measured by the timer 7. Outputs O.sub.0 to O.sub.3 produced on the output layer of the neural network 8 correspond to data representing emotional states. In other words, the four outputs O.sub.0, O.sub.1, O.sub.2 and O.sub.3 respectively correspond to emotions of "pleasure", "anger", "sadness" and "surprise". Incidentally, the outputs O.sub.0 to O.sub.3 are called emotional states. Further, previously outputted emotional states O.sub.0 to O.sub.3 are input to the neural network 8 as present emotional states S.sub.0 to S.sub.3 .

FIG. 3 shows examples of learning data, which are required for the learning of the neural network 8, such as the user information I.sub.0 to I.sub.5, the apparatus information I.sub.6, I.sub.7 and teacher signals T.sub.0 to T.sub.3. The neural network 8 is subjected to learning using the back propagation method and the like. The back propagation method is one kind of learning accompanied with a teacher. According to this method, there is provided a set of data (simply referred to as an input set) representing an input and its appropriate answer (i.e., teacher), so the learning is performed using the set of data. Suppose a situation where the user uses the apparatus for a long time so that the user and the apparatus are both tired. When an input representing such a situation is applied to the neural network 8, the neural network 8 firstly produces emotional states O.sub.0 to O.sub.3 representing a high possibility that the inappropriateness is caused. In that case, it is necessary that the neural network 8 learns to respond to the above situation with ideal emotional states O.sub.0 to O.sub.3 which show an emotion of "rage". In order to do so, teacher signals T.sub.0 to T.sub.3 representing "rage" are applied to the neural network 8. As described above, the learning of the neural network 8 is performed by repeating application of the teacher signals T.sub.0 to T.sub.3 with respect to several kinds of inputs. After completion of the learning, the neural network 8 is capable of producing "appropriate" emotional states O.sub.0 to O.sub.3, which complements the given input sets, with respect to information which is not directly input to the neural network 8 as the input set(s). If the neural network 8 is not taught the emotion of "anger", it is possible to construct emotional property of never being caught in the emotion of "anger". By the way, the actual emotions have continuity and directionality. In addition, the actual biological form has emotions which contain an emotion of strong response and an emotion of not so strong response. For example, it is easily caught in the emotion of "anger" but is not easily caught in the emotion of "pleasure". That is, using the characteristics of the neural network 8, it is possible to express more biological emotions. Incidentally, more detailed explanation of the learning of the neural network is described in a book entitled "Neurocomputer" published by "Gijutsuhyouronsya" of Japan.

The emotional states O.sub.0 to O.sub.3 of the neural network 8 are passed to the behavior determination engine 10 and the feature determination engine 11. They are used as one element of determination for determining a behavior such as a response from the apparatus against an inquiry from the user. Or, they are used to produce features such as expression and color of the personified interface.

FIG. 4 shows an example of a virtual four-dimensional space (hereinafter, referred to as an emotion map) which is formed by the emotional states O.sub.0 to O.sub.3. The emotion map is formed by four dimensions corresponding to the emotional outputs O.sub.0 to O.sub.3 representing the pleasure, anger, sadness and surprise respectively. Each of the emotional outputs O.sub.0 to O.sub.3 is variable within a range between (0, 0, 0, 0) and (1, 1, 1, 1). Herein, the characteristic of the emotional output becomes more intense as the value of the emotional output becomes larger. The intensity of the characteristic of the emotional output is represented by a location on the line connecting between (0, 0, 0, 0) and (1, 1, 1, 1). Herein, if all the values of the emotional outputs O.sub.0 to O.sub.3 are equal to each other, it can be said that emotions are placed in a neutral and stable state.

FIG. 5 is a block diagram showing an example of an internal structure of the behavior determination engine 10. The behavior determination engine 10 is mainly configured by an input detection information processing block 51, a behavior determination database 52 and a behavior determination block 53.

The input detection information processing block 51 analyzes user information I.sub.0 to I.sub.5 given from the external. Herein, the block 51 changes over processing elements in response to the user information so as to process the user information. That is, the block 51 uses a picture recognizer for processing of pictures while using a voice recognizer for processing of voices. Incidentally, the information processed by the block 51 is called processed information.

Processing of the input detection information processing block 51 is performed in accordance with steps shown in FIG. 6. It is constructed by an input type discrimination step S101, an input character string decision step S102, an input button decision and input location decision step S103, an input character string decision and sound quality decision step S104, a picture characteristic decision step S105 and a pulse rate decision step S106.

FIG. 7 shows an example of a part of content of the behavior determination database 52. The behavior determination database 52 describes behaviors of the interface in connection with the processed information input thereto and the emotional states O.sub.0 to O.sub.3 of the neural network 8.

Using the processed information given from the input detection information processing block 51 and the emotional states O.sub.0 to O.sub.3 of the neural network 8, the behavior determination block 53 performs searching on the behavior determination database 52 to determine the behavior of the interface.

The processing of the behavior determination block 53 is performed in accordance with steps shown in FIG. 8. It is constructed by a processed information input step S201, a neural network emotional state input step S202, a behavior determination database search step S203 and a behavior output step S204.

FIG. 9 is a block diagram showing an outline of the feature determination engine 11. Herein, the feature determination engine 11 is configured by an eye data production section 91, an eye data database 92, a nose data production section 93, a nose data database 94, a mouth data production section 95, a mouth data database 96, a color data production section 97, a color data database 98 and a feature data production section 99.

Creation of data for the features is performed with respect to parts such as eyes, nose, mouth and color. Each part has its own database. Based on the emotional states O.sub.0 to O.sub.3, the emotion creating device uses the eye data database 92, the nose data database 94, the mouth data database 96 and the color data database 98 to produce eye data, nose data, mouth data and color data which are suited to the emotional states O.sub.0 to O.sub.3. Based on those data, the device produces data used for formation of features, such as picture data.

FIG. 10 shows an example of a data storage format used for the eye data database 92, the nose data database 94, the mouth data database 96 and the color data database 98. Like the emotional states O.sub.0 to O.sub.3, emotion values denoted by a symbol D.sub.i (where i=0 to 3) correspond to the emotions of "pleasure", "anger", "sadness" and "surprise". Herein, the emotion value D.sub.i is set at any one of three values, i.e., "0", "0.5" and "1". At completion of the emotion value D.sub.i, formation data used for formation of each part is determined. The formation data correspond to picture data such as bit map data and polygon data. When all the formation data are completely produced for all parts, the feature data production section 99 integrates them to produce integrated picture data for representation of the features.

FIG. 11 is a flowchart whose processing is applied to each of the eye data production section 91, the nose data production section 93, the mouth data production section 95 and the color data production section 97, wherein it shows a method to produce the emotion value D.sub.i (where i=0 to 3) from the emotional state O.sub.i (where i=0 to 3) output from the neural network 8. Concretely speaking, the method to produce Di from the emotional state O.sub.i is the method that compares an output O.sub.i of the neural network 8 with emotion values D.sub.i stored in each of the eye data database 92, the nose data database 94, the mouth data

database 96 and the color data database 98 to select an emotion value D.sub.i which is the closest to O.sub.i.

The method of FIG. 11 to produce the emotion value D.sub.i (where i=0 to 3) is constructed by steps S301 to S307, as follows:

S301: a decision as to whether i=4;
S302: a decision as to whether the emotional state O.sub.i is less than 0.25:
S303: a decision as to whether the emotional state O.sub.i is 0.25 or more and is less than 0.75;
S304: the emotion value D.sub.i is set at 0;
S305: the emotion value D.sub.i is set at 0.5;
S306: the emotion value D.sub.i is set at 1; and
S307: increase a counter i.

Next, a description will be given with respect to the operation of the emotion creating device, which is configured in accordance with the embodiment of the invention, together with the emotion creating method.

The emotion creating device inputs pieces of user information I.sub.0 to I.sub.5 which correspond to analog variation information given from the camera 1, the mike 2 and the sensor 3 as well as streaming information given from the keyboard 4 and the mouse 5. In addition, the emotion creating device inputs pieces of apparatus information I.sub.6 and I.sub.7 given from the internal sensor 6 and the timer 7. In addition to the above pieces of information, the neural network 8 inputs previous emotional states S.sub.0 to S.sub.3 so as to output present emotional states O.sub.0 to O.sub.3.

The behavior determination engine 10 inputs the user information I.sub.0 to I.sub.5 and the emotional states O.sub.0 to O.sub.3 output from the neural network 8, thus determining the behavior of the interface.

Specifically, the behavior determination engine 10 operates in accordance with the aforementioned steps S101 to S106 shown in FIG. 6. That is, the input detection information processing block 51 inputs the user information I.sub.0 to I.sub.5 to discriminate an input type in step S101. If the input type corresponds to a key input, the block 51 makes a decision with respect to an input character string in step S102. If the input type corresponds to a mouse input, the block 51 makes a decision with respect to an input button and an input position in step S103. If the input type corresponds to a voice input, the block 51 makes a decision with respect to an input character string and sound quality in step S104. If the input type corresponds to a picture input, the block 51 makes a decision with respect to picture characteristics in step S105. If the input type corresponds to a sensor input, the block 51 makes a decision with respect to a pulse rate in step S106. Based on results of the decision, the input detection information processing block 51 outputs processed information.

Next, the behavior determination block 53 inputs the processed information output from the input detection information processing block 51 and the emotional states O.sub.0 to O.sub.3 output from the neural network 8. Using those inputs, the behavior determination block 53 performs searching on the behavior determination database 52 so as to determine the behavior of the interface.

FIG. 7 shows an example of the content of the behavior determination database 52. When the user information I.sub.4 representing a click of the mouse 5 is input to the behavior determination engine 10, the behavior determination block 53 determines to do nothing in a case where the emotional state O.sub.1 output from the neural network 8 is greater than 0.5. In other cases, the behavior determination block 53 makes a decision on an event of a position (x, y), so that the event is processed. When the user information I.sub.1 representing a voice input of the mike 2 is input to the behavior determination engine 10, the behavior determination block 53 lowers a tone (or pitch) to output voices for pronouncing a Japanese word of "O-HA-YO-U" (i.e., "Good Morning" in English) in a case where the emotional state O.sub.2 is greater than 0.5. In another case where the emotional state O.sub.1 is greater than 0.8 or the emotional state O.sub.3 is greater than 0.5, the behavior determination block 53 determines to do nothing. In other cases, the behavior determination block 53 outputs voices for pronouncing a Japanese word of "U-RU-SA-I" (i.e.,

"Shut Up" in English).

The feature determination engine 11 inputs the emotional states O.sub.0 to O.sub.3 of the neural network 8 to determine features of the interface.

Specifically, the eye data production section 91 performs searching on the eye data database 92 to determine eye data; the nose data production section 93 performs searching on the nose data database 94 to determine nose data; the mouth data production section 95 performs searching on the mouth data database 96 to determine mouth data; the color data production section 97 performs searching on the color data database 98 to determine color data. Then, the feature data production section 99 convolutes those data to provide features of the interface.

In the above, each of the eye data production section 91, the nose data production section 93, the mouth data production section 95 and the color data production section 97 produces the emotion value D.sub.i (where i=0 to 3) from the emotional state O.sub.i (where i=0 to 3). That is, if the emotional state O.sub.i is less than 0.25 (see step S302), the emotion value D.sub.i is set at 0. If the emotional state O.sub.i lies between 0.25 and 0.75 (see step S303), the emotion value D.sub.i is set at 0.5. If the emotional state O.sub.i is greater than 0.75, the emotion value D.sub.i is set at 1. Thus, normalization is performed using the emotion value D.sub.i described above. That is, the emotional state O.sub.i of the neural network 8 is compared with the emotion value D.sub.i stored in the eye data database 92, the nose data database 94, the mouth data database 96 and the color data database 98, so that the device selects the emotion value which is the closest to the emotional state.

FIG. 12 shows an example of a method of determination of features of a face, which is one example of the feature determination method. Specifically, FIG. 12 shows variations of a facial feature of eyes. The emotion value Di corresponds to any one of points on the emotion map, so the device is subjected to learning with respect to major points on the emotion map, i.e., ordinal variations of emotions which can be observed from the user. Herein, feature data of the face are provided in advance with respect to the major points, while intermediate features, which complement the major points, are output with respect to points other than the major points. In the case of the eyes, for example, there are provided three kinds of major points, i.e., "normal" (0, 0, 0, 0), "anger" (0, 0.5, 0, 0) and "rage" (0, 1, 0, 0). At occurrence of an intermediate point, the device creates data suited to an emotion of "slight anger" (0, 0.3, 0, 0), for example.

FIG. 13 is a block diagram showing a configuration of the emotion creating device in accordance with a modified example of the preferred embodiment of the invention, wherein parts equivalent to those shown in FIG. 1 are designated by the same numerals. As compared with the aforementioned example of the emotion creating device shown in FIG. 1, the modified example of the emotion creating device of FIG. 13 is characterized by providing a recording media 20 which stores an emotion creating program (including data) to realize an emotion creating method. As the recording media 20, it is possible to employ a magnetic disk, a semiconductor memory and other types of memories. A computer (not shown) loads the emotion creating program from the recording media 20. So, the operation of the computer is controlled to actualize functions of the emotion creating device. The operation of the emotion creating device actualized by the computer is quite identical to that of the aforementioned example of the emotion creating device; hence, the detailed description thereof will be omitted.

According the emotion creating device and its method in the modified example, the neural network 8 is subjected to learning with respect to a finite number of patterns established between combinations of user information I.sub.0 to I.sub.5 and apparatus information I.sub.6, I.sub.7 and their ideal emotional states O.sub.0 to O.sub.3. Thus, the neural network 8 is designed to have a capability to output the emotional states O.sub.0 to O.sub.3 with respect to every situation. So, it is possible to personify the behavior and features of the interface more naturally like the real biological life form. As this invention may be embodied in several forms without departing from the spirit of essential characteristics thereof, the examples of the embodiment are therefore illustrative and not restrictive, since the scope of the invention is defined by the appended claims rather than by the description preceding them, and all changes that fall within metes and bounds of the claims, or equivalence of such metes and bounds are therefore intended to be embraced by the claims.

United States Patent ***6,258,022***
Rose **July 10, 2001**

Behavior modification

Abstract

Behavior modification of a human subject takes place under hypnosis, when the subject is in a relaxed state. A machine plays back a video or audio recording, during which the subject is instructed to activate a device to create a perceptible stimulation which is linked, through the hypnosis, with a visualization of enhanced or improved performance. After the hypnosis, the user can reactivate the device at will, whenever the improved performance, such as an improved sporting performance, is desired. This will again create the perceptible stimulation and thus induce the required visualization.

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Claims

What is claimed is:

1. A method of stimulating enhanced performance of an activity by a human subject, comprising the steps of

a) providing a stimulation means for applying a mechanically or electrically operated stimulus,

b) hypnotizing the human subject and subjecting him to a visualization program while under hypnosis,

c) employing the stimulation means to apply a stimulus to the subject during the visualization program,

d) bringing the subject out of hypnosis, and

e) employing the stimulation means to reapply said stimulus after hypnosis under the control of the subject during the activity of which performance is to be enhanced.

2. A method according to claim 1, wherein step a) comprises providing a portable stimulation means.

3. A method according to claim 2, wherein step a) comprises providing a stimulation means that is able to be carried or worn by the subject during use.

4. A method according to claim 3, wherein step a) comprises providing a stimulation means that is operable to provide a stimulus that is perceptible by a part of the subject's body against which the stimulation means is worn or by which the stimulation means is carried or activated.

5. A method according to claim 1, wherein step a) comprises providing a stimulation means that applies noise, vibration, mechanical pulses or heat.

6. A method according to claim 1, wherein step b) comprises inducing a state of self-hypnosis or a state of externally-induced hypnosis.

7. A method according to claim 1, wherein step b) comprises subjecting the subject to a program that includes an induction phase to induce hypnosis and one or more of the following components:

an ego boosting phase in which the subject is motivates;

a visualization phase in which performance enhancement is visualized;

an anchoring phase in which a visualization is anchored to the stimulation; and

a trial phase in which the stimulation means is activated while a subject is under hypnosis to recreate a visualization previously imparted.

8. A method according to claim 1, wherein step b) comprises subjecting the subject to a pre-recorded visualization program.

9. A method according to claim 1, wherein step b) comprises subjecting the subject to a visualization program in the form of an audio or video recording.

10. A method according to claim 1, wherein steps b) and c) comprise playing a pre-recorded visualization program to the subject while employing the stimulation means to apply a stimulus to the subject, and wherein step e) comprises employing the stimulation means to apply said stimulus by choice of the subject after the visualization program has been completed, to recreate, in response to the stimulus, a visualization of modified behaviour.

Description

The present invention relates to behaviour modification in human subjects, and particularly, but not exclusively, to performance enhancement.

There are many situations in which the enhancement of human performance is important or desirable. For instance, many sportsmen wish to be able to enhance their performance in order to achieve greater success, but without making use of performance-enhancing drugs or other artificial aids which would infringe rules applicable to their sport or activity. Other desirable types of behaviour modification include overcoming phobias, fear, stress, road rage, insomnia, hypochondria and the like.

The present invention provides a method of behaviour modification of a human subject, in which a visualisation programme is undertaken by the subject under hypnosis and in association with a perceptible stimulation provided by stimulation means, the visualisation programme being so arranged as to enable the subject thereafter, in response to the perceptible stimulation, to visualise modified behaviour.

Preferably the method enhances performance.

The stimulation means is preferably adapted to be activated by the subject, and may be portable. Preferably the stimulation means may be carried or worn by the subject. The stimulation means may provide a stimulation which is perceptible by a part of the subject's body against which the stimulation means is worn or by which the stimulation means is carried or activated. The stimulation means may provide tactile or audible stimulation, such as noise, vibration, mechanical pulses or heat, or any other form of perceptible stimulation, such as trans-dermal, visual, smell, inhalation etc.

The hypnosis may be self-induced or induced externally.

Preferably the visualisation programme includes an induction phase to induce hypnosis, and one or more of the following components:

an ego boosting phase in which the subject is motivated;

a visualisation phase in which modified behaviour is visualised;

an anchoring phase in which a visualisation is anchored to the aforesaid perceptible stimulation; and

a trial phase in which the stimulation means is activated while under hypnosis to recreate a visualisation previously imparted.

Preferably the visualisation programme is pre-recorded, such as by audio or video recording.

The invention also provides stimulation apparatus for use in a method of modifying the behaviour of a human subject, comprising attachment means by which the apparatus may be attached to the body of the subject, and stimulation means operable to provide a stimulation which is perceptible to the subject.

The stimulation means is preferably adapted to be activated by the subject, and may be portable. Preferably the stimulation means may be carried or worn by the subject. The stimulation means may provide a stimulation which is perceptible by a part of the subject's body against which the stimulation means is worn or by which the stimulation means is carried or activated. The stimulation means may provide tactile or audible stimulation, such as noise, vibration, mechanical pulses or heat.

Preferably the stimulation means are mechanical or electrical and may be powered by electrical, mechanical, chemical or solar power means.

The attachment means may comprise a strap and/or adhesive means.

The invention also provides apparatus for behaviour modification, such as performance enhancement, comprising a pre-recorded visualisation programme which, in use, induces hypnosis in a human subject, and stimulation means operable to provide a perceptible stimulation to the human subject, the visualisation programme being so arranged as to enable the subject thereafter, in response to the perceptible stimulation, to visualise modified behaviour.

Preferably the stimulation means is in accordance with one or more definitions of the preceding aspects of the invention.

Preferably the visualisation programme includes an induction phase to induce hypnosis, and one or more of the following components:

an ego boosting phase in which the subject is motivated;

a visualisation phase in which modified behaviour is visualised;

an anchoring phase in which a visualisation is anchored to the aforesaid perceptible stimulation; and

a trial phase in which the stimulation means is activated while under hypnosis to recreate a visualisation previously imparted.

In a further aspect, the invention provides a method of using the apparatus of any of the definitions of the previous aspect of the invention, in which a subject plays back the pre-recorded visualisation programme while exposed to operation of the stimulation means, and wherein the stimulation means is operated by choice by the subject after the visualisation programme has been completed, to re-create, in response to the perceptible stimulation, a visualisation of modified behaviour.

Examples of the present invention will now be described in more detail, by way of example only and with reference to the accompanying drawings, in which:

FIG. 1 is a schematic diagram showing a subject under hypnosis in accordance with the invention; and

FIG. 2 is a schematic drawing of a stimulation means for use in accordance with the invention.

FIG. 1 shows a human subject 10 undergoing hypnosis in accordance with the present invention. The hypnosis may be self-induced or externally induced. The subject 10 is in a relaxed state, shown as lying down, preferably in quiet surroundings which may have subdued lighting. The subject 10 is near a machine 12 which can play back a video or audio recording shown schematically as a cassette 14. The cassette 14 is placed into the machine 12 (indicated schematically by the arrow 16) and the programme pre-recorded on the tape is then played back. It is to be appreciated that the recording medium could be any convenient medium, including software, tape, optical or other storage medium.

During playback, the subject 10 is exposed to operation of stimulation apparatus 18 shown generally in FIG. 2. The apparatus 18 has attachment means 20, shown as a strap, by which the apparatus may be attached to the body of the subject 10, such as by strapping the apparatus around the wrist of the subject. The strap 20 carries a capsule 22, preferably sealed against ingress of water, dirt etc. for longevity. Within the capsule 22, there is a power source 24 such as a battery, solar cell, chemical cell or electrical or mechanical power source. This may be renewable or not according to the desired longevity of the device and the capacity of the power source. It is envisaged that a small battery could provide adequate power for many months of normal use, in which case it is envisaged that replenishing the battery would not be necessary, but arrangements could be made for replacing the battery or replenished the power source, if appropriate.

The source 24 provides power for an actuator 26 which provides a tactile or audible stimulation to the subject 10 when actuated. The actuator 26 may provide noise, vibration, mechanical pulses or heat, for instance. By virtue of the strap 20 holding the capsule 22 against the wrist (or other part) of the subject's body, the stimulation provided by the actuator 26 will be perceptible primarily by that part of the subject's body against which the apparatus 18 is worn (with the exception of an audible stimulation).

The capsule 22 also contains a control member 28, such as an electrical switch, operable from outside the capsule 22, such as by finger pressure. When the control 28 is operated, the power source 24 is allowed to operate the actuator 26 to provide the stimulation.

In one alternative, the stimulation may be perceptible by the part of the body by which the control 28 is activated. For instance, a finger pressing on the control 28 may feel a vibration from the actuator 26. Any form of tactile, audio, trans-dermal, visual, smell, inhalation or other stimulation could be used.

The programme pre-recorded on a tape 14 consists of a visualisation programme which includes an induction phase in which hypnosis is induced in the subject, and then further components chosen to create a visualisation programme which enables the subject thereafter (i.e. after completion of the programme) and in response to the perceptible stimulation, to visualise modified behaviour, such as enhanced performance.

In more detail, an example of the visualisation programme would first induce hypnosis, and then take the subject through a sequence of phases including an ego boosting phase in which the user is challenged or motivated to better performance (or modified behaviour such as alleviation of a phobia, fear, stress or other condition) and in which the subject is taught that enhanced performance (or modified behaviour) will be achieved by activation of the stimulation device 18.

The programme then has a visualisation phase in which the subject is encouraged to visualise the improved performance (or modified behaviour) sought, such as a better golf shot, snooker shot, tennis game etc. During this visualisation phase, an anchoring phase occurs in which the subject is instructed to activate the device 18 in order to anchor the visualisation to the perception of stimulation from the apparatus 18. By virtue of the hypnosis, this anchoring imparts in the subject a link between perception of the stimulation and the visualisation, and hence between the stimulation and the modified behaviour or enhanced performance.

There then follows a trial phase in which the stimulation device 18 is activated (while the subject remains under hypnosis) to re-create the visualisation previously imparted.

Finally, the subject is brought back out of hypnosis.

Thereafter, the subject wears the device 18 whenever the activity is being undertaken (such as, during all future golf games). When faced with a difficult situation in which enhanced performance is required, the subject operates the control 28 to provide the stimulation from the actuator 26. By virtue of the connection imparted under hypnosis, the subject will respond to this stimulation by visualising the required enhanced performance, such as a better golf shot, and is then more likely to achieve a better golf shot than would otherwise be the case. The subject does not require any other external assistance in order to re-create this visualisation.

Appendix 1 below sets out in detail an example script for a visualisation programme for use in the manner described.

It is envisaged that the device 18 could be built around devices, known in themselves, which have hitherto been used for producing sound-emitting greetings cards and the like. While primarily intended to produce sound, it is envisaged that commercially known capsules of this nature could be programmed to produce vibration or other mechanical stimulation.

It will be apparent that many variations in the apparatus could be made without departing from the scope of the present invention. In particular, any alternative form of actuation which produces a tactile or audible stimulation could be used, as could any convenient, economic or otherwise appropriate power source and control device. The apparatus could be packaged in order to be worn or attached to any convenient part of the body, although the wrist is preferred. A strap is convenient for attachment to the wrist, but alternatively, or in addition, adhesive securing could be used.

The visualisation programme can be used to enhance performance in any of a wide range of skills and activities, such as sports, pastimes, business or other skills. Although described primarily in relation to performance enhancement in a specific skill, the programme can also be used for general behaviour modification, such as overcoming phobias, fears, stress, road rage, insomnia, hypochondria etc.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

APPENDIX 1

Introduction

Thank you for purchasing your CAN-DO PATCH. By the purchase of your CAN-DO PATCH you have made a positive statement about yourself and believe this . . . have shown yourself willing to take those positive steps which, with the use of your CAN-DO PATCH will empower you to make changes to your life . . . forever!

You will have read our information leaflet about your CAN-DO PATCH and the process involved and by now I assume you will want to commence to gain the improvements you seek so much.

Induction

Firstly ensure that your CAN-DO PATCH is adhering to a part of your body easily accessible by touch when playing your game.

Now find a place where you can be or sit comfortably without being able to be disturbed by noise or people.

I wonder if you can take two or three deep breaths; really long deep breath, really filling up your lungs and letting the breath out slowly, very slowly . . . just try that now . . . (pause). Excellent . . . you are about to experience with the aid of your mind and your CAN-DO PATCH and enjoy a very positive and beneficial experience . . . and this is true . . . because the things you used to dream about can now (as you continue to breath deeply and slowly) become your reality . . . now become aware of the area around your CAN-DO PATCH and now of all the sounds around you . . . the sound of my voice . . . the music . . . sounds outside . . . and just allow each sound to become a signal . . . a signal for you to relax with. Just disassociate yourself at this moment even from your thoughts . . . The way to do this is to relax completely . . . not only will this relaxation help to remove any anxiety or discomfort from your life but it is a wonderful way of quieting your rational thinking mind which is the verbal part of your nervous system . . . and if images are passing through your mind, just let them . . . just let them go in one side and out the other . . . and by doing so you may find new insights to improve your life . . . or uncover misconceptions about your playing skills . . . so for now just drift and dream . . . feel your feet relaxing . . . The relaxing feeling making your legs heavy as its power moves through your body . . . legs totally relaxed--hips--thighs . . . comfortable all tension leaving your body as its warm relaxing power moves through your spine . . . relaxing your shoulders and arms . . . so easy and heavily relaxed . . . breathing deeper, legs--body--arms--wrists and fingers. Just completely relax as you feel its warmth and relaxation. Relax your neck moving upwards into your scalp--relaxing your scalp--that feeling--breathing deeply . . . into your eyelids--your lids heavy and heavier . . . your face muscles relaxing--loose--downwards--your jaw slack--your teeth parted . . . just good warm

feelings . . . going around your mind and body as you continue to enjoy the power of positive relaxation for a moment now just focus on the area around your CAN-DO PATCH and . . . as you continue to relax you may be able to picture dramatic changes in the way you think . . . and you may be doubtful at first but I'm not trying to get you to do the impossible or anything unrealistic . . . I'm only helping you to create . . . to create the changes in your life . . . in your playing skills and your attitude to your game . . . The changes that you desire with skilful use of your CAN-DO PATCH . . . and with some determination . . . and some hard work on your part . . . you can help yourself . . . your game to function more skilfully . . . helping you to fulfil your goals . . . your ambitions.

Egg Boost

The suggestions you hear which are for your benefit . . . your subconscious, will know automatically . . . will, with trained use of your CAN-DO PATCH, create a deep and lasting impression in your mind so deep and lasting that your sub-conscious will use it for your benefit whenever it is necessary: The instructions you hear will begin to exercise a greater and greater influence over you and your game . . . so that the images you will be asked to see will influence the way you concentrate, the way you stand, the way you behave and the way you play. These thing will happen and will remain firmly embedded in the unconscious part of your mind so that from now on they will continue to exercise that same influence over your training . . . over your pre-match strategy . . . over your feelings and above all the excellence of your play when at the event. These influences will remain with you not only during this session but every time your activate your sub-conscious by learning to use your CAN-DO PATCH . . . they will be just as strong . . . just as powerful . . . more so the more you train your mental game using your CAN-DO PATCH . . . the better you will become.

Visualisation and Tactile Anchoring

Now as you continue to relax allow yourself to take another deep breath and again let the breath out slowly and now create a picture in your mind of the game you are in this picture . . . if at first your impressions are a little unclear don't worry because this will improve with practice. See everything in this picture, the colours, the audience, the course, the balls, your opponent . . . notice the smells in the air . . . your opponent, notice how he looks, what he must be feeling . . . take a while to build up this picture putting in as much detail as you are able . . . now see yourself calm . . . confident . . . very cool and very sure of yourself . . . Now activate your CAN-DO PATCH keeping that mental picture of yourself.

Your concentration is one hundred per cent. Your club is an extension of your mind. (Keep your CAN-DO PATCH activated).

Every stroke you play is the best possible.

You see shots well in advance.

You can play the perfect game.

You are calm--cool--concentration intense.

Your shots are controlled and excellent.

You see yourself as a natural winner.

All my suggestions have been communicated into your sub-conscious which will connect each time you use your CAN-DO PATCH.

Trial Run

So one again activate your CAN-DO PATCH and see yourself playing the perfect game . . . you may hear me talking to you as you do this . . . but just play your game in your mind regardless . . . right now . . .

(pause).

My concentration is 100%.

My club is an extension of my mind.

My shots are the best possible.

I see shots well in advance.

I play the perfect game.

I am aware calm--confident my concentration intense.

My shots are always controlled and excellent.

I see myself as a natural winner.

. . . (allow 3-5 mins to pass--repeating the above softly)

Excellent--Excellent every part of these suggestions has been noted by your subconscious. From now on every day you will activate your CAN-DO PATCH and visualise your perfect game . . . you will absorb the suggestions contained above as part of your training. Whenever or wherever you are playing . . . when activating your CAN-DO PATCH your images and my suggestions will continue to have a powerful effect on the natural excellence of your game . . . every day and in every way.

Your success is up to you . . . to create the person you can or want to be.

Deep breath now and once more activate your CAN-DO PATCH and bring to mind those positive images . . . repeat along with me . . . silently or aloud . . .

My concentration is 100%.

My club is an extension of my mind.

My shots are the best possible.

I see shots well in advance.

I am always calm, confident . . . concentration intense.

My shots are always controlled and excellent.

I see myself as a natural winner.

Vividly visualise now your game, make all the scenery as real as you are able. Notice how great you feel as you keep your CAN-DO PATCH activated . . . Play now whilst I am quiet (pause 3-5 mins).

Awakening: Boost
In just a moment you will be asked to open your eyes. I shall count from 10-down to 1: When I reach 3 your eyes will open and on number 1 you will feel great, re-energised and full of enthusiasm and confidence about training using your CAN-DO PATCH and future game.
NB
You may like to create difficult situation scenarios whereby in your mind you are able to play superbly to escape and win. Do this and remember to activate your CAN-DO PATCH when you do this.
Whenever you play always activate your CAN-DO PATCH when your need to.

United States Patent **6,358,201**
Childre , et al. **March 19, 2002**

Method and apparatus for facilitating physiological coherence and autonomic balance

Abstract

Method and apparatus for determining the state of entrainment between biological systems which exhibit oscillatory behavior such as heart rhythms, respiration, blood pressure waves and low frequency brain waves based on a determination of heart rate variability (HRV). Entrainment reflects a harmonious balance between the two branches of the autonomic nervous system within the body. This internal state of heightened physiological efficiency enhances health and promotes optimal performance. According to one embodiment a method is used to determine the entrainment level based on an entrainment parameter related to HRV. The method first determines the power distribution spectrum (PSD) and then calculates an entrainment parameter (EP), which is a measure of the power distribution in the HRV spectrum. High EP values occur when this power is concentrated within a relatively narrow range of frequencies, and lower values when the power is distributed over a broader range of frequencies. In one embodiment, an apparatus is provided for monitoring the heart beat and presenting this information via a personal computer, handheld device, or other processing means.

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Description

FIELD OF THE INVENTION

The present invention relates generally to the evaluation of heart rate variability, and specifically to the analysis of the power spectrum distribution thereof.

BACKGROUND OF THE INVENTION

With the growing complexity of life, the relation between physiological conditions and emotional health becomes of increasing interest. Many studies have shown that stress and other emotional factors increase the risk of disease, reduce performance and productivity and severely restrict the quality of life. To this end, the medical communities around the world continually seek remedies and preventive plans. Recently a focus on the self-regulation of systems within the body has led to research in the areas of biofeedback, etc.

In the last 25 years, a variety of new techniques have been introduced as alternatives to more traditional psychotherapies or pharmaceutical interventions for improving mental and/or emotional imbalances. In addition to the more psychological approaches like cognitive re-structuring and neurolinguistic programming, psychologists have employed several techniques from Eastern cultures to "still the mind" during focused meditation. In yoga, for example, one generally focuses on the breath or parts of the brain, whereas in qigong one focuses on the "dan tien" point (below the navel). In a Freeze Frame.RTM. (FF) technique, developed by the Institute of Heart Math in Boulder Creek, Calif., one focuses attention on the area around the heart. All these techniques focus attention upon areas of the body which are known to contain separate but interacting groups of neuronal processing centers, and biological oscillators with which they interact. The heart, brain, and the intestines contain biological oscillators known as pacemaker cells. By intentionally focusing attention on any one of these oscillator systems, one can alter its rhythms. This is at least true for the brain (meditation), yogic breathing (respiration), the heart (FF), and most likely the gut (qigong), since it is also regulated by the autonomic nervous system (ANS). The body also contains other oscillating systems such as the smooth muscles of the vascular system. We have previously shown that this system, measured by recording pulse transit time (PTT), as well as the brain, measured by an electroencephalograph (EEG), the heart, measured by a heart rate variability (HRV), and the respiration system, measured by the respiration rate, can all entrain. Furthermore, they all synchronize to a frequency varying around 0.1 Hertz (Hz). Thus, one can intentionally bring these systems, acting as coupled biological oscillators, into synchronize with each other.

The FF technique is a self-management technique by which one focuses on the heart to disengage from moment-to-moment mental and emotional reactions. A study utilizing the FF technique in a psychological intervention program with HIV-positive subjects resulted in significant reductions in life-stress, state and trait anxiety levels, and self-assessed physical symptoms. Two other studies with healthy individuals using the FF technique to enhance positive emotional states showed increased salivary IgA and increased sympathovagal balance. Increased sympathovagal balance is known to protect against detrimental physiological effects associated with overactive sympathetic outflow from the brain. Other studies have shown the techniques to be effective in improving autonomic balance and decreasing the stress hormone cortisol and increasing DHEA, improving glycemic regulation in diabetics, reducing blood pressure in hypertensive individuals and significantly reducing psychological stressors such as anxiety, depression, fatigue and overwhelm in many diverse populations.

Sympathovagal balance has been measured using various techniques. For example, individuals can be trained to consciously control their heart rate using biofeedback techniques. However, the enhanced parasympathetic activity is probably mediated through control of respiration. Neutral ***hypnosis*** and operant conditioning of heart rate have been demonstrated to decrease in the sympathetic/parasympathetic ratio by increasing parasympathetic activity independent of controlled breathing techniques. The FF technique does not require biofeedback equipment nor does it require conscious control of respiration although a short breathing protocol is used this technique. Our results suggest that emotional experiences play a role in determining sympathovagal balance independent of heart rate and respiration. The shifts in sympathovagal balance toward increased low-frequency (LF) and high frequency (HF) power (measures of heart rate variability) were physiological manifestations of experiencing the emotional state of appreciation. The FF technique focuses on genuinely experiencing the feelings of sincere appreciation or love, in contrast to visualizing or recalling a previous positive emotional experience.

The results of our studies indicate that relatively short periods of practice of the FF technique and other tools developed by the Institute of HeartMath leads to either an "entrainment" or "internal coherence" mode of heart function (described in greater detail below). Most subjects who are able to maintain these states report that the intrusion of random thoughts is greatly reduced and that it is accompanied by feelings of deep inner peace and heightened intuitive awareness.

We also observed that positive emotional states, which lead to the entrainment mode, generated marked changes in the dynamic beating patterns of the heart. A method for quantifying and analyzing and quantifying these heart rhythms is called analysis of heart rate variability (HRV). The normal resting heart rate in healthy individuals varies dynamically from moment to moment. Heart rate variability, which is derived from the electrocardiogram (ECG) or pulse, is a measure of these naturally occurring beat-to-beat changes in heart rate and is an important indicator of health and fitness. HRV is influenced by a variety of factors, including physical movement, sleep and mental and activity, and is particularly responsive to stress and changes in emotional state. The analysis of HRV can provide important information relative to the function and balance of the autonomic nervous system, as it can distinguish sympathetic from parasympathetic regulation of heart rate. Decreased HRV is also a powerful predictor of future heart disease, increased risk of sudden death, as well as all-cause mortality.

Frequency domain analysis decomposes the heart rate tachogram or waveform into its individual frequency components and quantifies them in terms of their relative intensity, in terms of power spectral density (PSD). By applying spectral analysis techniques to the HRV waveform, its different frequency components, which represent the activity of the sympathetic or parasympathetic branches of the autonomic nervous system, can be discerned. The HRV power spectrum is divided into three frequency ranges or bands: very low frequency (VLF), 0.033 to 0.04 Hz; low frequency (LF), 0.04 to 0.15 Hz; and high frequency (HF), 0.15 to 0.4 Hz.

The high frequency (HF) band is widely accepted as a measure of parasympathetic or vagal activity. The peak in this band corresponds to the heart rate variations related to the respiratory cycle, commonly referred to as respiratory sinus arrhythmia. Reduced parasympathetic activity has been found in individuals under mental or emotional stress, suffering from panic, anxiety or worry and depression.

The low frequency (LF) region can reflect both sympathetic and parasympathetic activity, especially in short-term recordings. Parasympathetic influences are particularly present when respiration rates are below 7 breaths per minute or when an individual takes a deep breath. This region is also called the "baroreceptor range" as it also reflects baroreceptor activity and at times blood pressure wave activity and resonance.

When an individual's HRV pattern and respiration are synchronized or entrained, as can happen spontaneously in states of deep relaxation, sleep or when using techniques to facilitate autonomic balance such as Freeze-Frame and the Heart Lock-In, the frequency at which the entrainment occurs is often near 0.1 Hertz. This falls in the center of the LF band and could be misinterpreted as a large increase in sympathetic activity, when in reality it is primarily due to an increase in parasympathetic activity and vascular resonance. Sophisticated modeling techniques have shown that in normal states, about 50% of the

total power in the LF band is explained by neural signals impinging on the sinus node which are generated at a central level, and the majority of the remaining power is due to resonance in the arterial pressure regulation feedback loop. The sympathetic system does not appear to produce rhythms that appear much above frequencies of 0.1 Hz, while the parasympathetic can be observed to operate down to frequencies of 0.05 Hz. Thus, in individuals who have periods of slow respiration rate, parasympathetic activity is modulating the heart rhythms at a frequency that is in the LF band. Therefore, in order to discriminate which of the ANS branches is pumping power into the LF region, both respiration and PTT should be simultaneously recorded and considered.

The increase in LF power while in the entrainment mode may represent increased baroreceptor afferent activity. It has been shown that the LF band reflects increased afferent activity of baroreceptors. The LF band has indeed been shown to reflect baroreceptor reflex sensitivity and is affected by physiological states. Increased baroreceptor activity is known to inhibit sympathetic outflow from the brain to peripheral vascular beds, whereas stress increases sympathetic outflow and inhibits baroreflex activity. The increase in LF power seen during the state of deep sustained appreciation may have important implications for the control of hypertension, since baroreflex sensitivity is reduced in these individuals.

There is a noticeable and obvious transition after the FF intervention to the entrainment mode which can be seen in the HRV waveforms and PSD data. In addition, many subjects report that they are able to use the FF technique while they were in a "tense" conversation with someone and starting to react. Even in these conditions, the HRV waveforms indicate that they were able to shift to and maintain the entrainment state.

From tachogram data, it can be seen that, as one moves from a state of frustration to one of sincere appreciation a transition occurs in the waveforms from a noisy wave of large amplitude to a non-harmonic wave form of similar amplitude (entrainment). We have also identified an additional state we call "amplified peace" to indicate this special emotional state of very deep peace and inner harmony. In this state, the HRV waveform becomes a smaller amplitude wave (internal coherence). In general, the transition in the frequency domain (PSD) is from a wide-band spectrum of moderate amplitude to a narrow-band spectrum around 0.1 Hz of very large amplitude (entrainment) and then to a wide-band spectrum of very small amplitude (internal coherence).

In most individuals, small to near-zero HRV, as just described, is an indicator of a potentially pathological condition or aging because it connotes loss of flexibility of the heart to change in rate or a decreased flow of information in the ANS. However, in trained subjects, it is an indication of exceptional self-management of their emotions and autonomic nervous system because their HRV is normally large and the shift into the internal coherence mode is a result of intentionally entering the amplified peace state. This is very different from a pathological condition underlying lowered HRV (in such cases the HRV is always low). The connection between emotional states and HRV could possibly account for the occasional observation of low HRV in otherwise healthy individuals which has detracted from the clinical utility of HRV analysis for unequivocally predicting disease.

During the condition of internal coherence, the electromagnetic energy field produced by the heart, as seen in a fast Fourier transform (FFT) analysis of an electrocardiogram (ECG) signal, is a clear example of a coherent electromagnetic field. Recent advances in the understanding of the interaction between coherent signals and noise in nonlinear systems has resulted in the prediction that these nonthermal, coherent electromagnetic signals may be detected by cells. Further evidence suggests that coherent electromagnetic fields may have important implications for cellular function. For example, it has been recently demonstrated that nonthermal, extremely low frequency electromagnetic signals may affect intracellular calcium signaling. In addition, coherent electromagnetic fields have been shown to produce substantially greater cellular effects on enzymatic pathways, such as ornithine decarboxylase activity, than incoherent signals. This fact suggests that the state of internal coherence may also affect cellular function and provides a potential link between emotional states, autonomic function, HRV and cellular processes.

Conscious focus of attention and/or positive emotions has been shown to significantly influence HRV and PSD. The results of our research support previous work and suggest that psychological interventions which minimize negative and enhance positive emotional states may significantly impact cardiovascular function.

The results of work in this area demonstrate that sincere feelings of appreciation produce a power spectral shift toward LF and HF activity and imply that 1) the major centers of the body containing biological oscillators can act as coupled electrical oscillators, 2) these oscillators can be brought into synchronized modes of operation via mental and emotional self-control, and 3) the effects on the body of such synchronization are correlated with significant shifts in perception and cardiovascular function. It is suggested that positive emotions lead to alterations in sympathovagal balance which may be beneficial in the treatment of hypertension and reduce the likelihood of sudden death in patients with congestive heart failure and coronary artery disease.

There is a need to provide quantified information regarding the balance of the ANS which is easily used and does not require extensive biofeedback equipment. There is further a need for a mobile method of monitoring this balance for use in everyday life.

BRIEF DESCRIPTION OF THE DRAWINGS

The file of this patent contains at least one drawing executed in color. Copies of this patent with color drawing(s) will be provided by the Patent & Trademark Office upon request and payment of the necessary fee.

The present invention may be more fully understood by a description of certain preferred embodiments in conjunction with the attached drawings in which:

FIG. 1 illustrates in highly diagrammatic form the way in which the sympathetic and parasympathetic subsystems of the autonomic nervous system (ANS) of a higher organism are believed to mutually affect heart rate variability (HRV);

FIG. 2 illustrates a power spectrum distribution (PSD) of the HRV determined in accordance with one embodiment of the present invention;

FIG. 3 illustrates, for each of four distinct ANS states, the characteristic time domain HRV and the corresponding PSD;

FIGS. 4A to 4C illustrate a subject's time domain HRV, pulse transit time, and respiration rates, and the corresponding PSDs, before and after the subject consciously performs an emotional self-regulation protocol specifically designed to improve the balance of the ANS;

FIG. 5 illustrates an apparatus for measuring HRV and calculating the degree of entrainment, which as previously described is also an indicator of increased autonomic balance (AB) according to one embodiment of the present invention;

FIG. 6 illustrates one format for simultaneously displaying HRV, and the entrainment ratio, as determined in accordance with the present invention;

FIGS. 7A-7E illustrate in flow chart form a process for calculating AB in accordance with the present invention;

FIGS. 8A-8F illustrate the steps of the process of FIGS. 7A-7E;

FIG. 9 illustrates a hand-held apparatus for calculating AB; and

FIGS. 10-12 illustrate three different sequences of graphic displays which provide animated visual representations of the achieved level of entrainment, as determined according to one embodiment of the present invention.

DEFINITIONS AND METHODOLOGY

In the following description of the invention and its various aspects and embodiments, we will be using certain terms. For convenience of reference, our preferred definitions thereof are as follows:

As noted above, Freeze-Frame.RTM. is one of the tools used in the HeartMath system of self-management. It consists of consciously disengaging the mental and emotional reactions to either external or internal events and then shifting the center of attention from the mind and emotions to the physical area around the heart while focusing on a positive emotion such as love or appreciation. This tool thus allows the individual to shift focus of attention from the mind to the heart. Such a shift results in a wider and more objective perception in the moment.

As used hereafter, the term "appreciation" shall mean the state in which the subject has clear perception or recognition of the feelings of sincere or active appreciation for someone or something. It is the heart-felt feeling of appreciation that is associated with the HRV changes, as contrasted with the mental concept of appreciation which does not appear to produce such HRV changes. The term "amplified peace" shall mean an inner state in which a much deeper state of peace and centeredness is felt than is normally experienced. One also has a sense of standing on the threshold of a new dimension of awareness in this state. There is a sense of inner equilibrium and an awareness that one has accessed a new domain of intuition. As with any experiential state, it is difficult to find words that adequately describe it. This is not a state that one normally walks around in but rather enters for relativity short time periods. However, with practice at staying focused in the heart, the ratios of time in this state can be increased. It can also be described as similar to those moments that one sometimes has when at the beach or in the forest when one feels an especially deep contact with nature or with oneself that is beyond one's normal experience. It is often in these moments that we find the answers to the deeper issues or problems that we experience.

By the term "biological oscillators" we mean cells or groups of cells that produce rhythmic oscillation. When the instantaneous systemic arterial pressure is continuously recorded, fluctuations with each heart beat and with each breath are seen. This rhythmic activity in the autonomic nervous system appears to be supported by at least three biological oscillator systems: 1) centrogenic rhythms in brainstem networks with facultative coupling (entrainment) with the respiratory oscillator, 2) the baroreceptor feedback network, and 3) the autorhythmicity of the vascular smooth muscle. The fact that each of the oscillators can develop different frequencies and that the phase-lags between the oscillations may vary easily explains the general experience that blood pressure waves are quite variable and unpredictable. The existence of several oscillators with similar basic frequencies enables synchronization and entrainment between oscillators. Thus, we can assume that states of regular and steady blood pressure waves are the expression of the entrained action of the complex multi-oscillatory system.

Arterial pulse transit time (PTT) is a measure of the speed of travel of the arterial pulse wave from the heart to some peripheral recording site. It is used as a non-invasive method to monitor the elasticity of the artery walls and to indicate changes in blood pressure on a beat-to-beat basis. The arterial pressure pulse is a wave of pressure which passes rapidly along the arterial system. The pulse wave velocity (4 to 5 m/sec) is much faster than the velocity of blood flow (<0.5 m/sec). The pulse wave velocity varies directly with pressure-related changes in the elasticity of the arterial wall. The more rigid or contracted the arterial wall, the faster the wave velocity. From this, it follows that PTT should vary inversely with blood pressure. Common estimates of the magnitude of this effect indicate that PTT varies by about 1 ms per mm Hg change in pressure.

We will also be describing the results of certain studies conducted in our laboratories. In order to more fully appreciate the nature and conditions of such studies, we wish to describe our key procedures:

For in-the-lab studies, preselected individuals trained in the FF technique are seated in straight, high backed chairs to minimize postural changes, fitted with ECG electrodes, and then given a 10-minute rest period. ECG measurements are recorded during the rest period and the last 5 minutes are used as a baseline period. Recordings are continued while the subjects are asked to utilize the FF technique and consciously focus on a loving state for the next 5 minutes. A selected number of subjects are assessed at each session. After

informed consent is obtained, and prior to each session, subjects are asked to refrain from talking, falling asleep, exaggerated body movements or intentionally altering their respiration. Subjects are carefully monitored to ensure there are no exaggerated respiratory or postural changes during the session.

The same subjects are asked to wear ambulatory ECG recorders for a 24-hour period which includes a normal business day in their work place. They are asked to use the FF technique on at least three separate occasions, when they are feeling stress or out of balance. They are instructed to press the recorder's marker button each time they use the FF technique. This portion of a study is designed to assess ANS balance in a real-life stressful environment and to determine the efficacy of the FF technique to consciously improve sympathovagal balance. In general, Ag/AgCl disposable electrodes are used for all bipolar ECG measurements. The positive electrode is located on the left side at the 6th rib, and the reference are placed in the right supraclavicular fossa. Grass model 7P4 amplifiers are used for ECG amplification. Respiration is monitored with a Resp-EZ piezoelectric belt around the chest. A Grass model 80 cardiac microphone is used when the blood pressure wave is recorded for calculation of pulse transit time (PTT). The PTT interval is the time between the peak of the R-wave of the ECG and the appearance of the pulse wave associated with that same cardiac contraction at the index finger on the left hand. In the out-of-lab studies, ambulatory ECG recording is accomplished with a Del Mar Holter recording system model 363.

During the data analysis phase, the HRV waveform is in the form of an R--R interval tachogram. The spectral analysis of this signal is obtained from the successive discrete series of R--R duration values taken from the ECG signal sampled at 256 Hz and FFTed. All data from an in-the-lab study is digitized by a Bio Pac 16 bit digitizer and software system. All post analysis, including FFTs, PSD and time domain measurements are done with the DADiSP/32 digital signal processing software. All FF responses from the Holter tape data which are artifact-free are used for analysis.

For an in-lab study, HRV data is analyzed for 5 minutes before and for 5 minutes during the practice of FF. The time domain traces are analyzed by obtaining the overall mean heart rate for both 5-minute periods and calculating the standard deviation around that mean. FFTs of the time domain data are analyzed by dividing the power spectra into three frequency regions: VLF (0.01 to 0.05 Hz), LF (0.05 to 0.15 Hz) and HF (0.15 to 0.5 Hz). The integral of the total power in each of these regions, the total power over all regions (VLF+LF+HF), the VLF/HF ratio and the LF/(VLF+HF) ratio are calculated for each individual in the baseline and FF periods. The following criteria are used to classify the subjects into two subgroups:

Entrainment mode, characterized by a very narrow band high amplitude signal in the LF region of the HRV power spectrum, with no other significant peaks in the VLF or HF region, and a relatively harmonic signal (sine wave-like), in the time domain trace of the HRV data; and

Internal coherence mode, characterized by an intentionally produced very low amplitude signal across the entire HRV power spectrum as compared to the baseline. The final discriminator of this mode is the ECG amplitude spectrum, where the first seven or so harmonics of the fundamental frequency are clearly displayed, with very few intermediate frequencies having a significant amplitude.

In general, the raw data baseline values to emotional expression values are analyzed for significance by using the Wilcoxon Signed Rank Test (T) utilizing the sum of the ranks for positive and negative differences for each group. Wilcoxon p values were taken from the table of critical values for the Wilcoxon Signed Rank Test (T). Typically, when a group is analyzed as a whole there will be no change in heart rate or heart rate standard deviation during the FF period. However, the power spectral analysis usually shows a significant decrease in the VLF/HF ratio and significant increases in LF power ($p<0.01$), HF power ($p<0.01$) and in the LF/(VLF+HF) ratio ($p<0.01$), where p is probability.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides a method of measuring certain body rhythms, and then analyzing this information to indirectly determine the entrainment state which is also reflective of balance between the sympathetic and parasympathetic portions of the autonomic nervous system.

According to one embodiment of the present invention, a method includes the steps of sampling a heart beat of a subject, determining a heart rate variability (HRV) of the heart beat as a function of time (HRV(t)), expressing HRV(t) as a function of frequency (HRV(f)), determining a distribution of frequencies in HRV(f), selecting a peak frequency of HRV(f), determining the energy in said peak frequency (E.sub.peak), determining the energy in frequencies below said peak frequency (E.sub.below) and above said peak frequency (E.sub.above), determining a ratio of E.sub.peak to E.sub.below and E.sub.above, and providing to the subject, in a first presentation format, a representation of a first parameter related to said ratio.

According to one aspect of the present invention, an apparatus includes sampling means adapted to sample a heart beat of a subject for a first predetermined time period, a display unit, a processing unit coupled to the sampling means and the display unit, wherein the processing unit is adapted to determine a heart rate variability (HRV) of the heart rate by measuring the interval between each beat during the first predetermined time period, wherein the HRV is a function of time, determine a frequency distribution of the HRV, the frequency distribution having at least one peak, the at least one peak including a first number of frequencies, calculate a first parameter of the frequency distribution of the HRV, wherein the first parameter is a ratio of the area under the at least one peak to the area under the rest of the frequency distribution, and outputting the first parameter to the display unit for presentation to the subject.

According to one aspect of the present invention, a method includes the steps of receiving heart rate variability (HRV) information, the HRV information comprising the time intervals between each heart beat of a subject during a first predetermined time period, expressing the HRV as a function of frequency, determining the power in said HRV over a first range of frequencies, selecting a power peak in said first range of frequencies, calculating a first parameter relating the power in said selected power peak to the power in said HRV over a second range of frequencies, presenting the first parameter to the subject.

A greatly simplified overview of some of the signals and functions of the human body are illustrated in FIG. 1. This figure is not intended to be inclusive of all of the functions of the autonomic nervous system of a human, but rather provides an exemplar of those signals and functions which are currently believed to be directly related to the operation of the heart. As illustrated in FIG. 1, the brainstem 5 receives various input signals, consisting of control and status information, from throughout the body. Thus, for example, the brainstem 5 receives information relating to respiration, blood pressure, cardiac output, thermoregulation, and reninangiotensin, as well as numerous other system inputs. Functioning as the control center of the central nervous system (CNS), the brainstem 5 continuously summarizes (.SIGMA.) all of this afferent information and synthesizes appropriate outputs to the heart 7 via either the sympathetic or parasympathetic subsystems.

Research has demonstrated that the output control signals of the sympathetic system, which is responsible for increased heart rate and blood pressure, such as in response to perceived danger, tend to be relatively low frequency (LF) rhythms. In contrast, the parasympathetic system, which operates to limit or suppress the effects of the sympathetic system, tend to be relatively high frequency (HF) signals. In general, the parasympathetic system tends to produce a quite, relaxed state whereas the sympathetic a more active, excited state. For example, on inhalation, the parasympathetic system is inhibited and the sympathetic system is more active, resulting in an increase in heart rate. In contrast, on exhalation, the parasympathetic system is active, resulting in a stronger parasympathetic signal to the heart and heart rate is decreased.

The brainstem 5 also receives afferent information from the baroreceptor network, and other receptor neurons, located throughout the heart and in the aortic arch of the heart 7, which are sensitive to stretch (pressure) and chemical changes within the heart 7. As the heart 7 beats, and its walls swell, various baroreceptors are triggered, providing signals as a function of the heart beat, where increased heart rate is generally reflected by increased baroreceptor signals.

In response to the parasympathetic and sympathetic control signals from the brainstem 5, the heart rate 7 varies. The sinus node (SN) of the heart 7 is a group of cells which act as a natural pacemaker to initiate the onset of the heart beat at a rate which is non-linearly related to the relative strengths of these autonomic control signals. It has been determined that the heart beats with a certain variability, where the time

between beats is not constant but rather varies according to the shifting relative balance between the parasympathetic and sympathetic signals. A typical heart rate variability (HRV) waveform, is illustrated in FIG. 1. Note that, as illustrated, the HRV is not constant but changes with time, while still displaying a generally cyclical pattern.

FIG. 2 illustrates, by way of example, the transformation of an HRV waveform, most conveniently measured in the time domain, into the frequency domain. Such a transformation can be accomplished by standard digital signal processing (DSP) methods, such as the well-known fast Fourier transform (FFT). This results in a type of histogram that measures the relative amplitudes for the different frequency components (rhythmic patterns) in the time domain waveform. Fast real-time rhythms map into peaks in the high frequency portion (right side) of the spectrum, whereas slow rhythms appear on the left, low frequency side. Any given peak may be due to a single rhythmic process or to a mixture of rhythms with very similar frequencies. The latter will contribute to both the height of a peak and increase its width. In the case of heart rate analysis, different frequencies (peaks) present in the power spectrum are due to cyclic fluctuations in autonomic activity (i.e., sympathetic and parasympathetic).

Once in the frequency domain, the power spectrum distribution (PSD) is calculated using known DSP techniques, and plotted on the vertical axis with frequency on the horizontal axis. In general, the power spectrum of a waveform is a plot of the wave amplitude for each component squared, as a function of the frequency of that component. Such a plot reveals the wave power, in units of energy per hertz, present in a small frequency range as a function of frequency, f. In the present example, the units of PSD are given as a power measurement, specifically squared beats-per-minute per second (BPM.sup.2 /Hz, where Hertz (Hz) is frequency or cycles-per-second).

It is generally known that the mental and emotional state of a human has significant effects upon ANS activity, and, in particular, the balance between the parasympathetic and sympathetic subsystems. Such effects can be clearly seen in the HRV waveforms. We have found that, in general, agitation or fear causes disorder, whereas emotions such as appreciation or love results in increased order. The latter state has been shown to encourage coupling between respiration and the HRV as well as other oscillatory systems in the body. For purposes of the present description, we shall refer to the state in which the HRV waveform and respiratory waveform are operating at the same rate and near the 0.1 hz frequency and appear as a sine wave as entrainment. As this mode of heart function has been documented to correlate with increased balance between the sympathetic and parasympathetic branches of the nervous system it is also referred to as a state of "autonomic balance" (AB). The present invention is specifically intended to assist or facilitate a user thereof in achieving entrainment and AB at will. Once achieved, various well documented, beneficial physiological processes will be enhanced. Several embodiments of the present invention, discussed below, are specially designed to provide visual feedback to the user in a manner which tends to further strengthen and prolong the essential characteristic of entrainment and AB.

Shown in FIG. 3A is the time domain HRV of a subject in various emotional states; FIG. 3B shows the corresponding PSDs. A Baseline condition is considered to be when the subject is in a normal, resting state. A Disordered state is where the subject is feeling agitated emotions such as anger or fear. Note the more irregular nature of this waveform, clearly showing the lower frequency components contributed by the sympathetic system. In contrast, in an entrainment state, the waveform is considerably more regular and orderly. Entrainment is a condition which we have shown can be attained by following a conscious plan or protocol for effecting a positive emotional state, such as appreciation or love.

As defined herein, these terms refer to the mental and emotional state of the individual, and the graphs serve to illustrate the electrophysiological characteristics of two, qualitatively distinct "heart function modes." According to one analysis methodology, the Entrainment Mode is reached when frequency locking occurs between the HRV waveform and other biological oscillators such as respiration. Note that other correlations may be made between the HRV waveform, as well as other parameters of the heart rate and its variability, and the general state of the subject, including other physiological systems. The correspondence between HRV and the emotional and mental state of the subject is provided herein as an exemplar, as there is a strong, documented relationship. However, alternate embodiments may correlate HRV waveforms with other functions and conditions, and are not limited to those described herein as exemplars, but rather the

analysis of the HRV waveform and the correlation with such conditions is achieved with the present invention. Similarly, the correspondence to emotional and mental states is not limited to those illustrated in FIGS. 3A and 3B.

Shown in FIG. 4A are three simultaneously recorded body responses for an individual taken before and after enacting the FF technique. The first recorded body response is HRV, displayed in beats per minute (BPM). The second recorded body response is pulse transit time (PTT), which is measured in seconds. The third recorded body response is respiration, the amplitude of which is measured in millivolts (mV). As shown in FIG. 4A, each of the recorded body responses undergo a dramatic transformation at approximately 300 seconds, the point at which the individual performs the FF technique. At that time entrainment of the HRV, PTT and respiration waveforms is achieved. Such entrainment is characteristic of AB and increased physiological coherence.

Shown in FIG. 4B are the corresponding PSD for each of the recorded body responses of FIG. 4A. Note, that the power spectra for each of the recorded body responses has a broad frequency range before performing FF. After performing FF, as illustrated in FIG. 4C, however, the power spectra for each recorded body response has a much narrower frequency range, and in each case the maximum PSD is centered between a frequency of approximately 0.1 Hz and 0.15 Hz. In addition, during entrainment, the maximum PSD for both HRV and PTT is much larger than that recorded before FF.

Shown in FIG. 5 is an entrainment apparatus 10 constructed in accordance with one embodiment of the present invention. In this particular embodiment, entrainment apparatus 10 comprises a photo plethysmographic finger sensor 12 and a computer system 14 having a monitor 15. Photo plethysmographic sensor 12 is electrically coupled to computer system 14 via coupling cable 16.

During operation, an individual's finger 18 is placed in contact with the plethysmographic sensor 12. In this particular embodiment, the sensor 12 includes a strap 20 which is placed over finger 18 to ensure proper contact between finger 18 and sensor 12. The photo plethysmographic sensor 12 detects the pulse wave produced by the heart beat of the individual, by way of finger 18, and sends this information to computer system 14. Computer system 14 collects and analyzes this heart beat data, and determines the individual's level of entrainment. A representation of the attained level of entrainment is displayed on monitor 15.

Shown in FIG. 6 is a display output 22 produced by entrainment apparatus 10 in accordance with one embodiment of the present invention. In this particular embodiment, the individual's heart rate, measured in beats per minute (BPM), is graphically displayed for a selected time period. The individual's accumulated entrainment score for this same time period is graphically displayed in reference to the calculated entrainment zone. In addition, the individual's entrainment ratio and average heart rate are also graphically displayed for this same time period.

FIGS. 7A-7E illustrate a method of calculating an entrainment parameter (EP) according to the preferred embodiment of the present invention. In general, the method involves monitoring the beat-to-beat changes in heart rate, calculating the EP, and presenting a representation of the categorization of the calculated EP. The method begins at start block 30. The process is initialized at step 32, where HRV data is obtained and processed in preparation for the next step. At step 34 an entrainment parameter (EP) and score are calculated. The entrainment parameter is determined by the power distribution of the HRV processed data, and the score is a historical indication of the EP. The EP and score are then presented at step 36, which may involve providing this information to a display terminal. The process continues to decision diamond 38, to determine if the process is to terminate or end. If the process is to end, processing continues to step 40 where the process is terminated. If the process is not to end, process flow returns to block 34.

The process is further detailed in FIG. 7B, where the heart beat is monitored at step 42. This may involve using electrical sensing apparatus, such as an electrocardiograph (ECG), light sensing apparatus, such as the photo plethysmographic sensor 12, or any other apparatus or means whereby each heart beat can be ascertained substantially in real time. For example, at regular time intervals, say 100 times per second, the output of sensor 12 is sampled and digitized using a conventional analog-to-digital (A/D) converter (not shown). At step 44, the raw samples are stored. This raw data is basically a record of each heart beat and

the relative time of its occurrence. The stored raw data can be thought of as comprising inter-beat-interval (IBI) information, from which the time interval between beats can be determined. It is the IBI variation which is generally referred to as "heart rate variability" or simply HRV.

Ravg.sub.i-1 (1-P min)

Note that in monitoring the heart beat, artifacts, such as noise and/or misreads, may have a tendency to disturb the process. An optional step is provided at block 46 where the artifacts and other artificially introduced noise are rejected. This may be done using a conventional DSP artifact rejection technique. Block 46 is further detailed in FIG. 7E, starting at decision diamond 94. Here the current IBI, referred to as IBI.sub.i is compared to an absolute minimum interval between beats (Amin) and to an absolute maximum interval between beats (Amax). Amin and Amax are reflect the actual range within which the human heart beat falls. For example, Amax and Amin indicate that IBI is either too long and too short respectively, and IBI does not normally occur at that value; thus these conditions are used to detect artifacts which are not accurate data. If IBI.sub.i falls between these two extremes processing continues to step 96. If IBI.sub.i does not fall within this range, no further check is made and processing jumps to step 98 for elimination of bad IBI.sub.i data. Note that a running average (Ravg) is calculated for IBI values. A range of Ravg values is determined for each IBI.sub.i and is then used to verify then next value, IBI.sub.i+1. The range of Ravg values is determined as a percentage of the IBI value. For evaluation of IBI.sub.i the range of Ravg values for IBI.sub.i-1 is used. In one embodiment, the range is defined between Rmin.sub.i-1 and Rmax.sub.i-1, where Rmin.sub.i-1 is Ravg.sub.i-1 -30% and Rmax.sub.i-1 is Ravg.sub.i-1 +30%. IBI.sub.i falls within this range if it satisfies the following relationship:

IBI.sub.i.epsilon.[Ravg.sub.i-1 (1-Pmin),Ravg.sub.i-1 (1+Pmax)]

Continuing at step 96, if IBI.sub.i is within this range, processing jumps to step 100. If IBI.sub.i is not within this range, processing continues to step 98 where IBI.sub.i is eliminated as bad data. In a preferred embodiment, if too many errors are encountered, calculation is frozen until sufficient good data is received to warrant continuing. Sufficient good data is indicated by the following relationship:

Amin<.A-inverted..epsilon.[IBI.sub.j,IBI.sub.k]<Amax

wherein IBI includes values IBI.sub.j, . . . IBI.sub.k. At step 100 the running average of IBI.sub.i is calculated as Ravg.sub.i. At step 102 the minimum range of Ravg for IBI.sub.i is calculated as Rmin.sub.i. At step 104 the maximum range of Ravg for IBI.sub.i is calculated as Rmax.sub.i. These values will be used to verify the next IBI value, IBI.sub.i+1. Processing then continues to decision diamond 106 to determine if further IBI processing is to be done, and if so processing returns to decision diamond 94. If not, processing continues to step 48.

At step 48, a conveniently sized segment of the raw data samples, say 64 seconds, is selected, and then linearly interpolated using standard DSP techniques, at step 50. To facilitate discrimination, the raw IBI data points have been scaled by 1000, i.e., converted to milliseconds. The HRV graph shown in FIG. 8A illustrates a representative set of scaled IBI data and the linearly interpolated data points, where the IBI data points are indicated by a black dot and the interpolated data points are indicated by "x."

At step 52, the selected segment of HRV data is demeaned and detrended by subtracting a linear regression least squared fit line (a common DSP technique) to center the waveform with respect to the vertical axis, and to remove any tendency of the waveform to slowly decrease or increase. As illustrated in FIG. 8B, the HRV segment exhibits a decreasing trend over time, as can be seen from the superimposed linear regression line.

As will be clear to those skilled in this art, the segmentation process performed in step 48 has the undesirable side effect of convolving the HRV data with a square wave, and thus tends to introduce noise at the boundaries between each segment. For example, where the number of data points in each segment is 128, there will be significant noise introduced between sample 128 and 129. A well known DSP technique, called Hanning windowing, effectively weights the center data points of the segment more heavily than

those at the edges to reduce the effects of this noise. As used in the present embodiment, the Hanning window equation uses a cosine taper as follows:

W(n)=0.5-0.5 cos(2.pi./N*n)

where N is the total number of data points in the segment, and n=[1,N-1]. At step 54, such a Hanning window is applied to the detrended data to eliminate the segmentation noise. As illustrated in FIG. 8C, the resultant HRV waveform is zero-referenced and exhibits no trend. It should be recognized that various other alternate methods or techniques can be employed to remove such noise as may have been introduced as artifacts of the recording, interpolating or segmentation processes.

At step 56, a user-established system control variable is examined to determine what type of spectrum analysis needs to be performed. If a magnitude spectrum is selected, an FFT is performed at step 58 to generate a magnitude spectrum. On the other hand, if a power spectrum is selected, the PSD of the detrended data is calculated, in step 60, using a standard FFT. This PSD is then normalized, at step 62, by dividing by the length of the segment in seconds (see, step 33). For example, if the number of data points was selected to be 128 points, the PSD is divided by 64, the duration of the segment, i.e., 64 seconds. This makes the units of power ms.sup.2 /Hz. Note that such a normalization process is not necessary if the magnitude spectrum is used.

The result after step 58 or 62 is illustrated in FIG. 8D, where the horizontal axis represents frequency (Hz) and the vertical axis represents power (ms.sup.2 /Hz). Note that HRV is portrayed in the form of a bar chart, wherein each bar represents the power contained in the HRV signal within a respective, narrow band of frequencies comprising a "bin," as illustrated in FIG. 8D. For convenience of reference, the bins are logically numbered sequentially, starting with bin 1 on the far left, and continuing to bin 64 on the far right, where each bin corresponds to a frequency. At step 64, a pair of user-selected system control variables is examined to select the range of bins from which the highest local peak will be selected. As it can be anticipated that the desired peak will be within a certain frequency range, it is neither necessary nor reasonable to consider the entire PSD. According to one embodiment, the starting search bin is selected by a variable "search bin start" (SBS), while the ending search bin is selected by a variable "search bin end" (SBE). For the example illustrated in FIG. 8D, the SBS is equal to 3 and the SBE is equal to 18, comprising the search range of bins 3, 4, 5, . . . , 18.

At step 66 (FIG. 7C), a search is made, within the bin range selected in step 64, for all local peaks in the HRV spectrum, each being represented by the single bin having the highest power level, i.e., the bin underneath the respective peak. Next, the bin representing the highest peak within the bin range is selected. In the example shown in FIG. 8D, there are three peaks within the bin range of bin 3 to bin 18. The highest peak is located at bin 5. Note that the first, and absolute largest, peak is represented by bin 2, so bin 3 is not considered to represent a peak.

Once the highest peak within the selected bin range has been determined, an entrainment parameter (EP) is calculated to indicate the energy of the wave in the entrainment area in relation to the total energy in the PSD. To calculate the EP, at step 66, the "width" of the peak is determined from a pair of user-selected variables: P1, which defines the number of bins to the left of the peak bin, and P2, which defines the number of bins to the right of the peak bin. Note that P1 and P2 may be different if an asymmetric distribution is desired. The total energy of the peak, Psum, is then calculated as the sum of the power values of all bins in the range [(Peak-P1), (Peak+P2)] at step 68.

Next, at step 70, the total power below the peak pulse (Pbelow) is calculated. The relevant range is determined by a pair of user-selected variables: B1 and B2. The value of Pbelow is a summation of the power values of all bins in the range [B1, B2]. Similarly, at step 72, the total power above the peak (Pabove) is calculated, within a relevant range determined by a pair of user-selected variables: A1 and A2. The value of Pabove is a summation of the power values of all bins in the range [A1, A2]. This is clearly illustrated in FIG. 8E. Finally, at step 74, EP is calculated according to the following equation:

EP=(Psum/Pbelow)*(Psum/Pabove).

At step 76, the EP value is then "scored" according to a plurality of user-selected entrainment level thresholds. For example, three stages of entrainment can be conveniently defined using only two variables, NLT1 and NLT2, each of which represents a respective value of EP. In such an embodiment, for EP below NLT1, the subject may be considered as not having achieved significant entrainment, and is given a score of "0". For EP above NLT1 and below NLT2, the subject is considered to have achieved mild entrainment, and is given a score of "1". For EP above NLT2, the subject is considered to have achieved full entrainment, and is given a score of "2". Of course, other criteria may be used to determine achieved entrainment level.

In general, maximum entrainment is reached when the peak pulse contains a very large portion of the total power. A particularly high EP is illustrated in FIG. 8F, where Psum is great compared to both Pbelow and Pabove. This indicates that most of the power is concentrated at this small group of frequencies. Thus, EP tends to emphasize the condition wherein the majority of the power is concentrated within a selected, relatively narrow range of frequency bins. On the other hand, it is certainly possible to devise alternate calculations which will reflect concentration of significant levels of power distributed over a broader range of frequency bins.

At step 78, the most recently calculated score is recorded and an accumulated score is calculated based on prior, historical scores, referred to as accumulated scores. At step 36, the actual EP result and accumulated scores are prepared for presentation to the user as a system output. This preparation involves steps such as 76 and 78.

At decision step 80, it is determined if the user desires this information to be simply output on a status screen of the computer, in a presentation format such as that shown by way of example in FIG. 6. In the preferred embodiment of the present invention, the user can elect to have this information control a game, such as the balloon game shown in FIG. 10. If the user so selects, at decision step 80, EP is compared to a various threshold levels and assigned an EP score accordingly.

According to one embodiment, EP is assigned a score selected from the set of {0, 1, 2}. The score values have the following significance:

EP Score	EP value	Entrainment
0	EP < level1	Low
1	level1 < EP .ltoreq. level2	Medium
2	level2 < EP	High

According to one embodiment, level1 is set to 0.9, and level2 is set to 7.0, to provide a convenient distribution. In a computer program implementing this embodiment, these levels are provided as floating point values. Alternate embodiments may use additional levels, or may use two levels.

If the user selects a nonstatic format, processing continues to step 84 of FIG. 7D, where the accumulated score, "Ascore," is calculated based on the historical information of the EP and EP score values. Ascore is then calculated based on the score value, and the previous score value (prescore). This calculation is performed according to the following scheme:

EP Score	EP Prescore	Ascore(i)
2	0	Ascore(i - 1) + 1
1	0	Ascore(i - 1) + 1
0	0	Ascore(i - 1) - 2
2	1	Ascore(i - 1) + 1
1	1	Ascore(i - 1) + 1
0	1	Ascore(i - 1) - 1
2	2	Ascore(i - 1) + 2
1	2	Ascore(i - 1) + 1
0	2	Ascore(i - 1) - 2

According to one embodiment, Ascore has values in the range of {0, 1, 2, . . . 100}, however alternate embodiments may use an alternate range of values. The above scheme provides scaled response to the EP, where Ascore slowly increases while remaining in medium entrainment, but quickly increases while remaining in high entrainment. Similarly, this scheme provides a quick decrease while remaining in the low entrainment.

Ascore information may be then be used to provide a graphical display. One embodiment, illustrated in FIG. 7D begins at decision diamond 84 to determine the value of Ascore.sub.i with respect to Ascore.sub.i-1. Ascore.sub.i is the current calculated value of Ascore, and Ascore.sub.i-1 is the previous calculated value of Ascore.

If Ascore.sub.i is equal to Ascore.sub.i-1, processing returns to step 38 without effecting any change in the graphical display. Note that alternate embodiments may include additional steps which provide this information to the display. If Ascore.sub.i is greater than Ascore.sub.i-1, processing continues to decision diamond 86 to determine if Ascore.sub.i has reached an Ascore.sub.max value. According to one embodiment, Ascore.sub.max, is equal to 100. If Ascore.sub.i is not greater than Ascore.sub.max, processing continues to step 88. At step 88 a graphical element transitions toward a goal. In one embodiment, the graphical element is a balloon, and the transition is to rise vertically into the air. In an alternate embodiment, the graphical element is a rainbow, and the rainbow begins to fill in colors to reach a pot of gold. Once the rainbow reaches the pot of gold, the pot begins to fill with coins and may overspill. In still another embodiment, a peaceful scene is slowly filled in with color and detail. Alternate embodiments may include other scenes, icons, or images, and may include obstacles to be overcome or various stages to be reached. Processing then returns to step 38.

Continuing with FIG. 7D, If Ascorei is greater than Ascore.sub.max, processing returns to step 38 without effecting any change in the graphical display. Note that alternate embodiments may include additional steps which provide this information to the display.

Returning to step 84 of FIG. 7D, if Ascore.sub.i is less than Ascore.sub.i-1, processing continues to decision diamond 90 to determine if Ascorei has reached an Ascore.sub.min value. According to one embodiment, Ascore.sub.min is equal to 0. If Ascore.sub.i is not less than Ascore.sub.min, processing continues to step 92. At step 92 a graphical element transitions away from a goal. In one embodiment where the graphical element is a balloon, the transition is to lower vertically toward the ground. In an alternate embodiment where the graphical element is a rainbow, the rainbow begins to lose colors and separate from a pot of gold. If the pot of gold includes gold coins, these coins are removed. In still another embodiment where a peaceful scene is displayed, color and detail are slowly removed from the display. Alternate embodiments may include other scenes, icons, or images, and may include obstacles to be overcome or various stages to be reached. Processing then returns to step 38.

At decision diamond 90, if Ascore, is less than Ascore.sub.min, processing continues to step 38 without effecting any change in the graphical display. Note that alternate embodiments may include additional steps which provide this information to the display.

Note that in an alternate embodiment, a graphical element, such as a balloon figure, may be manipulated in an appropriate way, such as rising based directly on the EP score. As illustrated in FIG. 10, a hot air balloon is illustrated rising in the sky indicating a state of entrainment. As discussed hereinbelow, the background of the scene includes a grassy field with various obstacles positioned horizontally across the screen. The balloon must rise above various heights to avoid each obstacle. This display provides a visual indication of the state of entrainment and provide a visual reward for achieving entrainment. Control of the balloon illustrates the individual's control of the emotional and/or mental state. In alternate embodiment, other graphic scenarios may be used, which accomplish a particular goal as the EP score value reflects entrainment.

In accordance with the present invention, the method is recursive, performing the various steps described above periodically, say every 5 seconds or so. According to one embodiment, the method is implemented in the form of a software program which can be stored and distributed in a computer readable medium. The software is then operated on a personal computer, or a hand held computing device, or any other medium capable of operating a software program and providing a user information display.

Shown in FIG. 9, is an entrainment apparatus 100 in accordance with an alternative embodiment of the present invention. In this particular embodiment, entrainment apparatus 100 is hand held unit which allows an individual to determine his or her level of entrainment. In one embodiment, entrainment apparatus 100 comprises a photo plethysmographic sensor 102, a data processing system 104, and a display 106.

In one embodiment, an individual places a finger within a receptacle located on the back of entrainment apparatus 29 which contains photo plethysmographic sensor 102. Photo plethysmographic sensor 102 senses the heart beat of the individual, by way of the finger, and sends this heart beat information to data processing system 104. Data processing system 104 collects and analyzes this heart beat data, and determines the individuals level of entrainment. A display output containing information relating to the individuals entrainment level is then generated by data processing system 104 and displayed on display 106. In one form, information relating to the individuals entrainment ratio is displayed on display 106, and a mode allows the users to review his or her low entrainment ratio, medium entrainment ratio or high entrainment ratio.

In an alternative embodiment, the sensor 102 comprises a vest or strap containing ECG electrodes. The individual places the vest on and then electrically couples it to the hand held portion of entrainment apparatus 100. The vest or strap is then used to sense the individuals heart beat and send heart beat information to data processing system 104.

Shown in FIG. 10 is a presentation format 24 produced by entrainment apparatus 10 in accordance with an alternative embodiment of the present invention. In this particular embodiment, a hot air balloon floats across a country landscape and the background scenery scrolls slowly by as the balloon floats into the sky based on the individual's entrainment level. If the individual does not maintain entrainment, the balloon sinks to the ground. Obstacles like a brick wall or a tree, as shown in FIG. 10, are presented during the course of the flight. If the individual's entrainment level is not high enough to clear one of these obstacles, the balloon's flight is impeded until an entrainment level high enough to raise the balloon above the obstacle is achieved. The calculated entrainment zone defines the balloon's climbing slope for high entrainment and for low entrainment.

Shown in FIG. 11 is an alternative presentation format 26 produced by entrainment apparatus 10 in accordance with an alternative embodiment of the present invention. In this particular embodiment, a rainbow grows toward a pot when an individual is in a state of entrainment. Growth of the rainbow toward the pot is smooth and steady while the individual maintains entrainment, but the rainbow recedes if the individual does not maintain entrainment. Once the rainbow reaches the pot, gold coins accumulate and fill the pot if the individual continues to maintain entrainment. For example, one coin is added to the pot for each five second time period of medium entrainment and two coins are added to the pot for each five second time period of high entrainment. A total score is then presented at the end of a selected time period.

Shown in FIG. 12 is yet another possible presentation format 28 produced by entrainment apparatus 10 in accordance with an alternative embodiment of the present invention. In this particular embodiment, a nature scene changes with time as the individual maintains entrainment. For example, the scene changes for every 10 seconds that entrainment is held. If entrainment is low or not maintained the scene does not change.

Alternate embodiments may employ a variety of display formats including detailed information, graphical information, graphic images, video images, and audio images. According to one embodiment, the level of entrainment controls the volume on a music delivery system. This may be implemented based on the EP value, where the volume increases with increasing EP and decreases with decreasing EP. The system may

be optimized by using music especially designed to enhance the entrainment process. Further, in one embodiment, the music changes style with entrainment level. Additionally audio controllers may provide verbal messages.

It is possible to combine the game functionality with a hand-held device in the form of a toy. In one embodiment, a crystal ball lights up and glows brighter as entrainment is maintained. The light may change color as entrainment levels are reached. Again, the color of the light is designed to optimize the entrainment method. The crystal ball may be a hand-held, or other convenient device, and may be battery-operated and/or portable to allow enhanced life performance. Alternate embodiments use toy designs and methods, such as radio-controlled toys, such as cars, trucks, and animals. The toy operation is based on the level of entrainment. In still other embodiments, stuffed animals or toys emit harmonizing sounds and music based on the level of entrainment.

For visual display embodiments, one embodiment begins with a solid background of dots, which dissolve as higher levels of entrainment are reached to reveal a graphic image, such as a 3-dimensional image. As entrainment reduces to a lower level, the dots fill the screen again.

Additionally, various computer games may use entrainment levels and/or the EP value and/or the accumulated scores as triggers to produce varied results. For example, in action games entrainment triggers access to new adventures as the game unfolds. The adventure plays out differently depending on the pattern of entrainment, i.e whether entrainment is maintained at one level, or oscillates between levels, or increases, or increases. It is possible to combine keyboard strokes and mouse and/or joystick movements to facilitate the game. In one embodiment, a locked door is only unlocked when entrainment reaches a certain level. It may be necessary to maintain entrainment at that level for a predetermined amount of time. The objects of such games may include spacecraft moving through space, animals in a jungle, race cars on a track, or any other imagery applicable to a game.

Various images are more helpful in achieving entrainment for an individual than other images. Those images are selected based on predetermined visual and auditory rhythm, and may be specific to the individual and may change from day to day. In one embodiment, a screen saver provides a visual image having a predetermined visual and auditory rhythm, and includes options for the individual to select based on personal preferences. Where feedback is provided to the screensaver program, the screen saver program may perform adjustments to optimize the effects for the individual. Our research suggests several criteria that tend to enhance entrainment. For example, circles, and shapes with rounded edges or curved lines tend to enhance entrainment better than squares, having angular, jagged, or sharp lines. Additionally, movement of the images should be slow, coherent and rhythmic, and transitions are smooth, slow and flowing. Colors and rhythms should oscillate, where the illusion is of inward and outward movement simultaneously. Movements should transition smoothly, without jarring or erratic motion.

The present invention is also applicable to sports endeavors and athletes, particularly those performing in high stress situations, such as a critical hole in golf. The games, devices, and techniques allow the athlete to practicing attaining entrainment and thus gain familiarity with this feeling state which can then be more easily accessed during actual games for improved performance. Various game embodiments may be designed for the sports enthusiast. For example, a beautiful golf course comes into view as entrainment is reached. Other games could include a golfer swinging a club or hitting a ball, where the path of flight and distance are determined by the degree of entrainment prior to the shot. In one embodiment, the game keeps score, and if not entrained, the ball goes into a sandtrap or lands in the rough or water or other hazard. Prolonged states of entrainment produces a hole in one, or other reward. Alternate embodiments may employ a similar strategy for other sports, such as baseball, basketball, football, and other popular sports.

In one embodiment, a vehicle is stuck in a traffic jam in Silicon Valley and moves proportionally to entrainment. As the car moves faster it heads for a scenic place. Note that these games may be operated on a personal computer, or other display device, or may be operated on a portable device. The portable device is highly desirable, as the value of entrainment on reducing stress and increasing the quality of life is most necessary during everyday life events. For example, a business device may combine a calculator or personal planner with the present invention, to allow a business person to utilize the device at a business

meeting or negotiations without the knowledge of those around. In one embodiment, a touchpad used for manipulating a pointer on a display screen is also used to monitor heart beat data. It is also possible to have a device which is accessed by multiple persons. Here prior to beginning an activity, such as a business meeting or a sports event, each member must reach a predetermined level of entrainment for a predetermined period of time. Satisfaction of which may be indicated by a particular color light or a specified sound.

A hand-held device is applicable to education, where it effectively programs the neural network of the brain of the student allowing familiarity with the feeling of coherent and entrained states. Once developed, these states will carry over throughout adult life to influence attainment and maintenance of emotional balance and physiological coherence. By providing an easy to use format, geared to younger users, the present invention encourages them to learn how to create coherent and entrained heart rhythms. Cartoon characters, animals and popular images may be animated and provide instructions for reaching entrainment and rewards for success.

The present invention is also applicable to the medical community and medical applications. As the entrained state provides an efficient physiological state, by puffing less wear and tear on the glands and organs, the present method of reaching and monitoring the entrainment state is a nonintrusive preventive medical technique. Our research suggests that by teaching individuals with certain pathologies to self-generate health, high performance heart rhythms that the bodies own regenerative systems seem to be activated and healing is facilitated. Applications of the present invention for such use include pain control, blood pressure control, arrythmia stabilization, and diabetic management.

Research suggests that afferent input from the heart at the brain stem level modulates the ability of pain signals to transmit from the nervous system to the brain. The level of entrainment is proportional to afferent input, thereby affecting the inhibition of pain signals from the heart to the brain. A subject experiencing pain may use the present invention to reach a state of entrainment, where the pain is lessened. Further, an entrained state leads to more efficient blood flow throughout the organism and may reduce the deleterious effects of high blood pressure. In one embodiment, a game includes a visual image of the human body including arteries and major blood vessels. The level of entrainment controls the images of blood flow through the body. The display illustrates the functioning of the body internally, and indicates the specific differences in heart function during stress and high emotions, as compared to entrainment and coherence. As the rhythms of the heart become entrained, the blood flow images change to illustrate the efficient use of energy. Still additional benefits of reaching and maintaining a state of entrainment include the efficient functioning of the autonomic nervous systems. In one embodiment, a game is used which provides visual images of the electrical signals of the nervous systems. Pulsating signals are displayed throughout the human system and are transmitted according to sensor detection from the subject. The goal of this game is to change the image such that the systems function efficiently, and to reduce or eliminate the frayed or frazzled images.

Our research has further shown that emotional self-management and physiological coherence are effective in reducing depression, anxiety, and other emotional stress, and also in improving glycemic control in diabetic populations. Additionally, maintaining an entrainment state is generally beneficial in treating anxiety, general depression, and other emotional disorders. For example, one embodiment provides a device for monitoring the autonomic balance according to the present invention prior to retiring for rest. This is particularly beneficial in the treatment of sleep disorders, and allows the subject to shift heart rhythms which tends to enhance sleep. Additionally, the present invention is applicable to impulse control, providing training to help overcome eating disorders, anger, and/or addiction. Our research suggests that the present invention is beneficial in learning stress management, and emotional self-management. In one embodiment, a visual display is provided to illustrate other systems within the body, such as neural and hormonal systems, where signals are displayed moving from the heart to the brain. Here the effects of these signals are clearly seen, and may be controlled by attaining a state of entrainment. Although various preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and/or substitutions are possible without departing from the scope and spirit of the present invention as disclosed in the claims.

Terminology & Related Research Topics:

Patents provide you with some of the mathematical calculus to human behavior. A few are based on the ½ Hz Autonomic Sensory Resonance Frequency and the 2.5 Hz Cortical Sensory Resonance Frequency which prove that humans can be manipulated using Sub-Natural Strategy. Implanted devices are obsolete. The whole science of Positive "S"(+S) emotional signature cluster modification strategies, Ambient Radio (aR) and Ambient TV (aTV) show a pattern of complicity.

Our lives are far much more than the experiences we have on our own. What's in our head and how our body responds to stimulus has much to do with the way reality really is for us. Most research of this type still remains classified but that shouldn't scare you. It might give just a sense of how complicated and confusing some of this has become. Some of it may not even be real and that's the beauty of misinformation. Am I getting somewhere?

United States Patent Application # 20020173823 - Sense organs synthesizer

United States Patent Application **20020173823**

Kind Code **A1**

English, William James **November 21, 2002**

Sense organs synthesizer

Abstract

The SENSE ORGANS SYNTHESIZER, for BLIND, DEAF, and BALANCE ORGANS IMPAIRED, synthesizes three types of sense organs (EYES, EARS, or BALANCE ORGANS). The senses are `perceived`, as if synthetic organs are real. My invention does NOT perform this; it is a feat of the SUBCONSCIOUSNESS. What is new about my invention is simple; I presume upon the following AUTONOMIC FUNCTIONS of subconsciousness: 1) (It) MUST analyze any and all organized/patterned ***subliminal*** signals for the meanings, 2) then it presents the meanings (not the original signals) to the consciousness. 3) The subconscious "has no choice" in these matters, is totally unprejudiced, and cannot even refuse these functions. A camera, microphone, or balance sensors, are input to a programmed microprocessor, that digitizes video, audio, or balance signals, such that they can be comprehended by the subconscious. Delivery is through linear arrayed electrodes' signals, to a few hundred TOUCH NERVE ZONES. Stimulation is by Transcutaneous Electric Nerve Stimulus (TENS). For the Blind, one `line` at a time is delivered to 525 nerve zones, 700 lines at 3500 Hz=FIVE PICTURES A SECOND. Altering frequencies of primary colors yields all hues, and a television quality picture. For the Deaf, electrodes represent sequential musical tones; Each has upper and lower threshold, `complimentary` to neighboring electrodes. Loud tones get more current. Nine octaves signal 216 nerve zones, in an excellent pattern sequence. For Balance Impaired, electrodes circle torso; Tilt, speed of tilt, and rotation signals, operate similarly to balance organs, through two circular arrays of electrodes.

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Claims

What I claim my invention is:

1. It is a sense organs synthesizer, delivering signal patterns representative of sight, hearing, and balance senses, through a few hundred touch nerve zones, working because of documented properties of the subconscious mind.

2. It is a tool to prove (or disprove) an ancient hypothesis of unknown origin and of different wordings, which states that the soul (sometimes using the terms subconsciousness or ***subliminal*** mind) bridges the gap between sense organs and the seat of consciousness, being an autonomic primary higher function of the subconsciousness, in analyzing complex sense organs' signals, and presenting the pure meanings (not the original signals) to the conscious mind. The greatest proof, is that `aggressive stimulation` leading to `subconscious overload` and the consequent `spill over` into consciousness, will not cause any psychiatric damage (when used for sense organs synthesis); As proven, all other `aggressive ***subliminal***` type therapies have caused acute Schizoid symptoms.

3. It is a medical therapy instrument for use on comatose patients, using the most sensitive and proven effective channel of communication, the sense of touch. It alerts the subconsciousness to the problem (comatose state), which the subconsciousness interprets as "needing a solution", and autonomically assists in waking the patient.

4. It is an airplane pilot's orientation device, when used similarly to balance organs synthesis, but wired to a gyrocompass instead. When pilots train, subconsciousness learns meanings of patterns on touch nerve zones, which are delivered to pilot's conscious awareness, instantly and constantly; The pilot is perfectly aware of his plane's orientation at all times.

Description

[0001] The manner by which SIGHT, HEARING, and BALANCE senses are SYNTHESIZED and fed to hundreds of TOUCH NERVE ZONES, is the content of this invention; But truly it is the characteristics of the SUBCONSCIOUS, that makes it work.

[0002] For the BLIND, it will likely take a maximum of five days use, before images begin to form in the visual cortex. Afterward, a television quality color picture is perceived. For the DEAF, understanding of

speech will perhaps take several weeks. For the BALANCE IMPAIRED, they will have almost immediate improvement and be well oriented in a few days.

[0003] These are bold statements, based on processes of the SUBCONSCIOUS MIND. My documenting publication about those properties was lost, is rare and out of print. I paraphrase quotes from memory, of Futurehealth Incorporated's COMPUTERIZED BIOFEEDBACK, (the Physician's Edition):

[0004] "The subconscious is totally un-prejudiced to any signal fed into it, MUST analyze (patterned/organized) signals for any possible meanings, and MUST PRESENT the analyzed-meanings to the CONSCIOUSNESS. It's capacity for deciphering data is great, and has not been measured. The subconscious has NO CHOICE in these matters, but must analyze ALL signals presented to it (if patterned, and having possible meanings)".

[0005] However these Physicians refer to ***Subliminal*** (not-audible) Hypnotic therapies, more often harmful than beneficial, these DOCUMENTED parameters reveal a GATEWAY to the consciousness, that may be utilized for SENSE ORGAN SYNTHESIS.

[0006] I do not use ***subliminal*** audio. I use conscious stimulation on hundreds of nerve zones, by electrodes on a STIMULATOR ARRAY PANEL. These stimulate differentiable "touch sense" nerve groups, with TENS (Transcutaneous Electrical Nerve Stimulation) frequencies. The only important thing yet unknown, is ratios of stimulation zones simultaneously and individually recognized by the subconscious, at highest frequency possible (per number of electrodes).

[0007] The OPTICON, invented at Stanford University and Stanford Research Institute in 1971, used a 24 vertical.times.6 horizontal crystal reed stimulator matrix against the finger pad, enabling the Blind to read PRINTED material at 80 wpm. That limitation exists because stimulators physically vibrate at 250 Hz, and faster reading obscured the letters. My invention uses 525 transcutational electrical stimulators, and operates at 3500 Hz (14 times the frequency of the Opticon), possible because skin is not physically vibrated. Also, I do not "repeat" any signal on a matrix (horizontal) as Stanford did, crediting subconscious to STACK SLICES of a complete video picture every 1/5 of a second (subconscious creating it's OWN "matrix").

[0008] For the BLIND, DEAF, or BALANCE IMPAIRED, the invention differs a little in construction for each. I yield a BRIEF DESCRIPTION of the TECHNICAL ASPECTS, below:

[0009] A micro video CAMERA (CCD), or MICROPHONE, or electrolytic BALANCE SWITCHES, serve as inputs; A MICROPROCESSOR modulates the visual, audio, or center of gravity vectors, and commands INTEGRATED MICROCHIPS with VARIABLES. The ICs adjust variables, which act as POTENTIOMETERS, controlling a `secondary` TENS (Transcutational Electrical Nerve Stimulus) potential to pass at varying amplitudes and frequencies, to a STIMULATOR ARRAY PANEL having ELECTRODES 2.5 cm in length and 1.2 mm separation, touching the skin (measurements are approximation).

[0010] For SIGHT SYNTHESIS: 525 electrodes deliver a vertical SLICE of the picture at "real time", every {fraction (1/3500)} of a second. Brighter pixels open variables more, allowing more current to electrodes. Color perception is also achieved, by assigning a SIGNATURE FREQUENCY to each of the three primary colors, which are additive to the white frequency.

[0011] For HEARING SYNTHESIS: 216 electrodes deliver a FREQUENCY RANGE of the tones each is responsible for; the separation of the electrodes help with discernment of pitch and volume. The lowest part of the STIMULATOR ARRAY PANEL (electrodes) delivers bass frequencies, sequential electrodes represent ascending tones, with upper frequency thresholds equal to the lower frequency thresholds of electrodes above them (they are `complimentary`). Loud tones open variables more, indicating more volume. The IC's command the variables like an audio equalizer (primary circuit), VARIABLES working like transistors, delivering the secondary circuit TENS signals to each ELECTRODE.

[0012] For BALANCE SYNTHESIS: Torus shaped multi-pole SWITCHES 1/3 filled with electrolyte liquid, may be worn like behind-the ear hearing aids or built into frames of eyeglasses. These have axes as the semicircular canals of the inner ear, giving all vectors of the head movements at the highest point over the center of gravity. Studying the characteristics of balance orientation, we sometimes turn our heads slightly when losing balance, presumably to orient normal organs best to regain balance; I propose not changing the way God designed the function. Motion, rotation, inertia, center of gravity, all combine to far more complex vectors than may be thought. Each switch has at least 450 electrical contacts, which are "closed" when electrolyte liquid touches them, on the lower third portion of toruses. A MICROCHIP "piggybacked" to these leads, signals MICROPROCESSOR as to acceleration and degree of rotation (angle), microprocessor commands IC with VARIABLES, the IC sets variables to control the secondary TENS potential to ELECTRODES on the STIMULATOR ARRAY PANELS. The (two) panels are circular, worn around the midriff (torso) of the body. A "pulse code" indicates direction and acceleration of all motions, and even rotating ones (as two balance switches are used).

[0013] This concludes the BRIEF DESCRIPTION of the TECHNICAL ASPECTS of this invention for the Blind, Deaf, and Balance Impaired.

[0014] Stimulator Array Panels (for all Applications):

[0015] The STIMULATOR ARRAY PANEL(S) are constructed of PARALLEL WIRE ELECTRODES, each 2.5 cm in length. Three models exist; One has a common ground running perpendicular along side to the individual electrodes, the wire electrodes are of high electrical resistance, with positive contact made at opposite side to the ground. This insures equal voltage is carried to all subdermal nerves, of the individual "zone" stimulated.

[0016] The second type has a comb-tooth common ground, interlocking between the individual stimulators. This stimulates nerves between ground and stimulators much closer, voltages do not penetrate so deep, and less power required. But as ground to below and above electrodes may add spacing requirements between stimulators, overall panel length a serious consideration; the panel best suited is to be determined by purpose, battery drain, cost, effectiveness, and panel length. One is chosen for electronic layout diagrams, and others are illustrated in DIAGRAMS SECTION as possibly a better choice.

[0017] The third type has no "common ground"; Sequential electrodes may be "opposite polarity" (+<-/+<-) "paired", (or +<->+), by a return circuit to the ICs. Every other pair might be charged, next signal charges formerly omitted ones. This third type is a relatively new concept to me, but I will try to apply it to any application in last edit, when parameters permit it. Some adaptation of this concept is expected to be favored.

[0018] The LENGTH of the wire electrodes (2.5 cm), insures a GROUP of touch nerves are stimulated, so that DIFFERENTIATION of "zones" is quickly discerned by the subconscious. This is important, as it greatly reduces spacing requirements between electrodes, and length of the STIMULATOR ARRAY PANEL.

[0019] SPACING requirements may be adjusted, only experimentation will yield the best distance between parallel wire electrodes. For design purposes in this application, mine are set at 1.2 mm apart. CONSCIOUS ability to discern one electrode from another, is NOT the means to finally determine best separation. The SUBCONSCIOUS might discern between closer electrodes, than the consciousness is capable of doing. An ORIENTATION PROGRAM in microprocessor operates electrodes in sequence, as "training" to subconscious of sequence and separation of zones stimulated. This may be operated on command or done automatically (a regimen to be established, an unknown at this time).

[0020] Length of STIMULATOR ARRAY PANEL required for individuals, will vary. Children have more nerve zones, and may use much shorter panel than required by adults. Generally, the length required (by separation of electrodes) is determined by height.

[0021] Wire harnesses containing many wires as presently used inside computers, are very prone to breakdown with the movement they will encounter (linking ARRAY PANEL with the MICROPROCESSOR). The shorter the harness, the better. This means MICROPROCESSOR should be near to the ARRAY PANEL. "Hard wiring" panel to it is impractical, the panel and/or wire harness will need replacing often enough, and one buss connector will attach panel to the microprocessor/TENS source/battery (one enclosure).

[0022] MICROPROCESSOR will be worn on a band around the neck, to shorten distance of wire harnesses, to protect them. Heavier, longer lasting battery packs may be worn on belt or where convenient.

[0023] A nylon or spandex "body net" may be used to hold the ARRAY PANEL to the body. Velcro will hold the panel securely to the body net. I suspect this would be the easiest way to attach early prototypes, maybe favored entirely. The body net should be a "wrap around" (not a "slip on"), and fastened in the front easily by the user, so as not to damage electrodes.

[0024] A future nerve stimulation method, hopefully near as technologies I am unfamiliar with are used, will be subdermal "implants", activated by a "smart skin" worn over the area. Coils woven into fabric of smart skin induces current in electrodes. The method of implanting electrodes may need to be invented. A tatoo machine, rolled over area to be "impregnated" with electrodes, "shoots" tiny pellets, wires, carbon filaments, invisible electrostatic or conductive ink, (whatever best), to desired subdermal depth of skin. The "smart skin" would find electrodes, microprocessor puts nerve zones in sequence, and "activates" implants. A great improvement if outer hardware is lighter, simpler, cheaper, microprocessor harness less prone to damage. It could be much simpler than it sounds, leaving STIMULATOR ARRAY PANEL (used at present) obsolete.

[0025] INTEGRATED MICROCHIPS with VARIABLES (ICs) make this invention possible, without costly and complex electronics. A PRIMARY signal "sets" all the variables constantly, at UHF speed. A SECONDARY higher voltage common to all variables' inputs, is thus controlled individually to the stimulator electrodes.

[0026] PROGRAMMING of MICROPROCESSOR(S), parameters of operation, designs of STIMULATOR ARRAY PANELS, are described throughout text of this document. Descriptions accompanying DIAGRAMS SECTION make reference to SECTION NAME and PAGE NUMBER, of written material. Many parameters must be adjustable in early prototypes, since there are unknowns needing research, before final model can be produced with "set" frequencies, voltages, thresholds, programming, electrode spacing, etc.

[0027] Sight Synthesis

[0028] The MICROPROCESSOR (for vision synthesis) captures the real time video picture from a `Charged Coupled Device` (CCD) micro camera, and splits it into 700 VERTICAL SLICES of 525 pixels each. Normal television gives 525 HORIZONTAL electron beam scans, but microprocessor delivers the picture as 700 vertical slices, sequentially delivered every {fraction (1/3500)} second.

[0029] Also, the COLORS are divided into the PRIMARIES (red, yellow, and blue), not as TV broadcasts. TV stations transmit red, yellow, and GREEN; adding extra signals in the blue frequency (that are removed afterward). After microprocessor captures the picture, the TRUE primaries are divided/modulated and sent to THREE ICs (one each for each of the primaries).

[0030] Three different TENS frequencies, are supplied to common inputs of three IC's variables; 500 hertz for blue, 1000 hertz (offset intermittent) for yellow, and 2000 hertz (offset intermittent) for red. Combined frequencies make 3500 Hz, indicating "white".

[0031] The physicist may say, "But blue is more energetic than red, it should have higher frequency". The conic light receptors of the retina are more vigorously stimulated by RED light, being that it is bent less and more of it hits nearer to the nerve; Lens, prism, and interferometer evidence, proves how the eye is fooled. Color perception is not the mystery claimed. Normal sight DOES perceive red, as if more "lively" than blue.

[0032] BLUE={fraction (1/7)}, YELLOW={fraction (2/7)}, and RED={fraction (4/7)} (of 3500 Hz). If the frequency spacing is perfectly even, they will NOT intermesh synchronized to form the myriad of hues desired, so I have assigned OFFSET INTERMITTENT frequencies for yellow and red, allowing synchronization with each of the others, to form ALL combinational hues and saturations of the primary colors.

[0033] Notice the fractions, which divide the total frequency of the Stimulator array panel, if added together=One. The "white frequency" is divided into primaries, that adding any two or three yields independently discernible ones, not confused with any other combination. {fraction (1/7)}, {fraction (2/7)} and {fraction (4/7)}, a geometric progression with common ratio=2, a finite set whereas added=1, does this. To clarify; Combined primaries form purple ({fraction (5/7)}), green ({fraction (3/7)}), orange ({fraction (6/7)}), and white ({fraction (7/7)}) SIGNATURE FREQUENCIES.

[0034] A chart of how the primary colors' SIGNATURE FREQUENCIES will combine to form individually discernible ones, is found in the section with the diagrams.

[0035] I own an advanced model TENS device, and personally certify even the offset intermittent frequencies and combinations used, are individually discernible from all other combinations. They will stand up to scrutiny.

[0036] Slower delivery of complete pictures than 1/5th second delay between them, could adversely affect the Blind enough to cause accidents. 1/5 second delay is long, compared to normal sight. Users could not operate a motor vehicle, unless other normal "reaction times" are unusually fast. Still, as the SLICES of the picture are delivered `real time` to the visual cortex, SOME `reaction time` events will be surprising. When a picture is being completed on the right side, 1/5 of a second will have passed since delivery of the LEFT side of the picture. If you threw a ball from the left side that moment, they might not see it until AFTER it hit them.

[0037] The MICRO CAMERA (CCD) is mounted on the bridge of sunglasses. A model already exists for surveillance purposes, a wire runs down behind ear to video recorder on security officer's belt. For my purpose, wire goes to MICROPROCESSOR instead.

[0038] To synthesize even CENTER OF VISION, a specialized wide-angle FISH EYE lens, blows-up the center of the picture larger than peripheral vision. Thin replacable plastic loops extend from the glasses' frames, touching the face where muscles can move them, a lever system inside the frames turns camera in any direction without moving the head. The camera turret is tension loaded, the camera returns to forward view when facial muscles relax. The movable center of vision aspect will not likely be perfected in the early prototypes, but advantages will be evident when it arrives; LESS pixels will synthesize BETTER vision, and FASTER pix delivery times made possible.

[0039] Sight is NOT organized consciously, of the optic nerve bundle arriving to the visual cortex. A five day old infant can see clearly, not for his conscious intelligence. It is a function of his God given SOUL (subconscious, if preferred), that demands "solution" to the meaning of millions of scattered pinpoints of light. Some organization of those signals is done before birth, because through translucent clothing, bright light does illuminate the interior of the uterus. However, only a few out of focus patterns may be seen by the unborn babe of the umbilical cord, veins and arteries of uterus, knees, and hands. General patterns of light and shadow are established by the unborn. So a person BORN blind, might need more than five days for the soul to first establish some patterns of shapes in light and shadow, before better comprehensive sight is formed.

[0040] The vertical SLICES of the picture delivered are pre-organized, so the soul need not do that job, but only to arrange `slices` side by side. It is possible, those NOT born blind will achieve a sharp synthesis of sight faster than my estimated five days, because the invention provides MORE "organization of signals" for the soul; The invention gives BETTER pre-organization of light patterns, than the eye does! However, it is at a DELAY of 1/5 second, as it is inconceivable to deliver 1/3 million signals to 1/3 million nerve zones, for an instantaneous complete picture, at any frequency.

[0041] I deliver signals to 525 nerve groups, 700 slices of a complete picture, at 3500 Hz. This equals 1,837,500 pixels per second (almost two million pixels, to deliver five pictures a second).

[0042] It is important to realize, the SOUL must be FORCED to create the "pictures" for the mind, and any conscious attempts to decipher the stimulus be THWARTED. Conscious interpretation will NOT synthesize actual sight, but would be like reading braille. This is done, if I am believed or not, by delivering the picture to the STIMULATOR ARRAY PANEL, INVERTED (upside down and backwards, as single-lens normal eye does). This may seem over much ponderance! Research will confirm the necessity of this operating parameter. It will result in UNYIELDING sight synthesis, not "blocked" by other conscious mental activities that could take temporary precedence. It is not probable the consciousness could decipher a moving lens-inverted image, quickly. The subconscious is FORCED to process signals, as it does for normal eyesight. It is entirely POSSIBLE, that CONSCIOUS stimulation of nerve zones is NOT necessary; Actual "***subliminal*** voltages" (not felt), might be all that is needed.

[0043] Hysterical Blindness is caused by strong emotional shock, causing the subconscious to cease creating pictures for a time, deeming it's powers assigned to "solving" another problem, more important than even sight. This is strong evidence, that the soul (subconscious, if preferred) has the picture creating ability, and "gates" the images to the visual cortex.

[0044] I fashioned an experiment, that deems confirmation by others:

[0045] Many of us have done a similar grade school classroom science project, whereby we put a "slit" in a piece of cardboard, and then move the cardboard over the field of vision, while keeping the eye focused straight ahead (not moving). It "writes an image" on the retina that is retained a few moments, if we close our eyes immediately after "scanning" an image.

[0046] After conceiving of this invention in 1968 (available electronics made it impractical, then), my question was this; If I MOVED my eye WITH the slit (at a crosshair point drawn midway), could my MIND construct the picture, from only the vertical "slice" painted over the SAME area of my retina? I tried it, and sliding the cardboard over a tabletop (to keep the horizontal crosshair point steady), I SAW a television scene CLEARLY, after only 7 or 8 attempts. My subconscious never forgot how to do this, and after 30 years, a repeat experiment yielded a "picture" in my visual cortex immediately! In 1968 I had no idea the subconscious did this, the result was frightening.

[0047] The experiment proves the mind CAN "paint" a complete picture, from only VERTICAL SLICES given to the SAME "slice" of the retina. This does NOT arrive, from a "residual image retained on the retina". The soul BUILDS a picture, from only vertical "slices" delivered over the SAME points of stimulus, in this one evidential proof.

[0048] The experiment also PROVES, that a MATRIX of LEDs delivering a VISUAL vertical signal expanded horizontally, COULD be adapted to the invention for persons with "detatched retina". This aspect is discussed more fully, in this text.

[0049] The best resolution that Stanford's `Opticon` could deliver, with only 24 vertical stimulation reeds at a slow 250 Hz, was 80 words per minute. TENS voltages deliver deeper and sharper stimulation, and does not physically "vibrate" skin surface (far more discernible, and at much higher frequencies). Basic `rubber sheet geometry` shows limitations of the Opticon, due to destructive interference being transferred to neighboring nerve zones through the skin, by physical vibration.

[0050] Nerve endings normally for "touch", are RE-ASSIGNED as the peripheral NERVE CELL CENTER, for other senses. If nerve endings are given clear signal patterns, the subconscious MUST decipher the meanings. Once done, the subconscious never forgets how, and never stops doing it. The soul has "no choice" concerning interpretation of senses' (or any other) stimulus, fully interpreting, and delivering meanings to the CONSCIOUSNESS.

[0051] The inventor, myself, has `second sight`. It developed in me from hours of working in photography darkrooms. I began to "see" where everything was, as if the lights were ON. If I forgot where something was, my subconscious remembered and let me "see" it. I also practiced and learned the kung-fu `Blind man fighting` technique, whereas blindfolded my subconscious "deciphered" a visual image of weapons swung at me, even if I could not consciously hear the air move, I blocked weapons, and even put sighted assailants on the defense. I learned it quickly, because my darkroom `second sight` was already developed quite well. The actual VISUAL perception I received scared me, and being a Christian I inquired of others about it. They believed demon spirits were giving me this sense of sight when blindfolded, so I stopped practicing the technique. It was not until I learned about COMPUTERIZED BIOFEEDBACK, I realized the subconscious SOUL has these powers (it is not demonic). Now, the manner in which biofeedback has been used, ***subliminal*** hypnotic "manipulating" subconscious emotional & reasoning processes, IS proven very dangerous. This invention may be the first totally safe utilization, of the soul's completely unprejudicial and vulnerable `gateway`, to the consciousness.

[0052] The invention will work so well, the actual VISUAL CORTEX will be "activated" in the formerly blind. To anyone knowing the properties behind it are not "just theoretical", that conclusion is a given; but few are familiar with backgrounds.

[0053] As the `movable center of vision` aspect might not be used in the first prototypes or less expensive models, the below paragraphs must be heeded. For models with `center of vision` hardware, position orientation is not as pronounced a problem; but fine-timing orientation of sudden peripheral movement, will still require a corrective `orientation signal`.

[0054] In vision synthesis, POSITION of objects in the field of view is easily perceived, most of the time. That is, when extreme left region of picture is different from extreme-right region. But when those slices are identical, as when a few objects are lit in a dark room, the blind cannot perceive WHERE anything truly is in the field of vision, unless an "extra signal" is provided (at borders) to ORIENT the picture.

[0055] Also, the 0 to 1/5th second "delay" being an unknown variable, poses problems to reaction timing. If 700 "slices" are delivered constantly, borders and center of vision non-existent, left and right objects would NOT be told apart; if they are there NOW, or WERE there 1/5th second ago. There is a solution:

[0056] The PROGRAMMING in the MICROPROCESSOR must include an extra `DOTTED-LINE SIGNAL` on the vertical borders, as frame of reference to "orient" objects, in the field of vision.

[0057] IT IS NECESSARY TO DESCRIBE THE NEEDS associated with use of the invention, that the solutions given here have a basis for them. If I simply give operating parameters of the device, it would sound ludicrous to anyone not knowing their purposes. It is an entirely new concept, needing full descriptions of problem areas foreseen, that answers to them are understood.

[0058] Synchronization of electrodes "signaling" one color objects is done, that neighboring electrodes do not cause destructive interference (distorting signals) to nearby nerve zones.

[0059] As the STIMULATOR ARRAY PANEL is activated every {fraction (1/3500)} second, HALF of that time is used for "setting" the ICs' VARIABLES, the second half ({fraction (1/7000)} second) of that moment, the variables send the TENS frequency (square wave) to the PANEL.

[0060] The MICROPROCESSOR also receives signals from one of the three (internally) synchronized TENS signals, that it may operate the ICs' variables in synchronization to all three frequencies.

[0061] From the diagrams, see that the IC's variables' INPUTS are all "hard wired" together (one common), each IC variable receiving full voltage from a TENS device. There are THREE TENS DEVICES, each wired to one of THREE IC's (common) variables inputs. The OUTPUTS of the variables, per pixel on the `slice` represented to the electrodes, the three primary colors (TENS frequencies) are also "hard wired" (pig tailed) together, for each electrode.

[0062] It is seen also, that as slices of a picture are delivered at 3500 Hz (one slice every {fraction (1/3500)} second), a BLUE region will only get stimulation every 7th slice, a YELLOW region will get stimulation {fraction (2/7)} of all slices, and a RED region every {fraction (4/7)} of all slices. When combined, all slices get stimulation and indicates WHITE light.

[0063] The solution to the dilemma of how to give "fine line" color definition of objects, is to operate the panel in `BLACK AND WHITE` mode ALTERNATELY, with the color perception mode, at the same 3500 Hz. Some pictures are made `black and white` (every color as if white, and every pixel represented).

[0064] Remember, none of the primary colors or combination of two of them, activate all electrodes with every `slice` of the picture. For strong "definition", our normal eyes see only shades of gray in dim light. This being exactly the problem, little line definition of individual primary color objects, BLACK AND WHITE pictures are "staggered" WITH delivery of COLOR pictures. The optimum ratio is an unknown; once determined, the MICROPROCESSOR is programmed for it, that fine-line definition COLOR pictures are "perceived"; This will happen, though only the B&W pix is truly "sharply defined". Again, the subconscious does this.

[0065] 3500 Hz reduces complete picture delivery time to 1/5 second (5 pix a second). The frequency should yield good results, as all combinations are exact harmonics to 250 Hz (which was the most discernible skin surface vibration, determined at Stanford University for the Opticon). My method is electric stimulus, not physical vibrations that causes destructive interference through skin tension (basic rubber sheet geometry).

[0066] This enhances discernability, and much higher frequencies may be used. The device might however work best at exact HARMONICS of 250 Hz; Every blend of primary colors are, at 3500 Hz; Blue=500 Hz, Yellow=1000 Hz, Red=2000 Hz; all combinations multiples of the base 250 Hz. As the body's electrical nerves operate at 60 Hz, and accidental contact with high voltages safeguarded by that frequency preferred; "touch" nerves are oppositely similar, most DISCERNIBLY stimulated at 250 Hz (physical vibration, not transcutaneous electrical).

[0067] Harmonics to 60 Hz may be tried, as frequencies and operating parameters are flexible.

[0068] In first prototypes, frequency must be adjustable. TWO and a HALF pix per second (for example), is 1750 Hz (B=250 Hz, Y=500 Hz, and R=1000 Hz). The number of STIMULATORS, or number of `slices` per complete pix may be reduced, making faster pix per sec. possible. We cannot know what is optimal, before prototypes yield this information. An array panel consisting of 60 vertical pixels and electrodes delivering a picture of 80 slices, if found to be the maximum the nervous system could deliver to visual cortex efficiently, it would still be a raging qualified success by any present standards.

[0069] The overall amplitude range is adjustable by THRESHOLD CONTROL. When the skin is perspiring or gets salty between washings, skin resistance to electricity is reduced. This would pose problems of uncomfortable or painful voltages, which work fine when skin is dry and clean.

[0070] The LOW and HIGH THRESHOLD (to be consciously felt), will need to be "set" for EACH primary color's output signal. This adjusts primary colors' amplitude, for best discernment of all hues.

[0071] As "two-wire transmission/reception" of television signals is engineered for other purposes, it would be good to incorporate the technology for my device. Thin coax cable may be damaged too easily, disrupting picture signals to the microprocessor being more than "a minor inconvenience" to the Blind.

[0072] The ARRAY PANEL for the Blind is 63 cm long (slightly over two feet). 525 electrodes at 1.2 mm separation, yields a panel length somewhat cumbersome, though no wider than adhesive tape. It will reach from the neck to mid-calf on most adults, going over a hip and down one leg. If electrodes' separation optimum is closer, panel may be made shorter.

[0073] STEREO VISION is possible, WITHOUT using TWO Stimulator Array Panels; Two CCD micro cams on sunglasses, signals from each are delivered consecutively to the SAME panel. Two Stimulator Panels may be used, but ONE panel will actually perform BETTER than two, since separation of signals is more quickly discerned.

[0074] If delivery speed of slices creates an "astigmatic effect", LOWER the frequency, use more SEPARATION between electrodes, use LESS electrodes. 60 linear.times.80 `slices` per complete pix at 1000 Hz yielding best results, is far below expectations. I am confident the subconscious can handle 525, not just 60 pixels, and at the higher 3500 Hz; We must verify optimums.

[0075] For people with DETACHED RETINA, having some vision remaining, a MATRIX PANEL on the inside of sunglasses lenses may REPLACE Stimulator Array Panel. FIBER OPTICS can carry the 525 linear (vertical) signals (from LCDs) to illuminate horizontal FRESNEL BARS. VERTICAL signals are given entire MATRIX, sequentially. How fast can it be operated? Perhaps much faster than STIMULATOR ARRAY PANEL (limited by touch nerves' frequency discernibility). Specialized fresnel optics made linear (straight line etch), can bring 2-D close up focus on the matrix for line definition, no other focal axis is necessary. I've met people with detached retina, laser re-attachment has limited success, heralded falsely as "a cure" for the malady. My previous descriptions of how a linear slice repeated on the SAME AREA of the retina, proven utilized by the SUBCONSCIOUS to build a picture, is expanded over MORE retinal area. My subconscious works no different than yours or theirs. The experiment described earlier proves it WILL work for these people, though we do not know "how many pix per second" is possible. `Recovery time` for the conic light receptors of the retina, SEEMS to be less than 50 per second. This is television pix delivery time, that makes TV pictures "flow together" as a smooth moving picture. Conic receptors might have much faster TRUE `recovery time`, at least to discern "sequential" signals to the brain; this needs to be learned. If 50 signals per second is the maximum speed that can be utilized, the fiber optic fresnel panel (as designed) could only deliver 1 and {fraction (1/14)} pix every three seconds. This is extremely slow, expecting much faster delivery is possible. Yet, a more "centralized" zone of vision or less resolution (less `slices` per pix) will increase pix delivery times, to acceptable tolerances (of delay). Modifications of horizontal fresnel shape may be made, for localized areas of damaged retina.

[0076] It will not take particular rationale or research, to confirm the above modification WILL work. If initial doubt exists about the other applications, it is expected. My experiment of 1968 described earlier being confirmed, is sufficient proof for at least the above utilization.

[0077] Returning to the transcutaneous method, below:

[0078] Microprocessor will command overall amplitude of TENS signal with EVERY `slice` delivery, by means of a `MAINS VARIABLE`. If THREE electrodes are activated on one slice, amplitude at `common input` from TENS devices is reduced proportionately ({fraction (3/525)}th). Proportioned decreases in amplitude calculated by microprocessor per less ELECTRODES stimulated, is a PROGRAMMING parameter. Simpler ICs are used, as 525 variables' tolerance capacity is lowered by a `MAINS VARIABLE`, at the junction of the secondary circuit TENS signals (incorporated at the `common input` of the variables).

[0079] One television model has 33 increments of saturation, for each of the three primary colors. Whereas range is adjusted with number of pixels activated per `slice signal`, increment widths change with it. In short, ICs receive signal to adjust MAINS VARIABLE, and re-incrementation of all other variables with each slice, is not desireable or necessary.

[0080] A little imagination will help understanding, of how the entire `Sight Synthsis` system presents a moving picture to the Blind. The Blind can know your "appearance", by allowing them to run their fingers over your face. Art is made into "raised relief" editions, so they may "see" paintings; by the sense of touch. Imagine instead of their fingers, a strip of SKIN on their backs is "moved across a raised relief picture", over and over again; The "picture" is the everyday world in front of them, all colors are even discernable, as the "vibrations" (frequencies) change with hues (combination of primaries), and saturations (brightness of any primary, indicated by amplitude).

[0081] If you have any imagination at all, you know what this invention means to the Blind, by comparing above illustration.

[0082] Hearing Synthesis

[0083] For the DEAF, MICROPHONE is input to MICROPROCESSOR, which acts as 216 band audio-equalizer. This signals an IC with 216 VARIABLES, which control a secondary circuit similarly to sound wave cycles, to the STIMULATOR ARRAY PANEL.

[0084] The SECONDARY voltage in this case, is straight DC current, the FREQUENCIES are entirely controlled by the VARIABLES.

[0085] Each electrode receives only one "tone range" (if a tone is represented). Normal hearing is 16 Hz to 8000 Hz, containing nine octaves of 12 notes each (if divided musically).

[0086] I multiply the notes two times per scale, using the forty-eighth root of two, to yield the tones and put them within individual frequency ranges. This gives 216 tones instead of the normal 108 true musical notes, in the nine octaves' range. The math will actually give you 432 tones, the extras are `thresholds` that are `complimentary` between electrodes frequency ranges.

[0087] Each electrode passes a sine wave voltage at the same frequency of the tone range; frequency may change within upper and lower thresholds, or encompass as many electrodes as necessary.

[0088] The sine wave is DIRECT CURRENT. The effect is more easily grasped, if diagrammed as a continuous sine wave. Half of the full wave (unlike sound) is low amplitude. Sound actually has opposite but EQUAL amplitude, with every half-cycle.

[0089] MICROPROCESSOR "splits" and REMOVES every half wave, of the full sine wave, a "square tooth" formed at zero amplitude (where the low amplitude half-cycle wave was).

[0090] Sound waves are alternate pressure/vacuum ripples in air, the "vacuum" half cycle" LOWERS current through microphone, the "pressure half cycle" RAISES current. It is the NUMBER of cycles that equals frequency (not half-cycles). The full wave delivered to electrodes does NOT characterize true audio perception (unless they are altered).

[0091] Speaker cones pressurize and depressurize air, exactly like sound acts on the microphone diaphragm. Pressurizing and then RELAXING nerve zones for the other half-cycle entirely (no current), does not "mimic" sound waves exactly, but FREQUENCY is preserved (cycles per second, but signal duration halved).

[0092] I am wary of CONSTANT electrical stimulus to nerve zones with NO REST to them, from exposure to some sounds. There is no evidence it would damage nerves, but touch nerves can be overworked and "desensitized". An intermittent depleted frequency (as above does) enhances differentiation, and will not "burn out" nerve zones' sensitivity, tempting users to turn up the THRESHOLD CONTROL (lessening sensitivity more). Full synthesis of opposite amplitude half wave cycles, gives zero rest to nerve zones for duration monotones (sight and balance synthesis signals, do not present this problem).

[0093] This solution divides full cycles in half, a good idea as 8000 Hz (highest tone represented) is not easily distinguished from neighboring electrodes; 4000 Hz is easier discerned, as there are greater frequency differences between electrodes.

[0094] An alternative is to INVERT the low amplitude half wave (giving it representative amplitude), creating two positive waves, with "spike" created at zero amplitude. This would apply if full cycle wave is found to be satisfactory (not likely). Another alternative, is to create one wave of equal duration as the cycle wave (both sides of cycle, as one long wave). Again, this gives zero rest to nerve zones for some sounds.

[0095] Alternating current CANNOT be used to represent the cycle wave; It would cause short circuiting through skin, when frequencies signal neighboring electrodes.

[0096] Input, processor, IC, TENS, and stimulator panel; are the HARDWARE of my invention. PROGRAMMING depends on operating parameters, many at present are theoretical.

[0097] The yielded mode of operation (in section with diagrams), is only a possibility. All operating parameters are flexible and may be changed as needed for programming, frequencies, electrode separation, etc.

[0098] To develop a SLIDING SCALE PERCEPTION (as normal hearing does), each electrode has an upper threshold frequency that is equal to the lower threshold frequency of the electrode above it (all electrodes/thresholds are `complimentary`). The sensation to the Deaf as the tone rises, is as if a vibration is increased and changes position in smooth gradients, no "jumps" between electrodes; Consciously perceived separation of electrodes is NOT desired. Subconscious separation of electrodes, helps to discern pitch and volume of many sounds at once. Voltage amplitude changes with volume of tones, and "patterns" formed sequentially by sounds and words the normally hearing perceive, are represented perfectly on the STIMULATOR ARRAY PANEL.

[0099] Conscious differentiation of nerve zones being not necessary, panel might be made much shorter than my diagram design. The "sliding scale perception" may DEPEND on electrodes being placed closer together. Being important to give sliding tones (varied frequency) that simulates actual hearing, the optimum distance for separation of electrodes is an unknown, to be established.

[0100] There are harmonics to most tones heard in everyday life, but we do not audibly hear most of them. If harmonics are several octaves away and seemingly insignificant, all characteristics of sound possible to reproduce, is done. Not all characteristics of normal hearing CAN be reproduced by this device. The range of electrodes' tones, will not divide all harmonics accurately as the normal ear. It is still a close mimic of normal hearing. All tones having `timbre`, have a phenomenally smooth and fine signal pattern sequence, with these operating parameters.

[0101] VOICE pitch range, is almost always within 500 Hz to 4000 Hz. The achievement of good synthesis of VOICE being most important, a solitary `full normal hearing range` synthesized by itself, might infringe upon extra stimulus (more divisions of tones) possibly needed, for fine comprehension of the VOICE range.

[0102] There are solutions, if this is the case:

[0103] The notes of the musical scale at equal temperament, have frequencies most easily determined by X/Y coordinates. X=2, and Y={fraction (1/12)} (the 12th root of 2). Multiply this number against a note, and it yields the next higher note in the 12 note (inclusive) scale. To divide properly into 24 tones per scale, X=2, and Y={fraction (1/24)}. To divide into 48 tones per scale, X=2, and Y={fraction (1/48)}. Voice might be comprehended better if expanded over more stimulator electrodes, sacrificing tones NOT in the voice pitch range, for an array panel of comfortable length taped to the body. Remember to yield twice the number of tones as electrodes, extra tones are thresholds.

[0104] Full range of normal hearing is the objective, with good comprehension of speech. TWO panels may be used side by side, one for voice range only, and the second panel for the full normal hearing range. It is known, normal hearing does not differentiate well between the highest tones, or lower tones very well either. We mostly recognize perfect pitch of notes, that are in the voice range (if gifted with "perfect pitch").

[0105] So there are FOUR ways to construct the hearing synthesis mode:

[0106] 1) For voice only (500 Hz to 4000 Hz), 2) For full range (16 Hz to 8000 Hz), 3) Separate array panels for both, or, 4) ONE panel that may be activated for EITHER 1) or 2), by `voice recognition program` to automatically switch-modes (preserving the full range mode, most of the time).

[0107] Other solutions exist, too. The voice when identified by a voice recognition program could be expanded widely, leaving the other tones in normal placements (superimposing, giving precedence to voice), the frequency expansion an artificial enhancement of voice.

[0108] Any voice recognition programming must be bypassable. One reason being, that MUSIC might even be enjoyed. A singing voice should not need modification, to comprehend it well.

[0109] An audio-compressor in the circuit may be of great help also, in comprehension of voice. Recognize, that full-compression must NOT be adjustable by the deaf. Especially loud sounds are an alert, and a car crashing should not sound like crumpling paper (as it would). A shout has equal volume as a whisper, at full-compression. A yell to "look out!" should not be interpreted to take a casual glance, if an accident is impending. It should be made illegal, to add full-compression adjustability on these devices.

[0110] Almost all hearing aids amplify only 500 Hz to 4000 Hz, for the hard-of-hearing. Other sounds when amplified, have been known to distort voice comprehension. This being a feasible problem with full range synthesis, the best means to MODIFY the voice range WITHIN the full range mode, MAY need to be determined and used (though hoped not necessary).

[0111] Let no one say that dividing the tone ranges, need not be as normal music divisions. The soul recognizes them and attaches emotional meanings to intonations, especially in voice. There is no mathematical reason known why some tones and blends are pleasingly harmonic, and others dissonant and disturbing. The soul recognizes intonations in voice, interprets meanings to them, and alerts us to things meant in intonations that were not expressed by the actual words spoken. No mathematics over the frequencies has explained it, but separation into regions of full music scales, will best equip the Deaf to interpret the patterns on the STIMULATOR ARRAY PANEL. Audio interpretation of voice is part emotional, based on musical tone divisions changing over a time-line to the subconscious, and my work to retain this aspect must be respected. The subconscious will not make as good an interpretation, of other type divisions of frequencies.

[0112] 8 MM moving picture systems have maximum audio frequency range of 100 to 4000 Hz, 35 MM movies range is 50 to 8000 Hz, and most hearing aids only amplify 500 to 4000 Hz (voice range). The widest range known audible to the human ear, is 16 cps to 20,000 cps (cycles per second); Possible, if less electrodes are necessary than expected. As frequencies get higher, there is a proportionate increase to number of electrodes required.

[0113] These frequency ranges may be of use, if determined that other tone divisions or more electrodes, are necessary. A narrower full range limitation might exist, than expected.

[0114] A great many more types of modulation are possible for electric signals, than for actual audio reproduction. This is to the advantage of research to find the best representative patterns, to synthesize voice. Sound can be made fully discernible to the deaf, by proper stimulation of a few hundred nerve zones.

[0115] Some people are blind AND deaf (both). Sight AND hearing synthesis may be COMBINED in one device, with TWO stimulator panels. As many of these are very uncooperative with others (not enjoying life much), it will take some doing to keep the equipment worn by them long enough, before the subconscious "deciphers" the stimulus signals. Imagine that time! A body net of nylon, spandex, whatever, can contain the entire system. No tape or adhesives necessary, and until the person realizes the purpose of the CCD camera, it too can be contained in the front of the body net. It would be a `temporary model`, be re-usable to another; The proper gear could now be given to the Blind-Deaf, without fear he will want to damage it (once he knows what it is for).

[0116] In the same vein, some Deaf are also Balance Impaired, from extensive damage or deformity to the inner ear organs. They may have combined devices, for hearing and balance synthesis. (Balance Synthesis mode, explained in next section).

[0117] As sight synthesis was the beginning of my inspiration, it was developed highly before work on hearing synthesis began. Hearing synthesis was more complex than expected. I do not doubt some things are assumed incorrectly. I really prefer another method of delivering `frequency range` to singular nerve regions, more discernible for all tones. Is it necessary to deliver signal frequencies, identical to audio cycles? Perhaps not. `Sliding pitch` is not discerned well at higher frequencies, not even normal hearing discerns slight pitch changes well.

[0118] If we test and find the best discerned "wide range" frequencies (high and low), apply the SAME range to ALL electrodes with tone divisions represented ONLY by electrode separation, the discernment of `sliding pitch` might actually be BETTER than normal hearing (for high/low tones). This is an experimental operating parameter, theoretically more realistic. All others are "hopefuls", highly dependent on conjecture about touch nerves' frequency discernment. This would make ELECTRODES work with patterns that are parallel and exactly harmonic, as with Sight Synthesis.

[0119] In the operating systems which have different frequency ranges on individual electrodes, each electrode commanded by `equalizer channel` (variable) of IC, discernment of pitch is still mainly by SEPARATION of electrodes. Pitch discernment changes within each electrodes' range, would depend on nerves' ABILITY to detect small changes of frequency. Some tone ranges would be discerned well; Others, perhaps not well enough. That it be TRIED at my insistence, though perhaps predestined to fail, at least I do not fail to consider the subconscious' unknowns; That would be purely foolish. It MIGHT excel far above all other systems, after the subconscious has time to adjust.

[0120] If above system fails to yield discernment of slight tone changes within critical singular electrodes' ranges, an EXPANSION of frequency range will be needed. Since we cannot expand equally through 216 electrodes, use the SAME frequency range for ALL electrodes. Individual tone ranges discerned well, overall pitch discernment yielded by separation of electrodes, all `threshold` tones complimentary-harmonic to high/low end of neighboring electrodes; Using a FULL OCTAVE (of frequency variance) for signature frequency representing any single tone's variations would work, even if it seems somewhat an "overkill". It would yield excellent sliding pitch perception. "Perfect pitch" would not be yielded, graduating tones partly represented by electrodes' separation and partly by expanded frequency at individual electrodes, but still a good synthesis. I expect subconscious would cause the consciousness to ignore the wide range of frequency on individual electrodes; thresholds are halved or harmonic frequency, and the "jump" between electrodes reduced in sensation. Also, a lower amplitude stimulation would be needed. The user would probably become totally unaware of the wide range of frequencies on individual electrodes, being a `signal` for subconscious deciphering, only the interpretation yielded to the consciousness, not even cognizant of the expanded signals to subconscious. The subconscious delivers only "the message", never "the code" of the original presentation.

[0121] Balance Synthesis

[0122] BALANCE SYNTHESIS, for persons with damage to the balance organs of the inner ear, is also accomplished. The balance organs are chiefly the three semicircular canals, of each inner ear. A liquid partly fills them, tiny internal hairs are bent in the direction of any flow, arising from change of the center of gravity. Hairs above the liquid line are not stimulated at all. Nerves connecting the hairs to the brain, deliver the stimulus of the liquid against the hairs. Slight movements stimulate a few NEW nerves, at the moving "liquid line". The brain takes more notice of any new vector (even with slow movement). We keep our balance quite well, with eyes shut.

[0123] The brain has an internal `mechanism` to assess the exact center of gravity from COMBINED vectors. It does not receive signals from normal balance coils, of exact center of gravity. Rather, it judges where it MUST be, from many vectors yielded by the three semicircular canals of each inner ear, and by other senses not even related to balance organs.

[0124] If the balance impaired must wear eyeglasses, electrolytic BALANCE SWITCHES are placed in the temple plates of glasses. Glasses must fit SNUGLY, sudden movements would jostle loose ones, and upset proper operation. It is imperative that good operation is maintained, ESPECIALLY during quick movements, when anyone is most likely to lose balance.

[0125] If the Balance Impaired does NOT need glasses, a BRACE hidden under the hairline (behind head), extending around and hooking just over the ears, will stabilize the two switches (positioned behind the ears). A clip on the brace clamps hairs close to the skull, so assembly is not jostled easily. If the patient must wear hearing aids, the switches may be contained inside `behind the ear` aids. The ear canal audio stem will eliminate need for any other stabilizing brace (in this model). Another possibility for those who are also hard of hearing; balance switches are miniaturized, telemetered (wirelessly) to the MICROPROCESSOR, when completely "in the ear" aids are used.

[0126] Replicating the PLACEMENT of the switches in proximity of the normal balance organs is necessary, because of the way we regain our balance. We tilt our heads when falling or losing balance. This serves to help us orient ourselves (if you've noticed). Also, the `center of gravity` is only straight down, when we are perfectly still. Inertia, momentum, and centrifugal force, all CHANGE the gravity center vector.

[0127] The body is flexible, and when moving, the GENERAL center of gravity can change with NO indications to balance organs. Yet the subconscious knows the position and movements of the body, and makes adjustments on it's own. Because of momentum and inertia, judgments are made as to best retain balance, as the subconscious COMBINES information (not from balance organs alone). Sight helps balance orientation when running, and we more easily lose balance in the dark.

[0128] The ELECTROLYTIC SWITCHES each consist of three hollow torus shapes, one third filled with electrically conductive liquid that makes contact with 450 or more wires each, completing the circuits. These are many circuits to send through so many hundreds of wires, so switches are "piggybacked" to MICROCHIPS (molded right to the switches). These MICROCHIPS send a signal of any change in position to the MICROPROCESSOR, where signal is processed and sent to the MICROCHIPS with VARIABLES, which control TENS signals to the STIMULATOR ARRAY PANELS.

[0129] The ARRAY PANELS yield patterned signals, representing exact center of gravity changes, constantly.

[0130] THREE AXES of rotation are measured by each inner ear mechanism, yielding a total of SIX signals. One might assume that only three are really necessary; but a close study of various arc motions possible, shows that we position our heads so that each group of semicircular canals can measure these motions, at different distances (radii) from `center of rotation`.

[0131] So, the three axes of rotation measured by EACH SET of balance organs, results in TWO SIGNALS constituting TWO centers of gravity. The THREE axes measured by EACH set of semicircular canals, are "combined" in the subconscious.

[0132] My device does NOT signal array panels, with two sets of three axes each. This is NOT necessary.

[0133] It is COMBINED information that indicates ONLY center of gravity during movement, that is represented on each of the two ARRAY PANELS. This reduces greatly the number of electrodes needed.

[0134] The ARRAY PANELS are circular, are worn horizontally around the torso of the body. The foremost portions represent "forward" tilt, backomost "backward" tilt, right side "right" tilt, etc. Radial movements will cause gradiating differences between (two) ARRAY PANELS, preserving "sense" of THOSE motions.

[0135] It should be grasped, why it takes THREE axes of rotation to measure center of gravity vector, accurately. Not quite so obvious; It only requires ONE radial axis, to represent this same vector. A flat (horizontal) torus switch could basically only measure direction of tilt, not degrees of it. Yet a fine representation of degrees already measured, may be transposed to "signature patterns" on ONE axis (ARRAY PANEL).

[0136] In this respect, the device might be doing part of the job of the subconscious, and therefore more easily interpreted. I can only theorize about it, not knowing what part of the `balance sense` is done by the utricle and saccule, also listed among `the balance organs`.

[0137] The invention replicates very closely, the operation of the balance organs. The signals are stronger, proportionate to VELOCITY of movement. As sudden movements bend the tiny hairs in the normal balance organs all along the liquid movement area sharply, so too do sudden movements stimulate the panels more vigorously. As velocity and accelleration can be calculated by microprocessor clock (measuring number of contacts every {fraction (1/60)}th second), measurement need not be "sensed" inside switches (as nerves of the balance organs do).

[0138] A gyrocompass can be used, though it gives different signals to the microprocessor. Yet, no gyrocompass is inexpensive or small enough to be practical for the infirmed. It would even be better, as sight would not be a necessary added vector to the subconscious (when we run or turn sharply). Even non-impaired people running in the dark (even on a flat surface), or turning quickly, may lose balance because movements sharply alter center of gravity vectors, when sight is not an added "correction" to orientation.

[0139] If you close your eyes, and someone brushes the hairs of your arm, you know which direction the motion went, and about how fast. The nerves of the balance organs work like this. The pattern felt at the electrodes as a slow change of angle becomes faster: The side tilted towards gets more amplitude, gaps between signal zones become smaller (toward tilt), and the whole "pattern" moves in direction of tilt, proportionate to speed (measured by microprocessor clock). Or stated another way:

[0140] Direction of the electrolyte liquid movement over wire contacts is recognized by the MICROPROCESSOR, a "pulse code" as "blinking arrow" signs of proportionate speed and direction, commands the IC to set VARIABLES like this. TENS signals indicate tilt, velocity of tilt, and even degrees of rotation, to the STIMULATOR ARRAY PANELS, indicating full vectors and accellerations.

[0141] PILOTS may "practice" using the device while not flying, then use it with a gyrocompass when flying. Other signals may be superimposed, indicating True North, airspeed, altitude, even longitude/latitude, G-forces, and position of radar objects. This will save many lives a year, now being lost due to pilot error. A pilot ALWAYS knowing (at least) the BANKING POSITION of his plane without looking at instruments, regardless of centrifugal force "fooling" his normal orientation sense in fog or at night, is a BETTER pilot.

[0142] Now I say they may "practice" while NOT flying, because one type of `touch sense device` was ALREADY tried, for fighter jet pilots; They did not "interpret meanings" quickly enough, as signals were organized ONLY by the consciousness. The familiarity gained by hours of use on the GROUND, makes the "interpretation of meanings" INSTANTANEOUS. The military model is not portable, operating by hydrolics to inflatable portions of the cockpit back rest.

[0143] When inexpensive gyrocompasses for small private planes become available, every pilot should have some hours of required practice with the invention, for maintaining license. Right now, high cost prohibits mandated use in small planes.

[0144] The profoundly balance impaired will have dramatic improvement, very quickly. When he leans, the pattern on the STIMULATOR PANEL will instantly move toward the tilt, compressed in that direction, with proportionate speed and strength to the quickness of movement. It will be so orienting, when before they appeared stumbling drunk. They walk into things, fall down steps, trip easily, are injured often, and called clumsy or retarded. Not even listed with the `five senses` in many treatises, it is still `the sense of balance` synthesized by the device.

[0145] If a simpler balance switch exists, it will hopefully be utilized. I would hope for one that operates similar to a cursor "joystick"; tracker is a lightweight sphere floating inside a hollow sphere, an oil-film eliminating drag. A magnet weight causes tracker to rotate, weight points to the center of gravity. Outer sphere has "sensors" that locate the three axes magnet position by triangulation for the microprocessor (being the center of gravity). This might indicate center of gravity faster than normal balance organs do. Aside, the many electric contacts (as in other models), is not necessary. If such a switch or similar type can be miniaturized, it should be substituted.

[0146] There is no problem foreseen with fabrication of ARRAY PANELS, with the neigboring ELECTRODES put in linear +-+-+- (opposite polarity electrodes, common `ground`). It simplifies fabrication and eliminates perpendicular ground. Only ONE TENS frequency is delivered at any one time, electrode voltages gradually change among neighbors, making above design possible. This cannot be done with sight and hearing synthesis, interference would distort signature frequencies and amplitudes.

[0147] The BALANCE SWITCHES operate in above manner also, as any other type of `contacts` to electrolytic fluid, would require twice their number (for equal sensitivity).

[0148] The THREE torus shaped `sensors` for each BALANCE SWITCH, are aligned as the semicircular canals of the inner ear, (no one axis exactly horizontal or vertical). The angles represented to the MICROPROCESSOR are combined by trigonomic or coordinate functions constantly, always yielding instant and exact `center of gravity` signals to ICs. Virtually no delay of signature patterns delivered to electrodes, will give excellent results.

[0149] For Comatose Patients

[0150] Comatose patients deemed unlikely to recover, have awakened. The percentage that recovers, have high incidence of relatives that visit them though unconscious, stimulating them with affectionate touches and words. There is something other to appeal to, than the consciousness. These relatives are often Christian, believing the SOUL of the comatose patient hears and receives compassionate words, to "fight their way back".

[0151] One theory, is that the unconscious person would not know the need to "re-connect" with their body and senses, being in a dream state. The relatives alert the subconscious' mechanisms to the problem; Once analyzed, the soul tries "solutions" (and sometimes finds them).

[0152] I request using my invention in sight and sound synthesis, upon COMATOSE patients. Even the ones with little or no brainwave activity. "Communication" to the subconscious, should contain

compassionately given information concerning his condition, and appeals to "fight" back to consciousness. As psychiatric practitioners know, ***subliminal*** hypnotic REDUCES consciousness levels; The OPPOSITE should work. Using television or radio to stimulate a patient, has no therapeutic value. The soul is in a dreamland, and does not know "the need to awaken".

[0153] I cannot design full parameters of operation, I am not qualified. But as God spoke to me about it, I must report that the brain ITSELF may be treated as a damaged `sense organ`, and be partly synthesized. The comatose patient needs to "re-connect", and the subconscious is the only vehicle that CAN connect the physical senses to the consciousness. The sense of touch is more readily recognized subconsciously than the others, and sense organs synthesis operates through "touch". Certainly, a loving relative would take a patent's hand, stroke his arm, pat his shoulder. Touch, accompanying words spoken, is a strong argument for many recoveries granted "little hope".

[0154] Once the invention is proven in other areas, this one must be given a try. It sounds bizarre, but as God is my Witness, I realized the thoughts about this were not my own, as I could not abandon them. Finally understanding, Jesus to be obeyed, was shown to "not ignore" these thoughts, and ADD this purpose to the others (despite any ridicule it will bring).

[0155] Physician's Warning Note:

[0156] Though I do not approve of computerized biofeedback therapies, WARNINGS from Physicians about use of subconscious manipulations must be given here. AGGRESSIVE ***SUBLIMINAL*** (constant) causes `Subconscious Overload`; Stimulus must not drive patient through many or conflicting emotional "states", must not be highly repetitive. Permanent and severe psychosis will result, if equipment is operated by untrained or abusive technicians. Patient must be monitored closely, if subconscious overload is to be avoided. Case histories show hundreds of patients driven to irretrievable INSANITY, though "treatments" were for mild psychoses. Nurses must NOT be allowed to alter Physicians' programmed regimens. Physicians need CERTIFICATION to use aggressive ***subliminal*** technology legally, and no one really knows how to use it safely; Physicians mostly learn how NOT to use it (to be certified).

[0157] I would fear most a physician meaning well, leaving the equipment "ON" 24 hours a day. This is not merely dangerous; Professionals warn that this GUARANTEES inducing mental breakdown; "Aggressive ***Subliminal***" (nearly constant), being the greatest offender in biofeedback ***subliminal*** therapies. The comatose patient needs to awaken, but with wits INTACT.

CONCLUSION AND THEOREM HYPOTHESIS

[0158] There is NO DANGER indicated for sense organs synthesis on the Blind, Deaf and Balance Impaired. This, even though aggressive stimulation IS rendered to the subconscious, which "spills over" INSTANTLY into the consciousness (within a few days of stimulus). What is warned as a "danger" for psychiatric mind altering practices, called `Aggressive ***Subliminal*** Overload`, is NOT a danger in SENSE ORGAN synthesis; but an actual BENEFIT to it.

[0159] The invention will PROVE THE HYPOTHESIS PRESENTED: Our SENSES are all "GATED THROUGH" the SOUL (subconscious, if preferred). THIS is why ***subliminal*** and biofeedback methods are so powerful, as the soul "has no choice" but to analyze all patterned and organized signals, and "deliver the meanings" to the CONSCIOUS mind; I put forth the hypothesis; this is a PRIMARY HIGHER FUNCTION of the soul. God did not "make a mistake" in making the soul totally un-prejudiced and vulnerable to ***subliminal*** manipulations; Our natural SENSES "deliver signals" so complex, if the conscious mind excluded all other work but to comprehend them, it could not but "scratch the surface". ***Subliminal*** technologies "feed" things through the SAME doorway, "bypassing" the conscious mind to so strongly affect the consciousness, simply because the subconscious "has no choice" but to do this.

[0160] For the "experimenters" playing with COMPUTERIZED BIOFEEDBACK and other technologies to covertly "affect" the thoughts and emotions of others, it is likened to your PREDECESSORS; When electric batteries were invented, men looked for ways to "use" the power. Immediately, they put the sick in tubs of water and SHOCKED them, for "curative" effects. Your "results" are no better! There is evidence that the technology is abused, in looking for ways to use the power. No one can deny that a PROPER "use" of this power, is `Sense Organs Synthesis`. Physicians and technical assistants who have used COMPUTERIZED BIOFEEDBACK and similar therapies, will undoubtedly be the FIRST consulted about the "feasibility" of this invention. I quoted substantiating principles THEY know well, but most people do NOT know such things "as fact". More than enough DOCUMENTATION exists, shadowing any "feasibility theory" (to professionals in the field). Enough of them will agree, it would be IMPOSSIBLE for this invention to "not work".

[0161] It is now a matter of APPLYING documented and proven principles to THE PURPOSE that is the very REASON for them. When prototypes yield initial results, it will amaze many who are familiar with the principles, that no one utilized the MOST LOGICAL PURPOSE for them, before this time. It simply is NOT TRUE that God designed the soul with it's openness and inner workings, for psycotechnic wizards to pattern thoughts and emotions.

[0162] I submit the Scripture: "To everything there is a season, and a time to every purpose under heaven".

[0163] Let any God fearing person reason for himself, if the parameters of the soul's proven inner workings are God given, so someone with ***subliminal*** sophistries can covertly manipulate another's thoughts and emotions? But these properties of the soul MUST HAVE a proper purpose, as the Bible does not lie.

[0164] I contend that God showed me "the purpose" of the properties of the subconscious, WHY the soul has a "no choice" parameter concerning certain type signals, WHY it "must analyze them", and WHY it "must present the solutions" to the consciousness.

[0165] I prayed and ASKED these things; I could NOT BELIEVE God would place a vulnerable "bridge" to our souls, allowing modernized mind control methods to covertly manipulate someone, UNLESS it had "another purpose" that has been PERVERTED.

[0166] The soul functions "like an organ". If God is true, then the "real you" is a SPIRIT (not the soul). The SOUL "bridges" between the SPIRIT and the BODY. Without the soul, the "real you" CANNOT connect to the brain; God gave it that function. HOW it "connects" them, is a mystery ages old; The soul has an "awareness and life" different from the spirit and brain, but also has DUTIES TO PERFORM, that are strongly evidenced.

[0167] Theologians claim the soul contains the heart, will, mind, and emotions (that the soul is a `container` for these things). Very little Scripture even remotely suggests such "believism theology", it is a theology that satisfies questions; "What is the soul?", and "What does it do?".

[0168] The SOUL studied by man, not just Bible believing man, has been called "the SUBCONSCIOUS". It evolved into "ways to manipulate" the CONSCIOUS mind. The most startling discoveries have to do with BRAINWASHING and MIND CONTROL. It is documented FACT that BIOFEEDBACK ***SUBLIMINAL*** technology can be used covertly to BRAINWASH. Psychiatrists tried it on the mentally ill, but it just sent patients into even deeper psychoses. One thing discovered was that `Aggressive ***Subliminal***` OVERLOADED the subconscious, and the messages intended to gently-filter into the consciousness, began to "spill over" into the consciousness instantly, causing mental breakdown symptoms of Schizophrenia! They also discovered the soul would NOT IGNORE any ***subliminal*** hypnotic (has "no choice"), but "MUST analyze" everything, and "present" the meanings to consciousness. Extremely complex messages at incredible speeds, the subconscious would eventually "solve", and the consciousness would "become aware" of the full message; This is how researchers know that the subconscious contains over 97% of the mind's total ability and capacity.

[0169] The invention delivers constant signals, like `Aggressive ***Subliminal***` does; but there will be no "breakdown" as other mental manipulation techniques cause, when signals "spill over" instantly into the consciousness. This is simply because the "spill over" is a normal consciousness SENSE interpretation, as the soul NATURALLY does for the senses, anyway.

[0170] The SOUL does this for the NATURAL senses, without inducing Schitzophrenia. Would it be different for SYNTHESIZED senses? Utilizing the NATURAL PURPOSE of the subconscious, presents no dangers. The SOUL interprets the NATURAL senses for the consciousness, and will interpret SYNTHESIZED "outer periphery" Nerve Centers, because God DESIGNED the soul to AUTONOMICALLY do this job. If the soul's workings can be MIS-used, this is positive proof these workings can be PROPERLY used, especially for the PRIMARY PURPOSE of the soul's HIGHER FUNCTIONS!

[0171] The hypothesis is NOT proof for the invention, the INVENTION will prove the HYPOTHESIS; Then the hypothetical statement may be changed from "if" to "so", and be accepted as Written Proof.

[0172] So the invention provides a means to PROVE the Hypothesis (being a popular opinion lacking proofs), allowing Theorem Hypothesis writing to be conclusive, being as the working invention is an end to all argument and debate about it.

[0173] This may be accepted as a provable "useful purpose" for the invention, even BEFORE testing it's physical capacities, and thereby legally entitled to Patent Grant (on this basis). This Statement is written positively in early form, but the invention will either prove (invention works) or disprove (does not work) Theorem Hypothesis. Again, knowledgeable Psychiatrists in Computerized Biofeedback/Hypnotic-***Subliminal*** fields will assure it is truly impossible for the invention to "not work". It is a shame THEY did not realize this "gateway" used in Psychotherapy, has complete identifying characteristics of normal modulus, for subconscious interpretation of the natural senses; Evidence proving feasibility of such a device, to invent.

[0174] Drawn Diagrams Section

[0175] For SIGHT SYNTHESIS DRAWINGS (Pages 42-45, following),

[0176] REFER to WRITTEN DESCRIPTIONS (Pages 9-20)

[0177] For HEARING SYNTHESIS DRAWINGS (Pages 46-47),

[0178] REFER to WRITTEN DESCRIPTIONS (Pages 21-28)

[0179] For BALANCE SYNTHESIS DRAWING (Page 48),

[0180] REFER to WRITTEN DESCRIPTIONS (Pages 29-34)

[0181] RELEVANT to ALL THREE synthesized senses,

[0182] REFER to WRITTEN DESCRIPTIONS, below:

[0183] S.O.S. INTRODUCTION (Pages 3-8)

[0184] COMATOSE PATENTS (Pages 35-36)

[0185] CONCLUSION AND THEOREM HYPOTHESIS (Pages 37-40)

Micro Burst and Down Burst Systems Technology -Project H.A.A.R.P.

Put simply, the apparatus for HAARP is a reversal of a radio telescope; antennas send out signals instead of receiving. HAARP is the test run for a super-powerful radiowave-beaming technology that lifts areas of the ionosphere by focusing a beam and heating those areas. Electromagnetic waves then bounce back onto earth and penetrate everything --living and dead.

HAARP publicity gives the impression that the High-frequency Active Auroral Research Program is mainly an academic project with the goal of changing the ionosphere to improve communications for our own good. However, other U.S. military documents put it more clearly -- HAARP aims to learn how to "exploit the ionosphere for Department of Defense purposes". Communicating with submarines is only one purpose, there are many, many more.

Information from the military on HAARP continually Downplay what it could do. Officials insist that the HAARP project is no different than other ionospheric heaters operating safely throughout the world in places such as Arecibo, Puerto Rico; Tromso, Norway and the former Soviet Union. However, a 1990 government document indicates that the radio-frequency (RF) power zap will drive the ionosphere to unnatural activities."...at the highest HF powers available in the West, the instabilities commonly studied are approaching their maximum RF energy dissipative capability, beyond which the plasma processes will 'runaway' until the next limiting factor is reached."

If the military, in cooperation with the University of Alaska Fairbanks, can show that this new ground-based "Star Wars" technology is sound, they both win. The military has a relatively-inexpensive defense shield and the University can brag about the most dramatic geophysical manipulation since atmospheric explosions of nuclear bombs. After successful testing, they would have the military projects of the future and huge markets for Alaska's North Slope natural gas. Looking at the other patents which built on the work of a Texas' physicist named Bernard Eastlund, it becomes clearer how the military intends to use the HAARP transmitter. It also makes governmental denials less believable. The military knows how it intends to use this technology, and has made it clear in their documents. The military has deliberately misled the public, through sophisticated word games, deceit and outright disinformation.

The HAARP system could give the military a tool to replace the electromagnetic pulse effect of atmospheric thermonuclear devices (still considered a viable option by the military through at least 1986), replace the huge Extremely Low Frequency (ELF) submarine communication system operating in Michigan and Wisconsin with a new and more compact technology. It could be used to replace the over-the-horizon radar system that was once planned for the current location of HAARP, with a more flexible and accurate system. It could also provide a way to wipe out communications over an extremely large area, while keeping the military's own communications systems working. It can give wide area earth-penetrating tomography which, if combined with the computing abilities of EMASS and Cray computers, would make it possible to verify many parts of nuclear nonproliferation and peace agreements. It could serve as a tool for geophysical probing to find oil, gas and mineral deposits over a large area. It could be used to detect incoming low-level planes and cruise missiles, making other technologies obsolete.

The above abilities seem like a good idea to all who believe in sound national defense, and to those concerned about cost-cutting. However, the possible uses which the HAARP records do not explain, and which can only be found in Air Force, Army, Navy and other federal agency records, are alarming. Moreover, effects from the reckless use of these power levels in our natural shield - the ionosphere - could be cataclysmic according to some scientists. Two Alaskans put it bluntly. A founder of the NO HAARP movement, Clare Zickuhr, says "The military is going to give the ionosphere a big kick and see what happens."

The military failed to tell the public that they do not know what exactly will happen, but a Penn State science article brags about that uncertainty. The HAARP project uses the largest energy levels yet played with by what Begich and Manning call "the big boys with their new toys". It is an experiment on the sky, and experiments are done to find out something not already known. Independent scientists told Begich and Manning that a HAARP-type "skybuster" with its unforeseen effects could be an act of global vandalism.

The patents described were the package of ideas which were originally controlled by ARCO Power Technologies Incorporated (APTI), a subsidiary of Atlantic Richfield Company, one of the biggest oil companies in the world. APTI was the contractor that built the HAARP facility. ARCO sold this subsidiary, the patents and the second phase construction contract to E-Systems in June 1994.

E-Systems is one of the biggest intelligence contractors in the world -- doing work for the CIA, defense intelligence organizations and others. $1.8 billion of their annual sales are to these organizations, with $800 million for black projects -- projects so secret that even the United States Congress isn't told how the money is being spent.

E-Systems was bought out by Raytheon, which is one of the largest defense contractors in the world. In 1994 Raytheon was listed as number forty-two on the Fortune 500 list of companies. Raytheon has thousands of patents, some of which will be valuable in the HAARP project. The twelve patents below are the backbone of the HAARP project, and are now buried among the thousands of others held in the name of Raytheon. Bernard J. Eastlund's U.S. Patent # 4,686,605 "Method and Apparatus for Altering a Region in the Earth's Atmosphere, Ionosphere, and/or Magnetosphere" was sealed for a year under a government Secrecy Order.

The Eastlund ionospheric heater was different; the radio frequency (RF) radiation was concentrated and focused to a point in the ionosphere. This difference throws an unprecedented amount of energy into the ionosphere. The Eastlund device would allow a concentration of one watt per cubic centimeter, compared to others only able to deliver about one millionth of one watt. This huge difference could lift and change the ionosphere in the ways necessary to create futuristic effects described in the patent. According to the patent, the work of Nikola Tesla in the early 1900's formed the basis of the research. What would this technology be worth to ARCO, the owner of the patents? They could make enormous profits by beaming electrical power from a powerhouse in the gas fields to the consumer without wires. For a time, HAARP researchers could not prove that this was one of the intended uses for HAARP. In April, 1995, however, Begich found other patents, connected with a "key personnel" list for APTI. Some of these new APTI patents were indeed a wireless system for sending electrical power.

Eastlund's patent said the technology can confuse or completely disrupt airplanes' and missiles' sophisticated guidance systems. Further, this ability to spray large areas of Earth with electromagnetic waves of varying frequencies, and to control changes in those waves, makes it possible to knock out communications on land or sea as well as in the air. The patent said:

"Thus, this invention provides the ability to put unprecedented amounts of power in the Earth's atmosphere at strategic locations and to maintain the power injection level, particularly if random pulsing is employed, in a manner far more precise and better controlled than heretofore accomplished by the prior art, particularly by detonation of nuclear devices of various yields at various altitudes..." '..it is possible not only to interfere with third party communications but to take advantage of one or more such beams to carry out a communications network even though the rest of the world's communications are disrupted. Put another way, what is used to disrupt another's communications can be employed by one knowledgeable of this invention as a communication network at the same time."

“Weather modification is possible by, for example, altering upper atmosphere wind patterns by constructing one or more plumes of atmospheric particles which will act as a lens or focusing device. ... molecular modifications of the atmosphere can take place so that positive environmental effects can be achieved. Besides actually changing the molecular composition of an atmospheric region, a particular molecule or molecules can be chosen for increased presence. For example, ozone, nitrogen, etc., concentrations in the atmosphere could be artificially increased...

Begich found eleven other APTI patents. They told how to make Nuclear-sized Explosions without Radiation", power-beaming systems, over-the-horizon radar, detection systems for missiles carrying nuclear warheads, electromagnetic pulses previously produced by thermonuclear weapons and other Star-Wars tricks. This cluster of patents underlay the HAARP weapon system.

Related research by Begich and Manning uncovered bizarre schemes. For example, Air Force documents revealed that a system had been developed for manipulating and disrupting human mental processes through pulsed radio-frequency radiation (the stuff of HAARP) over large geographical areas. The most telling material about this technology came from writings of Zbigniew Brzezinski (former National Security Advisory to U.S. President Carter) and J.F. MacDonald (science advisor to U.S. President Johnson and a professor of Geophysics at UCLA), as they wrote about use of power- beaming transmitters for geophysical and environmental warfare. The documents showed how these effects might be caused, and the negative effects on human health and thinking.

The mental-disruption possibilities for HAARP are the most disturbing. More than 40 pages of the book, with dozens of footnotes, chronicle the work of Harvard professors, military planners and scientists as they plan and test this use of the electromagnetic technology. For example, one of the papers describing this use was from the International Red Cross in Geneva. It even gave the frequency ranges where these effects could occur -- the same ranges which HAARP is capable of broadcasting.

The following statement was made more than twenty-five years ago, in a book by Brzezinski which he wrote while a professor at Columbia University:

"Political strategists are tempted to exploit research on the brain and human behavior. Geophysicist Gordon J. F.MacDonald -- specialist in problems of warfare -- says accurately-timed, artificially-excited electronic strokes 'could lead to a pattern of oscillations that produce relatively high power levels over certain regions of the earth...In this way, one could develop a system that would seriously impair the brain performance of very large populations in selected regions over an extended period'...No matter how deeply disturbing the thought of using the environment to manipulate behavior for national advantages , to some, the technology permitting such use will very probably develop within the next few decades."

In 1966, MacDonald was a member of the President's Science Advisory Committee and later a member of the President's Council on Environmental Quality. He published papers on the use of environmental control technologies for military purposes. The most profound comment he made as a geophysicist was, "The key to geophysical warfare is the identification of environmental instabilities to which the addition of a small amount of energy would release vastly greater amounts of energy." While yesterday's geophysicists predicted today's advances, are HAARP program managers delivering on the vision?The geophysicists recognized that adding energy to the environmental soup could have large effects. However, humankind has already added substantial amounts of electromagnetic energy into our environment without understanding what might constitute critical mass. The book by Begich and Manning raises questions: Have these additions been without effect, or is there a cumulative amount beyond which irreparable damage can be done? Is HAARP another step in a journey from which we cannot turn back? Are we about to embark on another energy experiment which unleashes another set of demons from Pandora's box? As early as 1970, Zbigniew Brzezinski predicted a "more controlled and directed society" would gradually appear, linked to technology. This society would be dominated by an elite group which impresses voters by allegedly superior scientific know-how.

Brzezinski was unhindered by the restraints of traditional liberal values; the elite would not hesitate to achieve its political ends by using the latest modern techniques for influencing public behavior and keeping society under close surveillance and control. Technical and scientific momentum would then feed on the situation it exploits", Brzezinski predicted. His forecasts proved accurate. Today, a number of new tools for the "elite" are emerging, and the temptation to use them increases steadily. The policies to permit the tools to be used are already in place. How could the United States be changed, bit by bit, into the predicted highly-controlled technosociety? Among the "steppingstones" Brzezinski expected were persisting social crises and use of the mass media to gain the public's confidence.

In another document prepared by the government, the U.S. Air Force claims:

"The potential applications of artificial electromagnetic fields are wide-ranging and can be used in many military or quasi-military situations...Some of these potential uses include dealing with terrorist groups, crowd control, controlling breaches of security at military installations, and antipersonnel techniques in tactical warfare. In all of these cases the EM (electromagnetic) systems would be used to produce mild to severe physiological disruption or perceptual distortion or disorientation. In addition, the ability of individuals to function could be degraded to such a point that they would be combat ineffective. Another advantage of electromagnetic systems is that they can provide coverage over large areas with a single system. They are silent and countermeasures to them may be difficult to develop... One last area where electromagnetic radiation may prove of some value is in enhancing abilities of individuals for anomalous phenomena."

Do these comments point to uses already somewhat developed? The author of the government report refers to an earlier Air Force document about the uses of radiofrequency radiation in combat situations. (Here Begich and Manning note that HAARP is the most versatile and the largest radio-frequency-radiation transmitter in the world.)

The United States Congressional record deals with the use of HAARP for penetrating the earth with signals bounced off of the ionosphere. These signals are used to look inside the planet to a depth of many kilometers in order to locate underground munitions, minerals and tunnels. The U.S. Senate set aside $15 million dollars in 1996 to develop this ability alone -- earth-penetrating-tomography. The problem is that the frequency needed for earth-penetrating radiations is within the frequency range most cited for disruption of human mental functions. It may also have profound effects on migration patterns of fish and wild animals which rely on an undisturbed energy field to find their routes.

As if electromagnetic pulses in the sky and mental disruption were not enough, Eastlund bragged that the super-powerful ionospheric heater could control weather. Begich and Manning brought to light government documents indicating that the military has weather-control technology. When HAARP is eventually built to its full power level, it could create weather effects over entire hemispheres. If one government experiments with the world's weather patterns,

what is done in one place will impact everyone else on the planet. Angels Don't Play This HAARP explains a principle behind some of Nikola Tesla's inventions -- resonance -- which affects planetary systems.

Physicist Daniel Winter, Ph. D. , of Waynesville, North Carolina, says HAARP high-frequency emissions can couple with longwave (low-frequency, or ELF) pulses the Earth grid uses to distribute information as vibrations to synchronize dances of life in the biosphere. Dan terms this geomagnetic action 'Earth's information bloodstream'., and says it is likely that coupling of HAARP HF (high-frequency) with natural ELF (extremely low frequency) can cause unplanned, unsuspected side effects.

David Yarrow of Albany, New York, is a researcher with a background in electronics. He described possible interactions of HAARP radiations with the ionosphere and Earth's magnetic grid:

"HAARP will not burn 'holes' in the ionosphere. That is a dangerous understatement of what HAARP's giant gigawatt beam will do. Earth is spinning relative to thin electric shells of the multilayer membrane of 'ion-o-speres' that absorb and shield Earth's surface from intense solar radiation, including charged particle storms in solar winds erupting from the sun. Earth's axial spin means that HAARP -- in a burst lasting more than a few minutes -- will slice through the ionosphere like a microwave knife. This produces not a 'hole', but a long tear -- an incision."

"Second concept: As Earth rotates, HAARP will slice across geomagnetic flux...a donut-shaped spool of magnetic strings -- like longitude meridians (on maps). HAARP may not 'cut' these strings in Gaia's magnetic mantle, but will pulse each thread with harsh, out-of-harmony high frequencies. These noisy impulses will vibrate geomagnetic flux lines, sending vibrations all through the geomagnetic web."

"The image comes to mind of a spider on its web. An insect lands, and the web's vibrations alert the spider to possible prey. HAARP will be a man-made microwave finger poking at the web, sending out confusing signals, if not tearing holes in the threads."

"Effects of this interference with symphonies of Gaia's geomagnetic harp are unknown, and I suspect barely thought of. Even if thought of, the intent (of HAARP) is to learn to exploit any effects, not to play in tune to global symphonies." Among other researchers quoted is Paul Schaefer of Kansas City. His degree is in electrical engineering and he spent four years building nuclear weapons. "But most of the theories that we have been taught by scientists to believe in seem to be falling apart," he says. He talks about imbalances already caused by the industrial and atomic age, especially by radiation of large numbers of tiny, high-velocity particles "like very small spinning tops into our environment. The unnatural level of motion of highly- energetic particles in the atmosphere and in radiation belts surrounding Earth is the villain in the weather disruptions, according to this model, which describes an Earth discharging its buildup of heat, relieving stress and regaining a balanced condition through earthquakes and volcanic action. "One might compare the abnormal energetic state of the Earth and its atmosphere to a car battery which has become overcharged with the normal flow of energy jammed up, resulting in hot spots, electrical arcing, physical cracks and general turbulence as the pent-up energy tries to find some place to go."

In a second analogy, Schaefer says "Unless we desire the death of our planet, we must end the production of unstable particles which are generating the earth's fever. A first priority to prevent this disaster would be to shut down all nuclear power plants and end the testing of atomic weapons, electronic warfare and 'Star Wars'." Meanwhile, the military builds its biggest ionospheric heater yet, to deliberately create more instabilities in a huge plasma layer -- the ionosphere -- and to rev up the energy level of charged particles.

They have published papers about electron precipitation from the magnetosphere (the outer belts of charged particles which stream toward Earth's magnetic poles) caused by man-made very low frequency electromagnetic waves. "These precipitated particles can produce secondary ionization, emit X-rays, and cause significant perturbation in the lower ionosphere."

Two Stanford University radio scientists offer evidence of what technology can do to affect the sky by making waves on earth; they showed that very low frequency radio waves can vibrate the magnetosphere and cause high-energy particles to cascade into Earth's atmosphere. By turning the signal on or off, they could stop the flow of energetic particles. Avalanches of energy dislodged by such radio waves could hit us hard. Their work suggests that technicians could control global weather by sending relatively small 'signals' into the Van Allen belts (radiation belts around Earth).Thus Tesla's resonance effects can control enormous energies by tiny triggering signals.

The Begich/ Manning book asks whether that knowledge will be used by war-oriented or biosphere-oriented scientists. The military has had about twenty years to work on weather warfare methods, which it euphemistically calls weather modification. For example, rainmaking technology was taken for a few test rides in Vietnam. The U.S. Department of Defense sampled lightning and hurricane manipulation studies in Project Skyfire and Project Stormfury. And they looked at some complicated technologies that would give big effects.

Looking at ways to cause earthquakes, as well as to detect them, was part of the project named Prime Argus, decades ago. The money for that came from the Defense Advanced Research Projects Agency (DARPA, now under the acronym ARPA.) In 1994 the Air Force revealed its Spacecast 2020 master plan which includes weather control. Scientists have experimented with weather control since the 1940's, but Spacecast 2020 noted that "using environmental modification techniques to destroy, damage or injure another state are prohibited". Having said that, the Air Force claimed that advances in technology "compels a reexamination of this sensitive and potentially risky topic." 40 Years Of Zapping The Sky? As far back as 1958, the chief White House advisor on weather modification, Captain Howard T. Orville, said the U.S. defense department was studying "ways to manipulate the charges of the earth and sky and so affect the weather" by using an electronic beam to ionize or de-ionize the atmosphere over a given area.

In 1966, Professor Gordon J. F. MacDonald was associate director of the Institute of Geophysics and Planetary Physics at the University of California, Los Angeles, was a member of the President's Science Advisory Committee, and later a member of the President's Council on Environmental Quality. He published papers on the use of environmental-control technologies for military purposes. MacDonald made a revealing comment: "The key to geophysical warfare is the identification of environmental instabilities to which the addition of a small amount of energy would release vastly greater amounts of energy." World-recognized scientist MacDonald had a number of ideas for using the environment as a weapon system and he contributed to what was, at the time, the dream of a futurist. When he wrote his chapter, "How To Wreck The Environment", for the book Unless Peace Comes, he was not kidding around. In it he describes the use of weather manipulation, climate modification, polar ice cap melting or destabilization, ozone depletion techniques, earthquake engineering, ocean wave control and brain wave manipulation using the planet's energy fields. He also said that these types of weapons would be developed and, when used, would be virtually undetectable by their victims. Is HAARP that weapon? The military's intention to do environmental engineering is well documented. U.S. Congress' subcommittee hearings on Oceans and International Environment looked into military weather and climate modification conducted in the early 1970's. "What emerged was an awesome picture of far-ranging research and experimentation by the Department of Defense into ways environmental tampering could be used as a weapon, HAARP zaps the ionosphere where it is relatively unstable. A point to remember is that the ionosphere is an active electrical shield protecting the planet from the constant bombardment of high-energy particles from space. This conducting plasma, along with Earth's magnetic field, traps the electrical plasma of space and holds it back from going directly to the earth's surface, says Charles Yost of Dynamic Systems, Leicester, North Carolina. "If the ionosphere is greatly disturbed, the atmosphere below is subsequently disturbed." Another scientist interviewed said there is a super-powerful electrical connection between the ionosphere and the part of the atmosphere where our weather comes onstage, the lower atmosphere. One man-made electrical effect - power line harmonic resonance - causes fallout of charged particles from the Van Allen (radiation) belts, and the falling ions cause ice crystals (which precipitate rain clouds). What about HAARP? Energy blasted upward from an ionospheric heater is not much compared to the total in the ionosphere, but HAARP documents admit that thousandfold-greater amounts of energy can be released in the ionosphere than injected. As with MacDonald's "key to geophysical warfare", "nonlinear" effects (described in the literature about the ionospheric heater) mean small input and large output. Astrophysicist Adam Trombly told Manning that an acupuncture model is one way to look at the possible effect of multi-gigawatt pulsing of the ionosphere. If HAARP hits certain points , those parts of the ionosphere could react in surprising ways. Smaller ionospheric heaters such as the one at Arecibo are underneath relatively placid regions of the ionosphere, compared to the dynamic movements nearer Earth's magnetic poles. That adds another uncertainty to HAARP - the unpredictable and lively upper atmosphere near the North Pole. HAARP experimenters do not impress common sense Alaskans such as Barbara Zickuhr, who says "They're like boys playing with a sharp stick, finding a sleeping bear and poking it in the butt to see what's going to happen." Earth could be Short-Circuited". Earth as a spherical electrical system is a fairly well-accepted model. However, those experimenters who want to make unnatural power connections between parts of this system might not be thinking of possible consequences. Electrical motors and generators can be caused to wobble when their circuits are affected. Could human activities cause a significant change in a planet's electrical circuit or electrical field? A paper in the respected journal Science deals with manmade ionization from radioactive material, but perhaps it could also be studied with HAARP-type skybusters in mind: "For example, while changes in the earth's electric field resulting from a solar flare modulating conductivity may have only a barely detectable effect on meteorology, the situation may be different in regard to electric field changes caused by manmade ionization..." Meteorology, of course, is the study of the atmosphere and weather. Ionization is what happens when a higher level of power is zapped into atoms and knocks electrons off the atoms. The resulting charged particles are the stuff of HAARP. "One look at the weather should tell us that we are on the wrong path," says Paul Schaefer, commenting on HAARP- Techn**ology.**

U.S. Navy Contract for Ultrasonic Acoustic Heterodyning Technology

Announced April 12, 2000

This announcement from American Technology Corp., the patent holder for acoustic heterodyning technology, clearly shows that the use of ultrasound for transmission of voice over significant distances is a reality. When voice-FM is used in place of normal, hearable audio, you have one method of targeting a person at a distance, even in a crowd, with hypnotic commands which cannot be heard by the ears but which are heard and understood by the mind. This development in covert hypnosis technology underscores the urgent need for debate and controls on all such anti-personnel weapons-capable technologies, instead of the stone silence all governments have maintained to this date.

Subject: ATCO Press Release 4/12/00 (1 of 2)

FOR IMMEDIATE RELEASE

AMERICAN TECHNOLOGY CORPORATION ANNOUNCES LICENSE WITH THOMSON MULTIMEDIA

NAVSEA Contract

Mr. Brosnan then announced that the PMS 400 division of NAVSEA has awarded a $218,000 research and development contract to the company and General Dynamics Bath Iron Works to test ATC's patented HyperSonic(TM) Sound technology (HSS(TM)) on board a U.S. Navy Aegis Destroyer under construction at Bath Iron Works. Among its many applications, HSS technology enables ship-to-ship communications without breaking radio silence. HSS can also target selected individuals in a group or in a noisy environment and deliver audio to that person. Bath Iron Works, a General Dynamics Company, supplies technology and shipbuilding services to the U.S. Navy. General Dynamics employs 43,000 people worldwide and has annualized sales of approximately $10 billion.

Elwood G. Norris, Founder of the company, demonstrated voice and music content with exceptional clarity and bandwidth through the latest, proprietary HSS emitter and modulator technologies to shareholders at the meeting in Escondido, California.

Patents

Mr. Brosnan announced that as of the date of the meeting, the company had been granted nine (9) patents on HSS and has another nine (9) patents pending. Additionally, the company has eight (8) patents pending on its SFT technology and two (2) patents pending on its MFW(TM) subwoofer technology.

NAVSEA AWARDS $218,000 RESEARCH AND DEVELOPMENT CONTRACT TO BATH IRON WORKS AND AMERICAN TECHNOLOGY CORPORATION FOR TEST APPLICATION OF HYPERSONIC(TM) SOUND TECHNOLOGY

(SAN DIEGO, CALIFORNIA - April 12, 2000) - The PMS 400 division of NAVSEA has awarded a $218,000 research and development contract to General Dynamics Bath Iron Works and American Technology Corporation (NASDAQ: ATCO) to test HyperSonic Sound Technology on board a U.S. Navy Aegis Destroyer under construction at Bath Iron Works.

HyperSonic Sound Technology, under development in the laboratories of American Technology Corporation in San Diego, California, is a revolutionary sound reproduction system. The most important quality of HSS(TM) is the ability to direct or focus sound into a tight beam, similar to the beam of light from a flashlight. No other audio reproduction device available today provides this powerful feature. Not since the development of the "cone" loudspeaker more than 75 years ago has any technology provided such significant departure from conventional speakers and such a remarkable approach to the reproduction of sound.

About Bath Iron Works

Bath Iron Works of Bath, Maine, a leader in surface combatant design and construction, employs 7,600 people. It is a subsidiary of General Dynamics (NYSE:GD), headquartered in Falls Church, Virginia. General Dynamics has leading market positions in shipbuilding and marine systems, land and amphibious combat systems, information systems, and business aviation. The company employs 43,000 people worldwide and has annualized sales of approximately $10 billion. More information about General Dynamics can be found on the worldwide web at www.generaldynamics.com.

HAARP

*By **Dr. Nick Begich & Jeane Manning***

HAARP will zap the upper atmosphere with a focused and steer able electromagnetic beam. It is an advanced model of an "ionospheric heater". (The ionosphere is the electrically-charged sphere surrounding Earth's upper atmosphere. It ranges between about 40- to 600 miles above Earth's surface.) Put simply, the apparatus for HAARP is a reversal of a radio telescope; antennas send out signals instead of receiving. HAARP is the test run for a super-powerful radio wave-beaming technology that lifts areas of the ionosphere by focusing a beam and heating those areas. Electromagnetic waves then bounce back onto earth and penetrate everything - living and dead.

HAARP publicity gives the impression that the High-frequency Active Auroral Research Program is mainly an academic project with the goal of changing the ionosphere to improve communications for our own good. However, other U.S. military documents put it more clearly -- HAARP aims to learn how to "exploit the ionosphere for Department of Defense purposes". Communicating with submarines is only one of those purposes. Press releases and other information from the military on

HAARP continually downplay what it could do. Publicity documents insist that the HAARP project is no different than other ionospheric heaters operating safely throughout the world in places such as Arecibo, Puerto Rico; Tromso, Norway and the former Soviet Union. However, a 1990 government document indicates that the radio-frequency (RF) power zap will drive the ionosphere to unnatural activities. "...at the highest HF powers available in the West, the instabilities commonly studied are approaching their maximum RF energy dissipative capability, beyond which the plasma processes will 'runaway' until the next limiting factor is reached."

If the military, in cooperation with the University of Alaska Fairbanks, can show that this new ground-based "Star Wars" technology is sound, they both win. The military has a relatively-inexpensive defense shield and the University can brag about the most dramatic geophysical manipulation since atmospheric explosions of nuclear bombs. After successful testing, they would have the military megaprojects of the future and huge markets for Alaska's North Slope natural gas. Looking at the other patents which built on the work of a Texas' physicist named Bernard Eastlund, it becomes clearer how the military intends to use the HAARP transmitter. It also makes governmental denials less believable. The military knows how it intends to use this technology, and has made it clear in their documents. The military has deliberately misled the public, through sophisticated word games, deceit and outright disinformation. The military says the HAARP system could: give the military a tool to replace the electromagnetic pulse effect of atmospheric thermonuclear devices (still considered a viable option by the military through at least 1986). Replace the huge Extremely Low Frequency (ELF) submarine communication system operating in Michigan and Wisconsin with a new and more compact technology. Be used to replace the over-the-horizon radar system that was once planned for the current location of HAARP, with a more flexible and accurate system. provide a way to wipe out communications over an extremely large area, while keeping the military's own communications systems working. provide a wide area earth-penetrating tomography which, if combined with the computing abilities of EMASS and Cray computers, would make it possible to verify many parts of nuclear nonproliferation and peace agreements. It's a tool for geophysical probing to find oil, gas and mineral deposits over a large area. be used to detect incoming low-level planes and cruise missiles, making other technologies obsolete.

The above abilities seem like a good idea to all who believe in sound national defense, and to those concerned about cost-cutting. However, the possible uses which the HAARP records do not explain, and which can only be found in Air Force, Army, Navy and other federal agency records, are alarming. Moreover, effects from the reckless use of these power levels in our natural shield - the ionosphere - could be cataclysmic according to some scientists. Two Alaskans put it bluntly. A founder of the NO HAARP movement, Clare Zickuhr, says "The military is going to give the ionosphere a big kick and see what happens." The military failed to tell the public that they do not know what exactly will happen, but a Penn State science article brags about that uncertainty. The HAARP project uses the largest energy levels yet played with by what Begich and Manning call "the big boys with their new toys". It is an experiment on the sky, and experiments are done to find out something not already known. Independent scientists told Begich and Manning that a HAARP-type "Skybuster" with its unforeseen effects could be an act of global vandalism.

The patents described below were the package of ideas which were originally controlled by ARCO Power Technologies Incorporated (APTI), a subsidiary of Atlantic Richfield Company, one of the biggest oil companies in the world. APTI was the contractor that built the HAARP facility. ARCO sold this subsidiary, the patents and the second phase construction contract to E-Systems in June 1994. E-Systems is one of the biggest intelligence contractors in the world – doing work for the CIA, defense intelligence organizations and others. $1.8 billion of their annual sales are to these organizations, with $800 million for black projects -- projects so secret that even the United States Congress isn't told how the money is being spent. E-Systems was bought out by Raytheon, which is one of the largest defense contractors in the world. In 1994 Raytheon was listed as number forty-two on the Fortune 500 list of companies. Raytheon has thousands of patents, some of which will be valuable in the HAARP project. The twelve patents below are the backbone of the HAARP project, and are now buried among the thousands of others held in the name of Raytheon. Bernard J. Eastlund's U.S. Patent # 4,686,605 "Method and Apparatus

for Altering a Region in the Earth's Atmosphere, Ionosphere, and/or Magnetosphere" was sealed for a year under a government Secrecy Order. The Eastlund ionospheric heater was different; the radio frequency (RF) radiation was concentrated and focused to a point in the ionosphere. This difference throws an unprecedented amount of energy into the ionosphere.

The Eastlund device would allow a concentration of one watt per cubic centimeter, compared to others only able to deliver about one-millionth of one watt. This huge difference could lift and change the ionosphere in the ways necessary to create futuristic effects described in the patent. According to the patent, the work of Nikola Tesla in the early 1900's formed the basis of the research. What would this technology be worth to ARCO, the owner of the patents? They could make enormous profits by beaming electrical power from a powerhouse in the gas fields to the consumer without wires.

For a time, HAARP researchers could not prove that this was one of the intended uses for HAARP. In April, 1995, however, Begich found other patents, connected with a "key personnel" list for APTI. Some of these new APTI patents were indeed a wireless system for sending electrical power. Eastlund's patent said the technology can confuse or completely disrupt airplanes' and missiles' sophisticated guidance systems. Further, this ability to spray large areas of Earth with electromagnetic waves of varying frequencies, and to control changes in those waves, makes it possible to knock out communications on land or sea as well as in the air. The patent said: "Thus, this invention provides the ability to put unprecedented amounts of power in the Earth's atmosphere at strategic locations and to maintain the power injection level, particularly if random pulsing is employed, in a manner far more precise and better controlled than heretofore accomplished by the prior art, particularly by detonation of nuclear devices of various yields at various altitudes....it is possible not only to interfere with third party communications but to take advantage of one or more such beams to carry out a communications network even though the rest of the world's communications are disrupted. Put another way, what is used to disrupt another's communications can be employed by one knowledgeable of this invention as a communication network at the same time." large regions of the atmosphere could be lifted to an unexpectedly high altitude so that missiles encounter unexpected and unplanned drag forces with resultant destruction ... " Weather modification is possible by, for example, altering upper atmosphere wind patterns by constructing one or more plumes of atmospheric particles which will act as a lens or focusing device. Molecular modifications of the atmosphere can take place so that positive environmental effects can be achieved. Besides actually changing the molecular composition of an atmospheric region, a particular molecule or molecules can be chosen for increased presence. For example, ozone, nitrogen, etc., concentrations in the atmosphere could be artificially increased... Begich found eleven other APTI patents. They told how to make Nuclear-sized Explosions without Radiation", power- beaming systems, over-the-horizon radar, detection systems for missiles carrying nuclear warheads, electromagnetic pulses previously produced by thermonuclear weapons and other Star-Wars tricks. This cluster of patents underlay the HAARP weapon system.

Related research by Begich and Manning uncovered bizarre schemes. For example, Air Force documents revealed that a system had been developed for manipulating and disrupting human mental processes through pulsed radio-frequency radiation (the stuff of HAARP) over large geographical areas. The most telling material about this technology came from writings of Zbigniew Brzezinski (former National Security Advisory to U.S. President Carter) and J.F. MacDonald (science advisor to U.S. President Johnson and a professor of Geophysics at UCLA), as they wrote about use of power- beaming transmitters for geophysical and environmental warfare. The documents showed how these effects might be caused, and the negative effects on human health and thinking. The mental-disruption possibilities for HAARP are the most disturbing. More than 40 pages of the book, with dozens of footnotes, chronicle the work of Harvard professors, military planners and scientists as they plan and test this use of the electromagnetic technology. For example, one of the papers describing this use was from the International Red Cross in Geneva. It even gave the frequency ranges where these effects could occur -- the same ranges which HAARP is capable of broadcasting. The following statement was made more than twenty-five years ago, in a book by Brzezinski which he wrote while a professor at Columbia University: "Political strategists are tempted to exploit research on the brain and human behavior. Geophysicist: Gordon J. F.MacDonald -- specialist in problems of warfare -- says accurately-timed, artificially-excited electronic strokes 'could lead to a pattern of oscillations that produce relatively high power levels over certain regions of the earth...In this way, one could develop a system that would seriously impair the brain performance of very large populations in selected regions over an extended period'...No matter how deeply disturbing the thought of using the environment to manipulate behavior for national advantages , to some, the technology permitting such use will very probably develop within the next few decades." In 1966, MacDonald was a member of the President's Science Advisory Committee and later a member of the President's Council on Environmental Quality. He published papers on the use of environmental control technologies for military purposes.

The most profound comment he made as a geophysicist was, "The key to geophysical warfare is the identification of environmental instabilities to which the addition of a small amount of energy would release vastly greater amounts of energy." While yesterday's geophysicists predicted today's advances, are HAARP program managers delivering on the vision? The geophysicists recognized that adding energy to the environmental soup could have large effects. However, humankind has already added substantial amounts of electromagnetic energy into our environment without understanding what might constitute critical mass. The book by Begich and Manning raises questions: Have these additions been without effect, or is there a cumulative amount beyond which irreparable damage can be done? Is HAARP another step in a journey from which we cannot turn back? Are we about to embark on another energy experiment which unleashes another set of demons from Pandora's box?

As early as 1970, Zbigniew Brzezinski predicted a "more controlled and directed society" would gradually appear, linked to technology. This society would be dominated by an elite group which impresses voters by allegedly superior scientific know-how. Angels Don't Play This HAARP further quotes Brzezinski: "Unhindered by the restraints of traditional liberal values, this elite would not hesitate to achieve its political ends by using the latest modern techniques for influencing public behavior and keeping society under close surveillance and control. Technical and scientific momentum would then feed on the situation it exploits", Brzezinski predicted. His forecasts proved accurate. Today, a number of new tools for the "elite" are emerging, and the temptation to use them increases steadily. The policies to permit the tools to be used are already in place. How could the United States be changed, bit by bit, into the predicted highly-controlled technosociety? Among the "steppingstones" Brzezinski expected were persisting social crises and use of the mass media to gain the public's confidence. In another document prepared by the government, the U.S. Air Force claims: "The potential applications of artificial electromagnetic fields are wide-ranging and can be used in many military or quasi-military situations...Some of these potential uses include dealing with terrorist groups, crowd control, controlling breaches of security at military installations, and antipersonnel techniques in tactical warfare.

In all of these cases the EM (electromagnetic) systems would be used to produce mild to severe physiological disruption or perceptual distortion or disorientation. In addition, the ability of individuals to function could be degraded to such a point that they would be combating ineffective. Another advantage of electromagnetic systems is that they can provide coverage over large areas with a single system. They are silent and countermeasures to them may be difficult to develop... One last area where electromagnetic radiation may prove of some value is in enhancing abilities of individuals for anomalous phenomena." Do these comments point to uses already somewhat developed? The author of the government report refers to an earlier Air Force document about the uses of radiofrequency radiation in combat situations. (Here Begich and Manning note that HAARP is the most versatile and the largest radio-frequency-radiation transmitter in the world.)

The United States Congressional record deals with the use of HAARP for penetrating the earth with signals bounced off of the ionosphere. These signals are used to look inside the planet to a depth of many kilometers in order to locate underground munitions, minerals and tunnels. The U.S. Senate set aside $15 million dollars in 1996 to develop this ability alone -- earth-penetrating-tomography. The problem is that the frequency needed for earth-penetrating radiations is within the frequency range most cited for disruption of human mental functions. It may also have profound effects on migration patterns of fish and wild animals which rely on an undisturbed energy field to find their routes. As if electromagnetic pulses in the sky and mental disruption were not enough, Eastlund bragged that the super-powerful ionospheric heater could control weather. Begich and Manning brought to light government documents indicating that the military has weather-control technology.

When HAARP is eventually built to its full power level, it could create weather effects over entire hemispheres. If one government experiments with the world's weather patterns, what is done in one place will impact everyone else on the planet.

Physicist Daniel Winter, Ph. D. , of Waynesville, North Carolina, says HAARP high-frequency emissions can couple with longwave (low-frequency, or ELF) pulses the Earth grid uses to distribute information as vibrations to synchronize dances of life in the biosphere. Dan terms this geomagnetic action 'Earth's information bloodstream'., and says it is likely that coupling of HAARP HF (high-frequency) with natural ELF (extremely low frequency) can cause unplanned, unsuspected side effects. David Yarrow of Albany, New York, is a researcher with a background in electronics. He described possible interactions of HAARP radiations with the ionosphere and Earth's magnetic grid: "HAARP will not burn 'holes' in the ionosphere. That is a dangerous understatement of what HAARP's giant gigawatt beam will do. Earth is spinning relative to thin electric shells of the multilayer membrane of 'ion-o-speres' that absorb and shield Earth's surface from intense solar radiation, including charged particle storms in solar winds erupting from the sun. Earth's axial spin means that HAARP -- in a burst lasting more than a few minutes -- will slice through the ionosphere like a microwave knife. This produces not a 'hole', but a long tear -- an incision." Crudely Plucking The Strings “Second concept: As Earth rotates, HAARP will slice across geomagnetic flux...a donut-shaped spool of magnetic strings -- like longitude meridians (on maps). HAARP may not 'cut' these strings in Gaia's magnetic mantle, but will pulse each thread with harsh, out-of-harmony high frequencies. These noisy impulses will vibrate geomagnetic flux lines, sending vibrations all through the geomagnetic web." "The image comes to mind of a spider on its web. An insect lands, and the web's vibrations alert the spider to possible prey. HAARP will be a man-made microwave finger poking at the web, sending out confusing signals, if not tearing holes in the threads." "Effects of this interference with symphonies of Gaia's geomagnetic harp are unknown, and I suspect barely thought of. Even if thought of, the intent (of HAARP) is to learn to exploit any effects, not to play in tune to global symphonies." Among other researchers quoted is Paul Schaefer of Kansas City. His degree is in electrical engineering and he spent four years building nuclear weapons. "But most of the theories that we have been taught by scientists to believe in seem to be falling apart," he says. He talks about imbalances already caused by the industrial and atomic age, especially by radiation of large numbers of tiny, high-velocity particles "like very small spinning tops into our environment. The unnatural level of motion of highly- energetic particles in the atmosphere and in radiation belts surrounding Earth is the villain in the weather disruptions, according to this model, which describes an Earth discharging its buildup of heat, relieving stress and regaining a balanced condition through earthquakes and volcanic action.

One might compare the abnormal energetic state of the Earth and its atmosphere to a car battery which has become overcharged with the normal flow of energy jammed up, resulting in hot spots, electrical arcing, physical cracks and general turbulence as the pent-up energy tries to find some place to go. In a second analogy, Schaefer says "Unless we desire the death of our planet, we must end the production of unstable particles which are generating the earth's fever. A first priority to prevent this disaster would be to shut down all nuclear power plants and end the testing of atomic weapons, electronic warfare

and 'Star Wars'." Meanwhile, the military builds its biggest ionospheric heater yet, to deliberately create more instabilities in a huge plasma layer -- the ionosphere -- and to rev up the energy level of charged particles. Electronic Rain From The Sky They have published papers about electron precipitation from the magnetosphere (the outer belts of charged particles which stream toward Earth's magnetic poles) caused by man-made very low frequency electromagnetic waves. "These precipitated particles can produce secondary ionization, emit X-rays, and cause significant perturbation in the lower ionosphere." Two Stanford University radio scientists offer evidence of what technology can do to affect the sky by making waves on earth; they showed that very low frequency radio waves can vibrate the magnetosphere and cause high-energy particles to cascade into Earth's atmosphere. By turning the signal on or off, they could stop the flow of energetic particles. Weather Control Avalanches of energy dislodged by such radio waves could hit us hard. Their work suggests that technicians could control global weather by sending relatively small 'signals' into the Van Allen belts (radiation belts around Earth). Thus Tesla's resonance effects can control enormous energies by tiny triggering signals. The Begich/ Manning book asks whether that knowledge will be used by war-oriented or biosphere-oriented scientists. The military has had about twenty years to work on weather warfare methods, which it euphemistically calls weather modification. For example, rainmaking technology was taken for a few test rides in Vietnam. The U.S. Department of Defense sampled lightning and hurricane manipulation studies in Project Skyfire and Project Stormfury. And they looked at some complicated technologies that would give big effects. Angels Don't Play This HAARP cites an expert who says the military studied both lasers and chemicals which they figured could damage the ozone layer over an enemy. Looking at ways to cause earthquakes, as well as to detect them, was part of the project named Prime Argus, decades ago. The money for that came from the Defense Advanced Research Projects Agency (DARPA, now under the acronym ARPA.) In 1994 the Air Force revealed its Spacecast 2020 master plan which includes weather control. Scientists have experimented with weather control since the 1940's, but Spacecast 2020 noted that "using environmental modification techniques to destroy, damage or injure another state are prohibited". Having said that, the Air Force claimed that advances in technology "compels a reexamination of this sensitive and potentially risky topic."

As far back as 1958, the chief White House advisor on weather modification, Captain Howard T. Orville, said the U.S. defense department was studying "ways to manipulate the charges of the earth and sky and so affect the weather" by using an electronic beam to ionize or de-ionize the atmosphere over a given area. In 1966, Professor Gordon J. F. MacDonald was associate director of the Institute of Geophysics and Planetary Physics at the University of California, Los Angeles, was a member of the President's Science Advisory Committee, and later a member of the President's Council on Environmental Quality. He published papers on the use of environmental-control technologies for military purposes. MacDonald made a revealing comment: "The key to geophysical warfare is the identification of environmental instabilities to which the addition of a small amount of energy would release vastly greater amounts of energy." World-recognized scientist MacDonald had a number of ideas for using the environment as a weapon system and he contributed to what was, at the time, the dream of a futurist. When he wrote his chapter, "How to Wreck the Environment", for the book Unless Peace Comes, he was not kidding around. In it he describes the use of weather manipulation, climate modification, polar ice cap melting or destabilization, ozone depletion techniques, earthquake engineering, ocean wave control and brain wave manipulation using the planet's energy fields. He also said that these types of weapons would be developed and, when used, would be virtually undetectable by their victims. Is HAARP that weapon? The military's intention to do environmental engineering is well documented. U.S. Congress' subcommittee hearings on Oceans and International Environment looked into military weather and climate modification conducted in the early 1970's. "What emerged was an awesome picture of far-ranging research and experimentation by the Department of Defense into ways environmental tampering could be used as a weapon," said another author cited in Angels Don't Play This HAARP. The revealed secrets surprised legislators. Would an inquiry into the state of the art of electromagnetic manipulation surprise lawmakers today? They may find out that technologies developed out of the HAARP experiments in Alaska could deliver on Gordon MacDonald's vision, because leading-edge scientists are describing global weather as not only air pressure and thermal systems, but also as an electrical system.

HAARP zaps the ionosphere where it is relatively unstable. A point to remember is that the ionosphere is an active electrical shield protecting the planet from the constantbombardment of high-energy particles from space. This conducting plasma, along with Earth's magnetic field, traps the electrical plasma of space and holds it back from going directly to the earth's surface, says Charles Yost of Dynamic Systems, Leicester, North Carolina. "If the ionosphere is greatly disturbed, the atmosphere below is subsequently disturbed.. Another scientist interviewed said there is a super-powerful electrical connection between the ionosphere and the part of the atmosphere where our weather comes onstage, the lower atmosphere. One man-made electrical effect - power line harmonic resonance - causes fallout of charged particles from the Van Allen (radiation) belts, and the falling ions cause ice crystals (which precipitate rain clouds). What about HAARP? Energy blasted upward from an ionospheric heater is not much compared to the total in the ionosphere, but HAARP documents admit that thousandfold-greater amounts of energy can be released in the ionosphere than injected. As with MacDonald's "key to geophysical warfare", "nonlinear" effects (described in the literature about the ionospheric heater) mean small input and large output. Astrophysicist Adam Trombly told Manning that an acupuncture model is one way to look at the possible effect of multi-gigawatt pulsing of the ionosphere. If HAARP hits certain points , those parts of the ionosphere could react in surprising ways. Smaller ionospheric heaters such as the one at Arecibo are underneath relatively placid regions of the ionosphere, compared to the dynamic movements nearer Earth's magnetic poles. That adds another uncertainty to HAARP - the unpredictable and lively upper atmosphere near the North Pole. HAARP experimenters do not impress common sense Alaskans such as Barbara Zickuhr, who says "They're like boys playing with a sharp stick, finding a sleeping bear and poking it in the butt to see what's going to happen." Could They Short-Circuit Earth? Earth as a spherical electrical system is a fairly well-accepted model. However, those experimenters who want to make unnatural power connections between parts of this system might not be thinking of possible consequences. Electrical motors and generators can be caused to wobble when their circuits are affected. Could human activities cause a significant change in a planet's electrical circuit or electrical field?

A paper in the respected journal Science deals with manmade ionization from radioactive material, but perhaps it could also be studied with HAARP-type skybusters in mind. "For example, while changes in the earth's electric field resulting from a solar flare modulating conductivity may have only a barely detectable effect on meteorology, the situation may be different in regard to electric field changes caused by manmade ionization..." Meteorology, of course, is the study of the atmosphere and weather. Ionization is what happens when a higher level of power is zapped into atoms and knocks electrons off the atoms. The resulting charged particles are the stuff of HAARP. "One look at the weather should tell us that we are on the wrong path," says Paul Schaefer, commenting on HAARP- type technologies. Angels Don't Play This HAARP: Advances in Tesla Technology is about the military's plan to manipulate that which belongs to the world - the ionosphere. The arrogance of the United States government in this is not without precedent. Atmospheric nuclear tests had similar goals. More recently, China and France put their people's money to destructive use in underground nuclear tests. It was recently reported that the US government spent $3 trillion dollars on its nuclear program since its beginnings in the 1940's. What new breakthroughs in life science could have been made with all the money spent on death? Begich, Manning, Roderick and others believe that democracies need to be founded on openness, rather than the secrecy which surrounds so much military science. Knowledge used in developing revolutionary weapons could be used for healing and helping mankind. Because they are used in new weapons, discoveries are classified and suppressed. When they do appear in the work of other independent scientists, the new ideas are often frustrated or ridiculed, while military research laboratories continue to build their new machines for the killing fields. However, the book by Manning and Begich gives hope that the military- industrial- academic- bureaucratic Goliath can be affected by the combined power of determined individuals and the alternative press. Becoming informed is the first step to empowerment.

Ground-Based 'Star Wars' Disaster Or 'Pure' Research?

"The earth is delicately balanced, and seeks to restore balance when disturbed. No one really knows how ionospheric experiments will affect that balance, or what the earth will do in response to try to restore balance." These words are from Rosalie Bertell, Ph.D., of Toronto, Canada, founder of the International Institute of Concern for Public Health. Dr. Bertell was commenting on a U. S. military experiment named HAARP (High Frequency Active Auroral Research Program). HAARP may be the test run for a ground-based 'Star Wars' defense system. Military documents say it is intended to disrupt portions of the ionosphere (electrically active layer above the upper atmosphere) by heating it with powerful pulsed radio frequency beams. Radiation that bounces back to the surface of the planet would be in the longwave ELF (extremely low frequency) range. Intended to be the most powerful ionospheric heater ever built, HAARP's ground-based apparatus - an array of 48 antennae each powered by its own transmitter - sits in the remote Alaskan wilderness northeast of the city of Anchorage. HAARP is much more than the auroral (Northern Lights) and radio-communications research project as is claimed by researchers at the University of Alaska's Geophysical Institute and their financial backers - the U.S. Navy and U.S. Air Force. Any weapons system in its early stages can be easily disguised as "pure" research. The fact is however, that HAARP is a military experiment aimed at invasively manipulating the ionosphere by beaming high energy upward from the ground. Such activity could potentially disrupt natural systems on the earth and high above it. Individual members of the European Parliament are among the growing number of people worldwide who have been startled to hear about HAARP. Voices expressing various levels of concern are being heard in many countries. For example, in contrast with the cautiously-worded comment of Dr. Bertell, a Germany-based researcher in the field of quantum electrodynamics, Al Zielinski, paints an apocalyptic word-picture. (He says HAARP technology could trigger a disaster with a global impact - electromagnetic waves causing destruction "when interacting with protective layers of the earth and its gravitational field".) The ionosphere seems very far away, but even when undisturbed by humans it affects our everyday lives. For example, radio broadcasts are bounced off this electrically charged layer which lies between forty and six hundred miles above the surface of the earth, just above the ozone layer. The ionosphere is alive with electrical activity, so much so that its processes are "non-linear". This means that the ionosphere is dynamic, and its reactions to experiments are unpredictable. The concept of non-linear is important in understanding the concerns of independent scientists who are knowledgeable about advanced physics and who warn against brash high-energy experiments on the ionosphere. Non-linear processes can change suddenly and unexpectedly, or they can increase in power dramatically. Some theorists such as Zielinski say that a non-linear process can under certain conditions tap into the background energy of space, which is also called "zero-point fluctuations of the vacuum".

Studying radio communications by using a tool as powerful as HAARP is a worthy scientific task in the opinion of the authors, but some independent researchers question whether the means justifies the end. Is it wise to poke holes in Earth's electrical umbrella? Is it wise to prod a dynamic natural system without knowing how it might react? HAARP-Type Technology Could Perform A Variety Of Tricks HAARP is intended to heat and lift a portion of the ionosphere above a selected location or locations on the planet in order to make a huge invisible "mirror" for bouncing electromagnetic radiation back to the surface of Earth. Why? The answer is that the U.S. military wants to: communicate with its submerged submarines by penetrating the oceans with ELF (Extremely Low Frequency) radiations. penetrate the land with ELF in order to search for hidden tunnels or other sites of military interest (a process known as earth-penetrating tomography). What else could a HAARP-type project do in the near future? If the technology is scaled up in size, it could: Shield a territory from intercontinental ballistic missiles Fry satellites Discriminate between incoming objects (missiles) Enhance communications Disrupt communications over a large area of the globe Change the chemical structure of the upper atmosphere and possibly alter the weather Affect human mental functioning Impact the health of humans and other biological systems. Ionospheric heaters as a class of research instruments are nothing new; they have operated in Puerto Rico, the former Soviet Union and Tromso, Norway (operated by Max Planck Insitut fur Aeronomie) as well as at another site in Alaska. But what is being tested in the Alaskan wilderness since 1994 is new -- a tool that can focus and steer the radio frequency energy upward. This makes it capable of hitting the ionosphere with a far greater impact than possible from the previous design of heaters. As

HAARP's focused radio-frequency beams heat and boil targeted locations of the ionosphere, Earth's electrical system will be injected with a further excess of high-energy particles. What happens when a saturated system is infused repeatedly with too much energy? This question has been raised by independent physicists.

Each experiment with the HAARP is a test run for what can later be a powerful multi-purpose tool for the United States military. When completely built, the tool will beam an immense amount of focused radio-frequency energy upward, heating and therefore lifting a part of the ionosphere. To picture how HAARP works, imagine a radio telescope in reverse; antennas that send out signals instead of receiving them. Then imagine an array of the most powerful of such instruments, working together to focus a beam upward. How can a lay person understand what such a tool could do? Alaska state legislators are not necessarily trained in science, so in the spring of 1996 their State Affairs committee called in representatives of both sides of the HAARP controversy. (Following publication of the book Angels Don't Play This HAARP, many Alaskans became aware of the experiment in their backyard and asked their lawmakers to look at it.) Alaska Lawmakers Hear Scientists' Concerns One of the experts who testified at the State Affairs Committee hearing was Richard Williams of Princeton, New Jersey. He has a doctorate degree in physical chemistry from Harvard University and worked for 30 years as an industrial scientist in solid state electronics, electronics, structure of clouds, water evaporation and other environmental problems. Dr. Williams is an independent scientist; he's not dependent on funding from the military. This lends him a degree of independent judgment which compels us to quote him at length: "I want to alert the legislature to an activity now going on in Alaska that, in addition to any local effect, might become a global threat to the atmosphere. That is HAARP. The initial experiment, as Mr.(project manager John) Hecksher said, will be done using modest power levels and are not a cause for concern. However, the project's internal documents indicate that plans include the eventual use of power levels up to ten billion watts. This is an enormous power level, more than 200 times the total electrical power level used by the city of Juneau. There could be a serious impact in the atmosphere that might result from energies of this magnitude. Effects might include drastic alteration of the thermal, refractive, scattering and emission character of the atmosphere over a wide range of the electromagnetic spectrum." "Experiments at this power level would produce large changes in the concentration of charged particles in the ionosphere that would persist for some time and might even lead to permanent changes." Dr. Williams told the committee that he is a supporter of the armed forces, but as a scientist he wanted to explain how "unintended consequences of innocent and beneficial human activities can cause serious changes on a global scale". We introduced two examples of activities earlier this century which caused unintentional and serious changes in the atmosphere, with effects worldwide. The first example he cited was the growing concentration of carbon dioxide in the atmosphere. "What we don't know yet is how this will affect the delicate balance of life on earth." The second unintended change that he cited is damage to the ozone layer, that shields us from harmful ultraviolet radiation. "In neither of these examples would an Environmental Impact Statement have identified the problem in time. Do we have any way to judge what (HAARP's) energy can do to the upper atmosphere?" Excess Of Charged Particles, A Product Of HAARP Perhaps, Dr. Williams offered, we do have an indicator: results of high-altitude nuclear explosions by the US and USSR during the Cold War. Intended to produce artificial radiation zones and possibly counteract a threat of intercontinental ballistic missiles, the explosions resulted in global interruptions of radio communications and profound disturbances of the upper atmosphere, including greatly increased concentrations of charged particles. Following one of these tests, in July of 1962, James Van Allen used specially-instrumented satellites to monitor the electron population in the upper atmosphere. He reported a large initial increase in electron population, followed by a slow decrease, with significant disturbances still observable a year after the explosion. "But this was just one injection of energy," Dr. Williams said. "To develop a military system, such as the one proposed by HAARP to communicate with submerged submarines, takes many tests, even if the system is never used in combat. For example, for test purposes over the years, the nuclear armed countries have exploded more than 2,000 nuclear weapons, mostly near the Earth's surface or under ground. A single massive injection of energy into the atmosphere violently disturbs its properties, and as Van Allen showed, the effect can last for a year or more." "What would be the effect of repeatedly injecting high energy thousands of times? I believe the answer is that no one knows." Those were changes of the atmosphere on a global scale, Dr. Williams noted. He pondered the possibility of additional, special, effects for polar regions, where the upper atmosphere has unique properties. Showers of charged particles coming from storms on the sun veer toward the poles, where they enter the atmosphere and produce the northern lights; some changes in the ozone layer have been most extreme over Antarctica and the far North. "Any future global changes in the atmosphere might well be noticed first in polar regions. Alaska may get the first warning of coming changes. And serve as the miner's canary for the rest of the world. If this happened, Alaska's state motto, 'North to the Future', would take on an unintended and ironic meaning." "For any program that might damage the atmosphere on a global scale, we need to have full warning of the plans in advance, and informed public discussion, to justify the activity and identify all possible hazards." Controversial Views Dr. William Gordon (Ph.D. at Rice University, an electrical engineer specializing in radio communications) has worked on an ionospheric heater project and said there is "no convincing evidence" that exposure to low frequency electric or magnetic fields causes monitorable health hazards. He said the U.S. Navy has sponsored a series of studies asking if their ELF transmitters in the states of Wisconsin and Michigan have caused harm. "The results are not all in, but from the material I have looked at, operation of the ELF facility does not produce ecological effects..." While testifying at the legislative hearing he claimed that operation of very powerful transmitters have no adverse health effects.

Dr. Patrick Flanagan of Arizona disagrees. Dr. Flanagan also gave telephoned testimony. Since the proponents of HAARP focused attention on whether those questioning the project have prestigious academic backgrounds, Dr. Begich introduced Patrick Flanagan at length: He has a doctorate in both medicine and physics and has experience in government weapons projects: he developed and sold a guided missile detector to the U.S. military when still a youth. Later he developed an electronic device for communication with the brain. Dr. Flanagan worked with a Pentagon think tank that was run by the former head of the Office of Scientific Research. He also developed speech encoding systems. He has worked for NASA, Tufts University, the Office of Naval Research, and at the Aberdeen Proving Grounds for the Department of Unconventional Weapons and Warfare. The major portion of Dr. Flanagan's life work, however, has been on electromagnetic fields and their

effects on living systems. In 1968 he turned his back on government-sponsored research, and since then has done independent research in his own laboratory. Max Planck Institute Points To Health Effects Possible effects of future HAARP fields on living systems is a concern that should be discussed, Dr. Flanagan told the committee. "One of the purposes of HAARP is to develop ELF (extremely low frequency) capability, for transmitting high-energy ELF waves, from .001 HZ all the way up to 40 Kilohertz, as described in (the military's) literature." In the meantime, new research by other scientists shows that ELF signals may have profound effects on living organisms. Dr. Flanagan cited the example of known effects of ELF on the Circadian rhythms, which is the biological clock, of all living organisms including humans. "The Max Planck Institute in Germany has done quite a bit of work on this, showing that very low energy levels - in fact, energy levels that are one tenth of the strength of the earth's magnetic field, can have profound effects on these rhythms... Mr. Hecksher and his colleagues may say that ELF fields from HAARP are not harmful, but remember – our government once sprayed DDT (pesticide) on school children while they were eating lunch, and said this was not harmful..." Dr. Flanagan in his brief testimony cited a study by a researcher at Catholic University which showed that coherent ELF fields, which is what HAARP will generate, can have an effect on DNA. For example they create abnormal development in chicken embryos and "possibly in humans".

In reply to denial by a military representative, Dr. Flanagan said there are thousands of papers written by reputable scientists on the negative effects of ELF fields on living systems. The Environmental Protection Agency released a report in 1991 linking electromagnetic fields to leukemia and brain cancer in children, for example. Flanagan continues, "we have a paper here that was just published in 1996 entitled Superimposing Spatially Coherent Electromagnetic Noise Inhibits Field-induced Abnormalities in Developing Chick Embryos. The paper shows that very low energy ELF fields develop abnormalities in developing chick embryos." (The fields could be counteracted by applying a white noise field.) "There is a tremendous amount of background literature on this. So ELF fields are not just harmless, as is being implied.... I don't think the question of electromagnetic safety has been entered at all."

At the legislative hearing, HAARP employees focused on HAARP's current power levels, while the researchers on the other side of the controversy focused attention on the direction in which the power levels for the project are heading.
Has the military decided to downsize this current program they call HAARP because of public attention to it? At the legislative hearing, a representative of the military said the current developmental prototype of HAARP is capable of 3.6 kilowatts of radiated power. The full scale prototype will provide up to ten times that, or about 3,600 kilowatts, he said.
Dr. Patrick Flanagan noted that "the power levels described by Dr. Hecksher aren't consistent with a statement he made on a TV show (Sightings). When he was interviewed, (Dr. Hecksher) said the HAARP system can punch holes through the ionosphere and these holes would heal shortly after a HAARP system was turned off."

To punch a hole through the ionosphere would take more than the alleged 3,600 kilowatts, Dr. Flanagan indicated. He did mention, however, that there was another disturbing possibility: the "maser amplification of the HAARP energy. For example, if HAARP is applying 3,600 kilowatts to the ionosphere, there's a possibility of what is called maser amplification of that energy by charged particles in the ionosphere...the energy is powered by the energy from the sun. So that these charged particles in the ionosphere can be caused to mase... So that puts out more energy than HAARP is putting in."

What do the military planners have in mind? Technical Memorandum 195, an unpublished 613-page compilation concerning the HAARP Workshop on Ionospheric Heating Diagnostics, (held in 1991 at Hanscom Air Force Base, Massachusetts) includes this piece of information: the desired level of power for HAARP is 100 billion watts, vastly greater than what the military is now claiming as a goal. Other documents from the military were openly published and refer to power levels between one and ten gigawatts (billion watts).

Whatever the eventual power level it does not take much power bouncing back to the surface of the earth to affect living organisms. Dr. Nick Begich also told the State Affairs Committee about a substantial amount of science literature on the topic that has been published as recently as the early 1990s. The findings suggest that lower levels of energy (lower than previously believed) can affect human physiology. These studies are the most significant aspect of what has not been properly disclosed by those responsible for the HAARP project's safety, he testified. The project began when the debate over effects of ionizing and non-ionizing radiation was still in its infancy. Since then, many scientists have come to the conclusion that lower energy densities, when pulsed in the right frequency range, will have profound health effects.

HAARP continues to occupy a significant amount of our attention and has remained the focus of much of our current work. We have had the opportunity to speak out about this project in numerous radio and television programs. In addition, a number of news articles have begun to be published throughout the country on this very important subject. We are thankful to all of the media people which have granted us time to bring our work out in front of the citizenry. The issue has not slowed down in terms of general interest in the topic. The story has served as a catalyst for involvement in political and governmental affairs for many individuals.

We have received a number of articles and news clippings from across the country which has provided a good deal of material for use in this publication. One of the most interesting pieces of information arrived just after the book was published.

An article, "Behind the Russian SDI Offer: A Scientific, Technological, and Strategic Revolution", appeared in the magazine 21st Century in the summer of 1993. The article was based on a front page story appearing in a Soviet

government newspaper, Izvestia, on April 2, 1993. The article disclosed a whole new area of science and invited the United States to participate in the joint development of this new technology in a "Star Wars" weapons program. The initiative indicated that the Russians were far ahead in many of the areas important to the development of this "Star Wars" technology. One of the key components of the Russian technology was their greater understanding of "nonlinear" processes involved in the generation, propagation and absorption of powerful pulses of electro-magnetic radiations. What are "nonlinear" processes? This relates to the idea of a small input of additional energy creating a disproportionally larger output of energy. A research scientist, Al Zielinski, recently sent us the following example of nonlinear effects:

Experiment #1

Imagine we had an unlimited amount of dominoes and we lined them up from here to, let's say, Paris. Then we could tip the first domino with 10 grams; it will fall down and cause the second domino to tumble, too, etc. The first action of 10 grams will cause all the dominoes to tumble including the last domino in Paris. From this experiment we should understand that it is not the 10 gram action that causes all the dominoes to tumble, but the 10 gram action just creates an imbalance of the first domino. It is the gravity, however, that causes the dominoes to fall. In other words: only a 10 gram action is required to trigger a gravitational activity of all our dominoes from here to Paris.

Experiment #2

Imagine we had an unlimited amount of special dominoes of which only the first one we line up here is of normal size, and all the subsequent dominoes we line up again from here to Paris are of continuously increased size. By the time we reached Paris, the last domino block would be 1000 meters high and weigh millions of tons. Again we tip the first domino here with 10 grams, which will fall down causing all the subsequent dominoes to tumble. By the time the gravitational action reaches Paris, the last domino in Paris will smash the Eiffel Tower.

From this experiment we should understand that it is not the 10 gram action here that will smash the Eiffel Tower in Paris, but it is the gravitational energy that is picked up on the way to Paris that smashes the Eiffel Tower.
In other words: only a 10 gram action is required to trigger a non-linear gravitational activity which will cause the destruction of the Eiffel Tower.

With the above examples in mind imagine the nonlinear effects of 1 billion watts of effective radiated power being directed at the ionosphere by the HAARP transmitter. This is the first phase capability of the project. The second phase will increase the effective radiated power levels even further -- to 4.7 billion watts! In our book we point out that energy in certain frequencies when reaching the outermost portions of the ionosphere can be amplified up to 1000 times by natural processes. This phenomena has been recorded by scientists at UCLA who have observed the results of these power amplifications at a fraction of the power level which HAARP will transfer to this region. This is extremely important in considering what may occur with this level of energy. A serious environmental disaster may well be the result.

The earlier referenced article from 21st Century magazine goes on to describe the implications of the use of phased array antennas and their potentials at 1 billion watt power levels. This is the antena array HAARP uses and the level of power it is designed to broadcast. What the article describes is a system which can be used for knocking down missiles and aircraft by effecting their guidance systems and creating atmospheric disturbances which lead to them crashing. They also talk about the ability, at lower power levels, to be able to look down from the ionosphere and detect cruise missiles and other incoming objects utilizing what was described as an advanced form of radar. Again this is exactly what has been described in the HAARP patents.

Plasma is a term for an electrically conductive state of matter generated from a gas. It can be created by action of extreme heat, powerful electromagnetic fields and by high levels of focused radio frequency energy such as the energy created with the HAARP instrument. 21st Century magazine suggests that, "The term plasmoid refers to the fact that under certain conditions a plasma can develop a self-contained, self-stabilizing structure based on the magnetic and other effects of internal configurations of electric currents within the plasma." This particular concept is important when referring to the concept of "painting the ionosphere" which was described by the military in the HAARP documents. This is in fact what the military will do with HAARP for certain applications. These plasmas are much different than those described in fusion research in that they involve very low electron energies. What is known is that although they are "cool" by comparison to fusion plasmas they are remarkably long lived and strong when generated in certain gases.

Those specific gases include nitrogen and oxygen, the major components of the earth's atmosphere! So what does all of this translate into? According to the article it is suggested that this technology can be used for modifying the ionosphere over very large areas for "over-the-horizons" telecommunications disruption, creating computer errors and perhaps even creating negative biological effects. What is known from other government documents, HAARP planning documents and International Red Cross documents is that all of this is possible with these new systems. What is also known now is that a single complex system can combine radar tracking with a speed-of-light means of destruction - the plasmoid. This is but one application of HAARP. The writers of the 21st Century article were
not acquainted with the patents regarding HAARP or they would have recognized that the United States military was not interested in the Russian overture of cooperation because we already possessed the means to produce these effects.

What also rings throughout the article brings us back to where we began our research into the HAARP system two years ago - to the ideas of Nikola Tesla. A New York Times article of December 8, 1915 says:

"Nikola Tesla, the inventor, has filed patent applications on the essential parts of a machine, possibilities which test a layman's imagination and promise a parallel of Thor's shooting thunderbolts from the sky to punish those who had angered the gods...Suffice it to say that the invention will go through space with a speed of 300 miles a second, a manless ship without propelling engine or wings sent by electricity to any desired point on the globe on its errand of destruction, if destruction its manipulator wishes to effect."

'It is not a time,' said Dr. Tesla yesterday, 'to go into the details of this thing. It is founded upon a principle that means great things in peace; it can be used for great things in war. But I repeat, this is no time to talk of such things.' 'It is perfectly practicable to transmit electrical energy without wires and produce destructive effects at a distance. I have already constructed a wireless transmitter which makes this possible, and have described it in my technical publications, among which I refer to my patent number 1,119,732 recently granted. With transmitters of this kind we are enabled to project electrical energy in any amount to any distance and apply it for innumerable purposes, both in war and peace. Through the universal adoption of this system, ideal conditions for the maintenance of law and order will be realized, for then the energy necessary to the enforcement of right and justice will be normally productive, yet potential, and in any moment available, for attack and defense. The power transmitted need not be necessarily destructive, for, if distance is made to depend upon it, its withdrawal or supply will bring about the same results as those now accomplished by force of arms.'

A second article also appeared in the New York Times, on September 22, 1940 and read:

"Nikola Tesla, one of the truly great inventors, who celebrated his eighty-fourth birthday on July 10, tells the writer that he stands ready to divulge to the United States government the secret of his 'teleforce', with which, he said, airplane motors would be melted at a distance of 250 miles, so that an invisible Chinese Wall of Defense would be built around the country..."

"This 'teleforce', he said, is based upon an entirely new principle of physics that 'no one has ever dreamed about', different from the principle embodied in his inventions relating to the transmission of electrical power from a distance, for which he has received a number of basic patents. This new type of force, Mr. Tesla said, would operate through a beam one one hundred-millionth of a square centimeter in diameter, and could be generated from a special plant that would cost no more than $2,000,000 and would take only about three months to construct." "The beam, he states, involves four new inventions, two of which already have been tested. One of these is a method and apparatus for producing rays 'and other manifestations of energy' in free air, eliminating the necessity for a high vacuum; a second is a method and process for producing 'very great electrical force'; the third is a method for amplifying this force and the fourth is a new method for producing 'a tremendous electrical repelling force'. This would be the projector, or gun, of the system. The voltage for propelling the beam to its objective, according to the inventor, will attain a potential of 50,000,000 volts."

"With this enormous voltage, he said, microscopic electrical particles of matter will be catapulted on their mission of defensive destruction. He has been working on this invention, he added, for many years and has recently made a number of improvements in it." As the ideas reverberate through my mind I cannot help but to feel that we again are walking down a darkened road ofdestruction. We are again on a path which may in fact lead to greater problems than those we seek to solve by tampering with the ionosphere.

In March 1996 the military begins to demonstrate the earth-penetrating-tomography applications of this technology –the idea of "x-raying" the earth with ELF waves generated by HAARP. These waves will pass through every living thing in the path and may have perceptible effects on people's health. This demonstration of this capability is critical for the military to gain the additional funding for the second phase of their project. That phase was originally estimated at $175 million dollars and will give the military power levels of 4.7 billion watts of effective radiated power.

United States Patent *4,686,605*
Eastlund **August 11, 1987**

Method and apparatus for altering a region in the earth's atmosphere, ionosphere, and/or magnetosphere

Abstract

A method and apparatus for altering at least one selected region which normally exists above the earth's surface. The region is excited by electron cyclotron resonance heating to thereby increase its charged particle density. In one embodiment, circularly polarized electromagnetic radiation is transmitted upward in a direction substantially parallel to and along a field line which extends through the region of plasma to be altered. The radiation is transmitted at a frequency which excites electron cyclotron resonance to heat and accelerate the charged particles. This increase in energy can cause ionization of neutral particles which are then absorbed as part of the region thereby increasing the charged particle density of the region.

Inventors: **Eastlund; Bernard J.** (Spring, TX)
Assignee: **APTI, Inc.** (Los Angeles, CA)
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Field of Search: 361/230,231 244/158 R 376/100 89/1.11 380/59

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Primary Examiner: Cangialosi; Salvatore
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Claims

I claim:

1. A method for altering at least one region normally existing above the earth's surface with electromagnetic radiation using naturally-occurring and diverging magnetic field lines of the earth comprising transmitting first electromagnetic radiation at a frequency between 20 and 7200 kHz from the earth's surface, said transmitting being conducted essentially at the outset of transmission substantially parallel to and along at least one of said field lines, adjusting the frequency of said first radiation to a value which will excite electron cyclotron resonance at an initial elevation at least 50 km above the earth's surface, whereby in the region in which said electron cyclotron resonance takes place heating, further ionization, and movement of both charged and neutral particles is effected, said cyclotron resonance excitation of said region is continued until the electron concentration of said region reaches a value of at least 10.sup.6 per cubic centimeter and has an ion energy of at least 2 ev.

2. The method of claim 1 including the step of providing artificial particles in said at least one region which are excited by said electron cyclotron resonance.

3. The method of claim 2 wherein said artificial particles are provided by injecting same into said at least one region from an orbiting satellite.

4. The method of claim 1 wherein said threshold excitation of electron cyclotron resonance is about 1 watt per cubic centimeter and is sufficient to cause movement of a plasma region along said diverging magnetic field lines to an altitude higher than the altitude at which said excitation was initiated.

5. The method of claim 4 wherein said rising plasma region pulls with it a substantial portion of neutral particles of the atmosphere which exist in or near said plasma region.

6. The method of claim 1 wherein there is provided at least one separate source of second electromagnetic radiation, said second radiation having at least one frequency different from said first radiation, impinging said at least one second radiation on said region while said region is undergoing electron cyclotron resonance excitation caused by said first radiation.

7. The method of claim 6 wherein said second radiation has a frequency which is absorbed by said region.

8. The method of claim 6 wherein said region is plasma in the ionosphere and said second radiation excites plasma waves within said ionosphere.

9. The method of claim 8 wherein said electron concentration reaches a value of at least 10.sup.12 per cubic centimeter.

10. The method of claim 8 wherein said excitation of electron cyclotron resonance is initially carried out within the ionosphere and is continued for a time sufficient to allow said region to rise above said ionosphere.

11. The method of claim 1 wherein said excitation of electron cyclotron resonance is carried out above about 500 kilometers and for a time of from 0.1 to 1200 seconds such that multiple heating of said plasma region is achieved by means of stochastic heating in the magnetosphere.

12. The method of claim 1 wherein said first electromagnetic radiation is right hand circularly polarized in the northern hemisphere and left hand circularly polarized in the southern hemisphere.

13. The method of claim 1 wherein said electromagnetic radiation is generated at the site of a naturally-occurring hydrocarbon fuel source, said fuel source being located in at least one of northerly or southerly magnetic latitudes.

14. The method of claim 13 wherein said fuel source is natural gas and electricity for generating said electromagnetic radiation is obtained by burning said natural gas in at least one of magnetohydrodynamic, gas turbine, fuel cell, and EGD electric generators located at the site where said natural gas naturally occurs in the earth.

15. The method of claim 14 wherein said site of natural gas is within the magnetic latitudes that encompass Alaska.

Description

DESCRIPTION

1. Technical Field

This invention relates to a method and apparatus for altering at least one selected region normally existing above the earth's surface and more particularly relates to a method and apparatus for altering said at least one region by initially transmitting electromagnetic radiation from the earth's surface essentially parallel to and along naturally-occurring, divergent magnetic field lines which extend from the earth's surface through the region or regions to be altered.

2. Background Art

In the late 1950's, it was discovered that naturally-occurring belts exist at high altitudes above the earth's surface, and it is now established that these belts result from charged electrons and ions becoming trapped along the magnetic lines of force (field lines) of the earth's essentially dipole magnetic field. The trapped electrons and ions are confined along the field lines between two magnetic mirrors which exist at spaced apart points along those field lines. The trapped electrons and ions move in helical paths around their particular field lines and "bounce" back and forth between the magnetic mirrors. These trapped electrons and ions can oscillate along the field lines for long periods of time.

In the past several years, substantial effort has been made to understand and explain the phenomena involved in belts of trapped electrons and ions, and to explore possible ways to control and use these phenomena for beneficial purposes. For example, in the late 1950's and early 1960's both the United States and U.S.S.R. detonated a series of nuclear devices of various yields to generate large numbers of charged particles at various altitudes, e.g., 200 kilometers (km) or greater. This was done in order to establish and study artificial belts of trapped electrons and ions. These experiments established that at least some of the extraneous electrons and ions from the detonated devices did become trapped along field lines in the earth's magnetosphere to form artificial belts which were stable for prolonged periods of time. For a discussion of these experiments see "The Radiation Belt and Magnetosphere", W. N. Hess, Blaisdell Publishing Co., 1968, pps. 155 et sec. Other proposals which have been advanced for altering existing belts of trapped electrons and ions and/or establishing similar artificial belts include injecting charged particles from a satellite carrying a payload of radioactive beta-decay material or alpha emitters; and injecting charged particles from a satellite-borne electron accelerator. Still another approach is described in U.S. Pat. No. 4,042,196 wherein a low energy ionized gas, e.g., hydrogen, is released from a synchronous orbiting satellite near the apex of a radiation belt which is naturally-occurring in the earth's magnetosphere to produce a substantial increase in energetic particle precipitation and, under certain conditions, produce a limit in the number of particles that can be stably trapped. This precipitation effect arises from an enhancement of the whistler-mode and ion-cyclotron mode interactions that result from the ionized gas or "cold plasma" injection.

It has also been proposed to release large clouds of barium in the magnetosphere so that photoionization will increase the cold plasma density, thereby producing electron precipitation through enhanced whistler-mode interactions. However, in all of the above-mentioned approaches, the mechanisms involved in triggering the change in the trapped particle phenomena must be actually positioned within the affected zone, e.g., the magnetosphere, before they can be actuated to effect the desired change.

The earth's ionosphere is not considered to be a "trapped" belt since there are few trapped particles therein. The term "trapped" herein refers to situations where the force of gravity on the trapped particles is balanced by magnetic forces rather than hydrostatic or collisional forces. The charged electrons and ions in the ionosphere also follow helical paths around magnetic field lines within the ionosphere but are not trapped between mirrors, as in the case of the trapped belts in the magnetosphere, since the gravitational force on the particles is balanced by collisional or hydrostatic forces.

In recent years, a number of experiments have actually been carried out to modify the ionosphere in some controlled manner to investigate the possibility of a beneficial result. For detailed discussions of these operations see the following papers:

(1) Ionospheric Modification Theory; G. Meltz and F. W. Perkins;

(2) The Platteville High Power Facility; Carrol et al.;

(3) Arecibo Heating Experiments; W. E. Gordon and H. C. Carlson, Jr.; and (4) Ionospheric Heating by Powerful Radio Waves; Meltz et al., all published in Radio Science, Vol. 9, No. 11, November, 1974, at pages 885-888; 889-894; 1041-1047; and 1049-1063, respectively, all of which are incorporated herein by reference. In such experiments, certain regions of the ionosphere are heated to change the electron density and temperature within these regions. This is accomplished by transmitting from earth-based antennae high frequency electromagnetic radiation at a substantial angle to, not parallel to, the ionosphere's magnetic field to heat the ionospheric particles primarily by ohmic heating. The electron temperature of the ionosphere has been raised by hundreds of degrees in these experiments, and electrons with several electron volts of energy have been produced in numbers sufficient to enhance airglow. Electron concentrations have been reduced by a few percent, due to expansion of the plasma as a result of increased temperature.

In the Elmo Bumpy Torus (EBT), a controlled fusion device at the Oak Ridge National Laboratory, all heating is provided by microwaves at the electron cyclotron resonance interaction. A ring of hot electrons is formed at the earth's surface in the magnetic mirror by a combination of electron cyclotron resonance and stochastic heating. In the EBT, the ring electrons are produced with an average "temperature" of 250 kilo electron volts or kev (2.5.times.10.sup.9 K) and a plasma beta between 0.1 and 0.4; see, "A Theoretical Study of Electron--Cyclotron Absorption in Elmo Bumpy Torus", Batchelor and Goldfinger, Nuclear Fusion, Vol. 20, No. 4 (1980) pps. 403-418.

Electron cyclotron resonance heating has been used in experiments on the earth's surface to produce and accelerate plasmas in a diverging magnetic field. Kosmahl et al. showed that power was transferred from the electromagnetic waves and that a fully ionized plasma was accelerated with a divergence angle of roughly 13 degrees. Optimum neutral gas density was 1.7.times.10.sup.14 per cubic centimeter; see, "Plasma Acceleration with Microwaves Near Cyclotron Resonance", Kosmahl et al., Journal of Applied Physics, Vol. 38, No. 12, Nov., 1967, pps. 4576-4582.

DISCLOSURE OF THE INVENTION

The present invention provides a method and apparatus for altering at least one selected region which normally exists above the earth's surface. The region is excited by electron cyclotron resonance heating of electrons which are already present and/or artificially created in the region to thereby increase the charged particle energy and ultimately the density of the region.

In one embodiment this is done by transmitting circularly polarized electromagnetic radiation from the earth's surface at or near the location where a naturally-occurring dipole magnetic field (force) line intersects the earth's surface. Right hand circular polarization is used in the northern hemisphere and left hand circular polarization is used in the southern hemisphere. The radiation is deliberately transmitted at the outset in a direction substantially parallel to and along a field line which extends upwardly through the region to be altered. The radiation is transmitted at a frequency which is based on the gyrofrequency of the charged particles and which, when applied to the at least one region, excites electron cyclotron resonance within the region or regions to heat and accelerate the charged particles in their respective helical paths around and along the field line. Sufficient energy is employed to cause ionization of neutral particles (molecules of oxygen, nitrogen and the like, particulates, etc.) which then become a part of the region thereby increasing the charged particle density of the region. This effect can further be enhanced by providing artificial particles, e.g., electrons, ions, etc., directly into the region to be affected from a rocket, satellite, or the like to supplement the particles in the naturally-occurring plasma. These artificial particles are also ionized by the transmitted electromagnetic radiation thereby increasing charged particle density of the resulting plasma in the region. In another embodiment of the invention, electron cyclotron resonance heating is carried out in the selected region or regions at sufficient power levels to allow a plasma present in the region to generate a mirror force which forces the charged electrons of the altered plasma upward along the force line to an altitude which is higher than the original altitude. In this case the relevant mirror points are at the base of the altered region or regions. The charged electrons drag ions with them as well as other particles that may be present. Sufficient power, e.g., 10.sup.15 joules, can be applied so that the altered plasma can be trapped on the field line between mirror points and will oscillate in space for prolonged periods of time. By this embodiment, a plume of altered plasma can be established at selected locations for communication modification or other purposes.

In another embodiment, this invention is used to alter at least one selected region of plasma in the ionosphere to establish a defined layer of plasma having an increased charged particle density. Once this layer is established, and while maintaining the transmission of the main beam of circularly polarized electromagnetic radiation, the main beam is modulated and/or at least one second different, modulated electromagnetic radiation beam is transmitted from at least one separate source at a different frequency which will be absorbed in the plasma layer. The amplitude of the frequency of the main beam and/or the second beam or beams is modulated in resonance with at least one known oscillation mode in the selected region or regions to excite the known oscillation mode to propagate a known frequency wave or waves throughout the ionosphere.

BRIEF DESCRIPTION OF THE DRAWINGS

The actual construction, operation, and apparent advantages of this invention will be better understood by referring to the drawings in which like numerals identify like parts and in which:

FIG. 1 is a simplified schematical view of the earth (not to scale) with a magnetic field (force) line along which the present invention is carried out;

FIG. 2 is one embodiment within the present invention in which a selected region of plasma is raised to a higher altitude;

FIG. 3 is a simplified, idealized representation of a physical phenomenon involved in the present invention; and

FIG. 4 is a schematic view of another embodiment within the present invention.

FIG. 5 is a schematic view of an apparatus embodiment within this invention .

BEST MODES FOR CARRYING OUT THE INVENTION

The earth's magnetic field is somewhat analogous to a dipole bar magnet. As such, the earth's magnetic field contains numerous divergent field or force lines, each line intersecting the earth's surface at points on opposite sides of the Equator. The field lines which intersect the earth's surface near the poles have apexes which lie at the furthest points in the earth's magnetosphere while those closest to the Equator have apexes which reach only the lower portion of the magnetosphere.

At various altitudes above the earth's surface, e.g., in both the ionosphere and the magnetosphere, plasma is naturally present along these field lines. This plasma consists of equal numbers of positively and negatively charged particles (i.e., electrons and ions) which are guided by the field line. It is well established that a charged particle in a magnetic field gyrates about field lines, the center of gyration at any instance being called the "guiding center" of the particle. As the gyrating particle moves along a field line in a uniform field, it will follow a helical path about its guiding center, hence linear motion, and will remain on the field line. Electrons and ions both follow helical paths around a field line but rotate in opposite directions. The frequencies at which the electrons and ions rotate about the field line are called gyromagnetic frequencies or cyclotron frequencies because they are identical with the expression for the angular frequencies of gyration of particles in a cyclotron. The cyclotron frequency of ions in a given magnetic field is less than that of electrons, in inverse proportion to their masses.

If the particles which form the plasma along the earth's field lines continued to move with a constant pitch angle, often designated "alpha", they would soon impact on the earth's surface. Pitch angle alpha is defined as the angle between the direction of the earth's magnetic field and the velocity (V) of the particle. However, in converging force fields, the pitch angle does change in such a way as to allow the particle to turn around and avoid impact. Consider a particle moving along a field line down toward the earth. It moves into a region of increasing magnetic field strength and therefore sine alpha increases. But sine alpha can only increase to 1.0, at which point, the particle turns around and starts moving up along the field line,

and alpha decreases. The point at which the particle turns around is called the mirror point, and there alpha equals ninety degrees. This process is repeated at the other end of the field line where the same magnetic field strength value B, namely Bm, exists. The particle again turns around and this is called the "conjugate point" of the original mirror point. The particle is therefore trapped and bounces between the two magnetic mirrors. The particle can continue oscillating in space in this manner for long periods of time. The actual place where a particle will mirror can be calculated from the following:

sin.sup.2 alpha.sub.o =B.sub.o /B.sub.m (1)

wherein:

alpha.sub.o =equatorial pitch angle of particle

B.sub.o =equatorial field strength on a particular field line

B.sub.m =field strength at the mirror point

Recent discoveries have established that there are substantial regions of naturally trapped particles in space which are commonly called "trapped radiation belts". These belts occur at altitudes greater than about 500 km and accordingly lie in the magnetosphere and mostly above the ionosphere.

The ionosphere, while it may overlap some of the trapped-particle belts, is a region in which hydrostatic forces govern its particle distribution in the gravitational field. Particle motion within the ionosphere is governed by both hydrodynamic and electrodynamic forces. While there are few trapped particles in the ionosphere, nevertheless, plasma is present along field lines in the ionosphere. The charged particles which form this plasma move between collisions with other particles along similar helical paths around the field lines and although a particular particle may diffuse downward into the earth's lower atmosphere or lose energy and diverge from its original field line due to collisions with other particles, these charged particles are normally replaced by other available charged particles or by particles that are ionized by collision with said particle. The electron density (N.sub.e) of the plasma will vary with the actual conditions and locations involved. Also, neutral particles, ions, and electrons are present in proximity to the field lines.

The production of enhanced ionization will also alter the distribution of atomic and molecular constituents of the atmosphere, most notably through increased atomic nitrogen concentration. The upper atmosphere is normally rich in atomic oxygen (the dominant atmospheric constituent above 200 km altitude), but atomic nitrogen is normally relatively rare. This can be expected to manifest itself in increased airglow, among other effects.

As known in plasma physics, the characteristics of a plasma can be altered by adding energy to the charged particles or by ionizing or exciting additional particles to increase the density of the plasma. One way to do this is by heating the plasma which can be accomplished in different ways, e.g., ohmic, magnetic compression, shock waves, magnetic pumping, electron cyclotron resonance, and the like.

Since electron cyclotron resonance heating is involved in the present invention, a brief discussion of same is in order. Increasing the energy of electrons in a plasma by invoking electron cyclotron resonance heating, is based on a principle similar to that utilized to accelerate charged particles in a cyclotron. If a plasma is confined by a static axial magnetic field of strength B, the charged particles will gyrate about the lines of force with a frequency given, in hertz, as f.sub.g =1.54.times.10.sup.3 B/A, where: B=magnetic field strength in gauss, and A=mass number of the ion.

Suppose a time-varying field of this frequency is superimposed on the static field B confining the plasma, by passage of a radio frequency current through a coil which is concentric with that producing the axial field, then in each half-cycle of their rotation about the field lines, the charged particles acquire energy from the oscillating electric field associated with the radio frequency. For example, if B is 10,000 gauss, the frequency of the field which is in resonance with protons in a plasma is 15.4 megahertz.

As applied to electrons, electron cyclotron resonance heating requires an oscillating field having a definite frequency determined by the strength of the confining field. The radio-frequency radiation produces time-varying fields (electric and magnetic), and the electric field accelerates the charged particle. The energized electrons share their energy with ions and neutrals by undergoing collisions with these particles, thereby effectively raising the temperature of the electrons, ions, and neutrals. The apportionment of energy among these species is determined by collision frequencies. For a more detailed understanding of the physics involved, see "Controlled Thermonuclear Reactions", Glasstone and Lovberg, D. Van Nostrand Company, Inc., Princeton, N.J., 1960 and "The Radiation Belt and Magnetosphere", Hess, Blaisdell Publishing Company, 1968, both of which are incorporated herein by reference.

Referring now to the drawings, the present invention provides a method and apparatus for altering at least one region of plasma which lies along a field line, particularly when it passes through the ionosphere and/or magnetosphere. FIG. 1 is a simplified illustration of the earth 10 and one of its dipole magnetic force or field lines 11. As will be understood, line 11 may be any one of the numerous naturally existing field lines and the actual geographical locations 13 and 14 of line 11 will be chosen based on a particular operation to be carried out. The actual locations at which field lines intersect the earth's surface is documented and is readily ascertainable by those skilled in the art.

Line 11 passes through region R which lies at an altitude above the earth's surface. A wide range of altitudes are useful given the power that can be employed by the practice of this invention. The electron cyclotron resonance heating effect can be made to act on electrons anywhere above the surface of the earth. These electrons may be already present in the atmosphere, ionosphere, and/or magnetosphere of the earth, or can be artificially generated by a variety of means such as x-ray beams, charged particle beams, lasers, the plasma sheath surrounding an object such as a missile or meteor, and the like. Further, artificial particles, e.g., electrons, ions, etc., can be injected directly into region R from an earth-launched rocket or orbiting satellite carrying, for example, a payload of radioactive beta-decay material; alpha emitters; an electron accelerator; and/or ionized gases such as hydrogen; see U.S. Pat. No. 4,042,196. The altitude can be greater than about 50 km if desired, e.g., can be from about 50 km to about 800 km, and, accordingly may lie in either the ionosphere or the magnetosphere or both. As explained above, plasma will be present along line 11 within region R and is represented by the helical line 12. Plasma 12 is comprised of charged particles (i.e., electrons and ions) which rotate about opposing helical paths along line 11.

Antenna 15 is positioned as close as is practical to the location 14 where line 11 intersects the earth's surface. Antenna 15 may be of any known construction for high directionality, for example, a phased array, beam spread angle (.theta.) type. See "The MST Radar at Poker Flat, Alaska", Radio Science, Vol. 15, No. 2, Mar.-Apr. 1980, pps. 213-223, which is incorporated herein by reference. Antenna 15 is coupled to transmitter 16 which generates a beam of high frequency electromagnetic radiation at a wide range of discrete frequencies, e.g., from about 20 to about 1800 kilohertz (kHz).

Transmitter 16 is powered by power generator means 17 which is preferably comprised of one or more large, commercial electrical generators. Some embodiments of the present invention require large amounts of power, e.g., up to 10.sup.9 to 10.sup.11 watts, in continuous wave or pulsed power. Generation of the needed power is within the state of the art. Although the electrical generators necessary for the practice of the invention can be powered in any known manner, for example, by nuclear reactors, hydroelectric facilities, hydrocarbon fuels, and the like, this invention, because of its very large power requirement in certain applications, is particularly adapted for use with certain types of fuel sources which naturally occur at strategic geographical locations around the earth. For example, large reserves of hydrocarbons (oil and natural gas) exist in Alaska and Canada. In northern Alaska, particularly the North Slope region, large reserves are currently readily available. Alaska and northern Canada also are ideally located geographically as to magnetic latitudes. Alaska provides easy access to magnetic field lines that are especially suited to the practice of this invention, since many field lines which extend to desirable altitudes for this invention intersect the earth in Alaska. Thus, in Alaska, there is a unique combination of large, accessible fuel sources at desirable field line intersections. Further, a particularly desirable fuel source for the generation of very large amounts of electricity is present in Alaska in abundance, this source being natural gas. The presence of very large amounts of clean-burning natural gas in Alaskan latitudes, particularly on the North Slope, and the availability of magnetohydrodynamic (MHD), gas turbine, fuel cell, electrogasdynamic

(EGD) electric generators which operate very efficiently with natural gas provide an ideal power source for the unprecedented power requirements of certain of the applications of this invention. For a more detailed discussion of the various means for generating electricity from hydrocarbon fuels, see "Electrical Aspects of Combustion", Lawton and Weinberg, Clarendon Press, 1969. For example, it is possible to generate the electricity directly at the high frequency needed to drive the antenna system. To do this, typically the velocity of flow of the combustion gases (v), past magnetic field perturbation of dimension d (in the case of MHD), follow the rule:

v=df

where f is the frequency at which electricity is generated. Thus, if v=1.78.times.10.sup.6 cm/sec and d=1 cm then electricity would be generated at a frequency of 1.78 mHz.

Put another way, in Alaska, the right type of fuel (natural gas) is naturally present in large amounts and at just the right magnetic latitudes for the most efficient practice of this invention, a truly unique combination of circumstances. Desirable magnetic latitudes for the practice of this invention interest the earth's surface both northerly and southerly of the equator, particularly desirable latitudes being those, both northerly and southerly, which correspond in magnitude with the magnetic latitudes that encompass Alaska.

Referring now to FIG. 2 a first ambodiment is illustrated where a selected region R.sub.1 of plasma 12 is altered by electron cyclotron resonance heating to accelerate the electrons of plasma 12, which are following helical paths along field line 11.

To accomplish this result, electromagnetic radiation is transmitted at the outset, essentially parallel to line 11 via antenna 15 as right hand circularly polarized radiation wave 20. Wave 20 has a frequency which will excite electron cyclotron resonance with plasma 12 at its initial or original altitude. This frequency will vary depending on the electron cyclotron resonance of region R.sub.1 which, in turn, can be determined from available data based on the altitudes of region R.sub.1, the particular field line 11 being used, the strength of the earth's magnetic field, etc. Frequencies of from about 20 to about 7200 kHz, preferably from about 20 to about 1800 kHz can be employed. Also, for any given application, there will be a threshhold (minimum power level) which is needed to produce the desired result. The minimum power level is a function of the level of plasma production and movement required, taking into consideration any loss processes that may be dominant in a particular plasma or propagation path.

As electron cyclotron resonance is established in plasma 12, energy is transferred from the electromagnetic radiation 20 into plasma 12 to heat and accelerate the electrons therein and, subsequently, ions and neutral particles. As this process continues, neutral particles which are present within R.sub.1 are ionized and absorbed into plasma 12 and this increases the electron and ion densities of plasma 12. As the electron energy is raised to values of about 1 kilo electron volt (kev), the generated mirror force (explained below) will direct the excited plasma 12 upward along line 11 to form a plume R.sub.2 at an altitude higher than that of R.sub.1.

Plasma acceleration results from the force on an electron produced by a nonuniform static magnetic field (B). The force, called the mirror force, is given by

F=-.mu..gradient.B (2)

where .mu. is the electron magnetic moment and .gradient. B is the gradient of the magnetic field, .mu. being further defined as:

W.sub..perp. /B=mV.sub..perp..sup.2 /2B

where W.sub..perp. is the kinetic energy in the direction perpendicular to that of the magnetic field lines and B is the magnetic field strength at the line of force on which the guiding center of the particle is located. The force as represented by equation (2) is the force which is responsible for a particle obeying equation (1).

Since the magnetic field is divergent in region R.sub.1, it can be shown that the plasma will move upwardly from the heating region as shown in FIG. 1 and further it can be shown that

1/2M.sub.e V.sub.e.perp..sup.2 (x).apprxeq.1/2M.sub.e V.sub.e.perp..sup.2 (Y)+1/2M.sub.i V.sub.i.parallel..sup.2 (Y) (3)

where the left hand side is the initial electron transverse kinetic energy; the first term on the right is the transverse electron kinetic energy at some point (Y) in the expanded field region, while the final term is the ion kinetic energy parallel to B at point (Y). This last term is what constitutes the desired ion flow. It is produced by an electrostatic field set up by electrons which are accelerated according to Equation (2) in the divergent field region and pulls ions along with them. Equation (3) ignores electron kinetic energy parallel to B because V.sub.e.parallel. .apprxeq.V.sub.i.parallel., so the bulk of parallel kinetic energy resides in the ions because of their greater masses. For example, if an electromagnetic energy flux of from about 1 to about 10 watts per square centimeter is applied to region R, whose altitude is 115 km, a plasma having a density (N.sub.e) of 10.sup.12 per cubic centimeter will be generated and moved upward to region R.sub.2 which has an altitude of about 1000 km. The movement of electrons in the plasma is due to the mirror force while the ions are moved by ambipolar diffusion (which results from the electrostatic field). This effectively "lifts" a layer of plasma 12 from the ionosphere and/or magnetosphere to a higher elevation R.sub.2. The total energy required to create a plasma with a base area of 3 square kilometers and a height of 1000 km is about 3.times.10.sup.13 joules.

FIG. 3 is an idealized representation of movement of plasma 12 upon excitation by electron cyclotron resonance within the earth's divergent force field. Electrons (e) are accelerated to velocities required to generate the necessary mirror force to cause their upward movement. At the same time neutral particles (n) which are present along line 11 in region R.sub.1 are ionized and become part of plasma 12. As electrons (e) move upward along line 11, they drag ions (i) and neutrals (n) with them but at an angle .theta. of about 13 degrees to field line 11. Also, any particulates that may be present in region R.sub.1, will be swept upwardly with the plasma. As the charged particles of plasma 12 move upward, other particles such as neutrals within or below R.sub.1, move in to replace the upwardly moving particles. These neutrals, under some conditions, can drag with them charged particles.

For example, as a plasma moves upward, other particles at the same altitude as the plasma move horizontally into the region to replace the rising plasma and to form new plasma. The kinetic energy developed by said other particles as they move horizontally is, for example, on the same order of magnitude as the total zonal kinetic energy of stratospheric winds known to exist.

Referring again to FIG. 2, plasma 12 in region R.sub.1 is moved upward along field line 11. The plasma 12 will then form a plume (cross-hatched area in FIG. 2) which will be relatively stable for prolonged periods of time. The exact period of time will vary widely and be determined by gravitational forces and a combination of radiative and diffusive loss terms. In the previous detailed example, the calculations were based on forming a plume by producing 0.sup.+ energies of 2 ev/particle. About 10 ev per particle would be required to expand plasma 12 to apex point C (FIG. 1). There at least some of the particles of plasma 12 will be trapped and will oscillate between mirror points along field line 11. This oscillation will then allow additional heating of the trapped plasma 12 by stochastic heating which is associated with trapped and oscillating particles. See "A New Mechanism for Accelerating Electrons in the Outer Ionosphere" by R. A. Helliwell and T. F. Bell, Journal of Geophysical Research, Vol. 65, No. 6, June, 1960. This is preferably carried out at an altitude of at least 500 km.

The plasma of the typical example might be employed to modify or disrupt microwave transmissions of satellites. If less than total black-out of transmission is desired (e.g., scrambling by phase shifting digital signals), the density of the plasma (N.sub.e) need only be at least about 10.sup.6 per cubic centimeter for a plasma orginating at an altitude of from about 250 to about 400 km and accordingly less energy (i.e., electromagnetic radiation), e.g., 10.sup.8 joules need be provided. Likewise, if the density N.sub.e is on the order of 10.sup.8, a properly positioned plume will provide a reflecting surface for VHF waves and can be used to enhance, interfere with, or otherwise modify communication transmissions. It can be seen from the

foregoing that by appropriate application of various aspects of this invention at strategic locations and with adequate power sources, a means and method is provided to cause interference with or even total disruption of communications over a very large portion of the earth. This invention could be employed to disrupt not only land based communications, both civilian and military, but also airborne communications and sea communications (both surface and subsurface). This would have significant military implications, particularly as a barrier to or confusing factor for hostile missiles or airplanes. The belt or belts of enhanced ionization produced by the method and apparatus of this invention, particularly if set up over Northern Alaska and Canada, could be employed as an early warning device, as well as a communications disruption medium. Further, the simple ability to produce such a situation in a practical time period can by itself be a deterring force to hostile action. The ideal combination of suitable field lines intersecting the earth's surface at the point where substantial fuel sources are available for generation of very large quantitities of electromagnetic power, such as the North Slope of Alaska, provides the wherewithal to accomplish the foregoing in a practical time period, e.g., strategic requirements could necessitate achieving the desired altered regions in time periods of two minutes or less and this is achievable with this invention, especially when the combination of natural gas and magnetohydrodynamic, gas turbine, fuel cell and/or EGD electric generators are employed at the point where the useful field lines intersect the earth's surface. One feature of this invention which satisfies a basic requirement of a weapon system, i.e., continuous checking of operability, is that small amounts of power can be generated for operability checking purposes. Further, in the exploitation of this invention, since the main electromagnetic beam which generates the enhanced ionized belt of this invention can be modulated itself and/or one or more additional electromagnetic radiation waves can be impinged on the ionized region formed by this invention as will be described in greater detail herein after with respect to FIG. 4, a substantial amount of randomly modulated signals of very large power magnitude can be generated in a highly nonlinear mode. This can cause confusion of or interference with or even complete disruption of guidance systems employed by even the most sophisticated of airplanes and missiles. The ability to employ and transmit over very wide areas of the earth a plurality of electromagnetic waves of varying frequencies and to change same at will in a random manner, provides a unique ability to interfere with all modes of communications, land, sea, and/or air, at the same time. Because of the unique juxtaposition of usable fuel source at the point where desirable field lines intersect the earth's surface, such wide ranging and complete communication interference can be achieved in a resonably short period of time. Because of the mirroring phenomenon discussed hereinabove, it can also be prolonged for substantial time periods so that it would not be a mere transient effect that could simply be waited out by an opposing force. Thus, this invention provides the ability to put unprecedented amounts of power in the earth's atmosphere at strategic locations and to maintain the power injection level, particularly if random pulsing is employed, in a manner far more precise and better controlled than heretofore accomplished by the prior art, particularly by the detonation of nuclear devices of various yeilds at various altitudes. Where the prior art approaches yielded merely transitory effects, the unique combination of fuel and desirable field lines at the point where the fuel occurs allows the establishment of, compared to prior art approaches, precisely controlled and long-lasting effects which cannot, practically speaking, simply be waited out. Further, by knowing the frequencies of the various electromagnetic beams employed in the practice of this invention, it is possible not only to interfere with third party communications but to take advantage of one or more such beams to carry out a communications network even though the rest of the world's communications are disrupted. Put another way, what is used to disrupt another's communications can be employed by one knowledgeable of this invention as a communications network at the same time. In addition, once one's own communication network is established, the far-reaching extent of the effects of this invention could be employed to pick up communication signals of other for intelligence purposes. Thus, it can be seen that the disrupting effects achievable by this invention can be employed to benefit by the party who is practicing this invention since knowledge of the various electromagnetic waves being employed and how they will vary in frequency and magnitude can be used to an advantage for positive communication and eavesdropping purposes at the same time. However, this invention is not limited to locations where the fuel source naturally exists or where desirable field lines naturally intersect the earth's surface. For example, fuel, particularly hydrocarbon fuel, can be transported by pipeline and the like to the location where the invention is to be practiced.

FIG. 4 illustrates another embodiment wherein a selected region of plasma R.sub.3 which lies within the earth's ionosphere is altered to increase the density thereof whereby a relatively stable layer 30 of relatively

dense plasma is maintained within region R.sub.3. Electromagnetic radiation is transmitted at the outset essentially parallel to field line 11 via antenna 15 as a right hand circularly polarized wave and at a frequency (e.g., 1.78 megahertz when the magnetic field at the desired altitude is 0.66 gauss) capable of exciting electron cyclotron resonance in plasma 12 at the particular altitude of plasma 12. This causes heating of the particles (electrons, ions, neutrals, and particulates) and ionization of the uncharged particles adjacent line 11, all of which are absorbed into plasma 12 to increase the density thereof. The power transmitted, e.g., 2.times.10.sup.6 watts for up to 2 minutes heating time, is less than that required to generate the mirror force F required to move plasma 12 upward as in the previous embodiment.

While continuing to transmit electromagnetic radiation 20 from antenna 15, a second electromagnetic radiation beam 31, which is at a defined frequency different from the radiation from antenna 15, is transmitted from one or more second sources via antenna 32 into layer 30 and is absorbed into a portion of layer 30 (cross-hatched area in FIG. 4). The electromagnetic radiation wave from antenna 32 is amplitude modulated to match a known mode of oscillation f.sub.3 in layer 30. This creates a resonance in layer 30 which excites a new plasma wave 33 which also has a frequency of f.sub.3 and which then propogates through the ionosphere. Wave 33 can be used to improve or disrupt communications or both depending on what is desired in a particular application. Of course, more than one new wave 33 can be generated and the various new waves can be modulated at will and in a highly nonlinear fashion.

FIG. 5 shows apparatus useful in this invention, particularly when those applications of this invention are employed which require extremely large amounts of power. In FIG. 5 there is shown the earth's surface 40 with a well 41 extending downwardly thereinto until it penetrates hydrocarbon producing reservoir 42. Hydrocarbon reservoir 42 produces natural gas alone or in combination with crude oil. Hydrocarbons are produced from reservoir 42 through well 41 and wellhead 43 to a treating system 44 by way of pipe 45. In treater 44, desirable liquids such as crude oil and gas condensates are separated and recovered by way of pipe 46 while undesirable gases and liquids such as water, H.sub.2 S, and the like are separated by way of pipe 47. Desirable gases such as carbon dioxide are separated by way of pipe 48, and the remaining natural gas stream is removed from treater 44 by way of pipe 49 for storage in conventional tankage means (not shown) for future use and/or use in an electrical generator such as a magnetohydrodynamic, gas turbine, fuel cell or EGD generator 50. Any desired number and combination of different types of electric generators can be employed in the practice of this invention. The natural gas is burned in generator 50 to produce substantial quantities of electricity which is then stored and/or passed by way of wire 51 to a transmitter 52 which generates the electromagnetic radiation to be used in the method of this invention. The electromagnetic radiation is then passed by way of wire 53 to antenna 54 which is located at or near the end of field line 11. Antenna 54 sends circularly polarized radiation wave 20 upwards along field line 11 to carry out the various methods of this invention as described herein above.

Of course, the fuel source need not be used in its naturally-occurring state but could first be converted to another second energy source form such as hydrogen, hydrazine and the like, and electricity then generated from said second energy source form.

It can be seen from the foregoing that when desirable field line 11 intersects earth's surface 40 at or near a large naturally-occurring hydrocarbon source 42, exceedingly large amounts of power can be very efficiently produced and transmitted in the direction of field lines. This is particularly so when the fuel source is natural gas and magneto-hydrodynamic generators are employed. Further, this can all be accomplished in a relatively small physical area when there is the unique coincidence of fuel source 42 and desirable field line 11. Of course, only one set of equipment is shown in FIG. 5 for sake of simplicity. For a large hydrocarbon reservoir 42, a plurality of wells 41 can be employed to feed one or more storage means and/or treaters and as large a number of generators 55 as needed to power one or more transmitters 52 and one or more antennas 54. Since all of the apparatus 44 through 54 can be employed and used essentially at the sight where naturally-occurring fuel source 42 is located, all the necessary electromagnetic radiation 20 is generated essentially at the same location as fuel source 42. This provides for a maximum amount of usable electromagnetic radiation 20 since there are no significant storage or transportation losses to be incurred. In other words, the apparatus is brought to the sight of the fuel source where desirable field line 11 intersects the earth's surface 40 on or near the geographical location of fuel source 42, fuel source 42 being at a desirable magnetic latitude for the practice of this invention, for example, Alaska.

The generation of electricity by motion of a conducting fluid through a magnetic field, i.e., magneto-hydrodynamics (MHD), provides a method of electric power generation without moving mechanical parts and when the conducting fluid is a plasma formed by combustion of a fuel such as natural gas, an idealized combination of apparatus is realized since the very clean-burning natural gas forms the conducting plasma in an efficient manner and the thus formed plasma, when passed through a magnetic field, generates electricity in a very efficient manner. Thus, the use of fuel source 42 to generate a plasma by combustion thereof for the generation of electricity essentially at the site of occurrence of the fuel source is unique and ideal when high power levels are required and desirable field lines 11 intersect the earth's surface 40 at or near the site of fuel source 42. A particular advantage for MHD generators is that they can be made to generate large amounts of power with a small volume, light weight device. For example, a 1000 megawatt MHD generator can be construed using super-conducting magnets to weigh roughly 42,000 pounds and can be readily air lifted.

This invention has a phenomenal variety of possible ramifications and potential future developments. As alluded to earlier, missile or aircraft destruction, deflection, or confusion could result, particularly when relativistic particles are employed. Also, large regions of the atmosphere could be lifted to an unexpectedly high altitude so that missiles encounter unexpected and unplanned drag forces with resultant destruction or deflection of same. Weather modification is possible by, for example, altering upper atmosphere wind patterns or altering solar absorption patterns by constructing one or more plumes of atmospheric particles which will act as a lens or focusing device. Also as alluded to earlier, molecular modifications of the atmosphere can take place so that positive environmental effects can be achieved. Besides actually changing the molecular composition of an atmospheric region, a particular molecule or molecules can be chosen for increased presence. For example, ozone, nitrogen, etc. concentrations in the atmosphere could be artificially increased. Similarly, environmental enhancement could be achieved by causing the breakup of various chemical entities such as carbon dioxide, carbon monoxide, nitrous oxides, and the like. Transportation of entities can also be realized when advantage is taken of the drag effects caused by regions of the atmosphere moving up along diverging field lines. Small micron sized particles can be then transported, and, under certain circumstances and with the availability of sufficient energy, larger particles or objects could be similarly affected. Particles with desired characteristics such as tackiness, reflectivity, absorptivity, etc., can be transported for specific purposes or effects. For example, a plume of tacky particles could be established to increase the drag on a missile or satellite passing there through. Even plumes of plasma having substantially less charged particle density than described above will produce drag effects on missiles which will affect a lightweight (dummy) missile in a manner substantially different than a heavy (live) missile and this affect can be used to distinguish between the two types of missiles. A moving plume could also serve as a means for supplying a space station or for focusing vast amount of sunlight on selected portions of the earth. Surveys of global scope could also be realized because the earth's natural magnetic field could be significantly altered in a controlled manner by plasma beta effects resulting in, for example, improved magnetotelluric surveys. Electromagnetic pulse defenses are also possible. The earth's magnetic field could be decreased or disrupted at appropriate altitudes to modify or eliminate the magnetic field in high Compton electron generation (e.g., from high altitude nuclear bursts) regions. High intensity, well controlled electrical fields can be provided in selected locations for various purposes. For example, the plasma sheath surrounding a missile or satellite could be used as a trigger for activating such a high intensity field to destroy the missile or satellite. Further, irregularities can be created in the ionosphere which will interfere with the normal operation of various types of radar, e.g., synthetic aperture radar. The present invention can also be used to create artificial belts of trapped particles which in turn can be studied to determine the stability of such parties. Still further, plumes in accordance with the present invention can be formed to simulate and/or perform the same functions as performed by the detonation of a "heave" type nuclear device without actually having to detonate such a device. Thus it can be seen that the ramifications are numerous, far-reaching, and exceedingly varied in usefulness.

United States Patent *4,712,155*
Eastlund , et al. **December 8, 1987**

Method and apparatus for creating an artificial electron cyclotron heating region of plasma

Abstract

A method and apparatus altering a region of plasma that lies above the earth's surface at altitudes (e.g. below 50 kilometer) where the collison rate of the electrons in the plasma is originally greater than the cyclotron frequency of the electrons. First, artificial magnetic lines of force are established from the earth's surface by positioning a loop of cable at the earth's surface. An electrical current of sufficient amperage is passed through the cable which inherently generates the artificial magnetic field from the center of the loop. The field strength B on the artificial lines in the region of plasma to be altered is sufficient to increase the cyclotron frequency of the electrons in the plasma so that it will exceed the rate of collosion of the electrons. The plasma is then excited by electron cyclotron resonance heating to thereby further alter the plasma by transmitting circularly polarized electromagnetic radiation upward in a direction substantially parallel to and along the artificial field lines.

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Claims

What is claimed is:

1. A method of creating an artificial electron cyclotron resonance heating region of plasma at about 50 km above the earth's surface in which the collision rate of the electrons in said plasma is greater than the cyclotron frequency of said electrons, said method comprising:

establishing a first artificial magnetic field having a plurality of artificial field lines which extend from the surface of the earth through said region of plasma by

positioning a circular loop of an electrical conductive cable at the surface of the earth so that the center of said loop will be colinear with the said artificial magnetic field lines;

passing an electric current through said loop to establish said artificial magnetic field having a magnetic field strength of about 10 fold greater than the field strength naturally occurring in said region; and

transmitting first circularly polarized electromagnetic radiation having a frequency from 10 kilohertz to 30 gigahertz from the earth's surface, said transmitting being conducted essentially at the outset of transmission substantially parallel to and along said field lines of said artificial magnetic field, adjusting the frequency of said first radiation to a value which will excite electron cyclotron resonance at an initial altitude of about 50 km above the earth's surface, whereby in the region in which said electron cyclotron resonance takes place heating, further ionization, and movement of both charged and neutral particles is effected.

2. The method of claim 1 wherein said excitation of electron cyclotron resonance is continued to cause movement of said plasma region along said artificial magnetic field lines upward to an altitude which is higher than the altitude at which said excitation was initiated.

3. The method of claim 2 wherein said rising plasma region pulls with it a substantial portion of neutral particles of the atmosphere which exist in or near said plasma region.

4. The method of claim 1 wherein there is provided at least one separate source of second electromagnetic radiation, said second radiation having at least one frequency different from said first radiation, impinging said at least one second radiation on said plasma region while said plasma region is undergoing electron cyclotron resonance excitation caused by said first radiation.

5. The method of claim 4 wherein said second radiation has a frequency which is absorbed by said plasma region.

6. The method of claim 1 wherein said first electromagnetic radiation is right hand circularly polarized in the northern hemisphere and left hand circularly polarized in the southern hemisphere.

7. The method of claim 4 wherein said loop is positioned at an angle with respect to the normal horizontal plane at the earth's surface whereby said artificial magnetic force lines will extend outwardly from the earth's surface at an angle with respect to a normally occurring earth's magnetic field line.

8. The method of claim 7 wherein the radius of said loop is approximately equal to the altitude of said region.

9. The method of claim 8 wherein said region is at an altitude of about 35 kilometers.

10. The method of claim 9 wherein said cable comprises a 1 meter diameter, super-conductive cable positioned in a circular loop which, in turn, has a radius of 35 kilometers and wherein said amperage is substantially about 5.times.10.sup.8 amperes.

11. The method of claim 5 including:

establishing a second artificial field at a point on the earth's surface at a point spaced from said first artificial magnetic field; establishing a second plasma region along the artificial field lines of said second artificial magnetic field at an altitude substantially the same as the altitude of said plasma region of said first magnetic field; and propagating said plasma waves between said first and second plasma regions.

Description

DESCRIPTION

1. Technical Field

This invention relates to a method and apparatus for creating an artificial electric cyclotron resonance heating region of plasma and more particularly relates to creating artificial magnetic field lines from the earth's surface and then altering at least one region of plasma normally existing along said artificial lines at a selected altitude above the earth's surface.

2. Background Art

The earth's magnetic field is somewhat analogous to a dipole bar magnet. As such, the earth's magnetic field contains numerous divergent field or force lines, each line having ends which intersect the earth's surface at points on opposite sides of the Equator. The field lines which intersect the earth's surface near the poles have apexes which lie at the furthest points in the earth's magnetosphere while those closest to the Equator have apexes which reach only the lower portion of the magnetosphere.

Above the earth's surface, plasma is naturally present along these field lines. This plasma consists of equal numbers of positively and negatively charges particles (i.e., electrons and ions) which are guided by the field line. It is well established that a charged particle in a magnetic field gyrates about field lines, the center of gyration at any instance being called the "guiding center" of the particle. As the gyrating particle moves along a field line in a uniform field, it will follow a helical path about its guiding center, hence linear motion, and will remain on the field line. Electrons and ions both follow helical paths around a field line but rotate in opposite directions. The frequencies at which the electrons and ions rotate about the field line are called gyromagnetic frequencies or cyclotron frequencies because they are identical with the expression for the angular frequencies of gyration of particles in a cyclotron. The cyclotron frequency of ions in a given magnetic field is less than that of electrons, in inverse proportion to their masses.

While this plasma is present at lower altitudes, e.g. below 50 kilometers, the collision rate of the electrons in the plasma becomes much greater than the cyclotron frequency of the electrons at that altitude so an electron normally experiences one or more collisions with other electrons, ions, or particles before it can complete one path around its field line. These collisions cause the electrons to continuously change course preventing the electrons from following their normal helical pathes around the field line.

At higher altitudes, the cyclotron frequency of the electrons exceed the collision rate between electrons so particular electrons may continue to follow defined helical pathes around a particular field line for prolonged periods, especially if the electrons are at a sufficient altitude and energy level to become trapped on the field line between mirror points there thereon. When the flow of electrons is relatively coherent or constant for at least a complete helical path about a field line, energy may be inputted from the earth along the field line to add energy to the electrons to substantially alter the plasma of which the electrons form a part thereof. For a more complete discussion of how earth-generated energy is transmitted to substantially alter a region of plasma, see copending U.S. Patent Application Ser. Nos. 690,333 and 690,354, both, filed Jan. 10, 1985.

In the above-mentioned applications, energy is added to the plasma by transmitting electromagnetic radiation to establish electron cyclotron resonance heating in a region of plasma which lies at an altitude where the cyclotron frequency is greater than the collision rate of the electrons in the plasma. Increasing the energy of electrons by electron cyclotron resonance heating, is based on a principle similar to that involved in accelerating charged particles in a cyclotron. That is, by passage of a radiofrequency current through a coil which is concentric with that producing the axial field, then in each half-cycle of their rotation about the field lines, the charged particles, e.g. electrons, acquire energy from the oscillating electric field associated with the radio frequency.

The use of electron cyclotron resonance heating to add energy to the electrons of a plasma has heretofore been restricted to regions of plasma which lie at altitudes where the cyclotron frequency exceeds the collision rate of the electrons, (e.g. ionosphere and higher). However, since many benefits (e.g. long distance communications, weather modification, etc.) may arise from being able to alter plasma regions at lower altitudes a need exists for being able to excite electron cyclotron resonant heating in regions of plasma at lower altitudes where the collision rate of the electrons is originally greater that the cyclotron frequency of the electrons.

DISCLOSURE OF THE INVENTION

The present invention provides a method and apparatus for creating an artificial electron cyclotron heating region of plasma that lies above the earth's surface at altitudes (e.g. below 50 kilometers) where the collision rate of the electrons in the plasma is orginally greater than the cyclotron frequency of the electrons. First, artificial magnetic lines of force are established from the earth's surface into the region in which the operation is to be carried out.

To establish the artificial magnetic field lines, a loop of cable is positioned at the earth's surface so that the center of the loop will be colinear with the desired artificial field lines. An electrical current of sufficient amperage is passed through the cable which inherently generates a dipole field, with the central field line thereof extending outward from the plane of the loop. The artificial magnetic field is designed so that the field strength B at the altitude of the region of plasma to be altered is sufficient to increase the cyclotron frequency of the electrons in the plasma so that it will exceed the collision rate of the electrons. When this occurs, the plasma is now in condition to be excited by electron cyclotron resonance heating to thereby increase the charged particle energy. This is done by transmitting circularly polarized electromagnetic radiation from the earth's surface at or near one end of a artificial magnetic field line where it intersects the earth's surface. Right hand circular polarization is used in the northern hemisphere and left hand circular polarization is used in the southern hemisphere. The radiation is deliberately transmitted at the outset in a direction substantially parallel to and along the artificial field line which extends upwardly through the region of plasma to be altered. The radiation is transmitted at a frequency which is based on the cyclotron or gyrofrequency of the charged particles and which, when applied to the plasma is said at least one region, excites electron cyclotron resonance within the plasma to heat and accelerate the charged particles in their respective helical paths around and along the field line. Sufficient energy may be employed to cause ionization of neutral particles (molecules of oxygen, nitrogen and the like, particulates, etc.) which then become a part of the plasma thereby increasing the charged particle density of the plasma.

In one embodiment of the invention, electron cyclotron resonance heating is carried out in the selected region at sufficient power levels to allow the plasma to generate a mirror force which forces the charged electrons of the altered plasma upward along the force line to an altitude which is higher than the original altitude. As the plasma moves upward, other particles from the atmosphere at the same altitude as the selected region move horizontally into the region to replace the rising plasma and to form new plasma. The kinetic energy developed by said other particles as they move horizontally is on the same order of magnitude of as the total zonal kinetic energy of stratospheric winds known to exist at altitudes equal to the region being altered. Since there is evidence that these stratospheric winds may be linked to certain weather patterns on earth, the present method may be used to affect similar patterns.

In another embodiment, the present method is used to alter at least one selected region of plasma in the stratosphere to establish a defined layer of plasma having an increased charged particle density. Once this layer is established and while maintaining the transmission of the main beam of circularly polarized electromagnetic radiation, the main beam is modulated and/or at least one second different, modulated electromagnetic radiation beam is transmitted from at least one separate source at a different frequency which will be absorbed in the plasma layer. The amplitude of the frequency of the main beam and/or the second beam or beams is modulated in resonance with at least one known oscillation mode in the selected region or regions to excite the known oscillation mode to propagate a known frequency wave or waves throughout the stratosphere which may be used in communications.

BRIEF DESCRIPTION OF THE DRAWINGS

The actual construction, operation, and apparent advantages of the present invention will be better understood by referring to the drawings in which like numerals identify like parts and in which:

FIG. 1 is a simplified schematic view of the earth (not to scale) with a naturally occurring magnetic field (force) line having an artificial magnetic field thereon in accordance with the present invention;
FIG. 2 is one embodiment within the present invention in which a selected region of plasma is raised to a higher altitude to thereby induce horizontal flow in said region;
FIG. 3 is a schematic view of another embodiment within the present invention; and
FIG. 4 is a schematic view of still a further embodiment within the present invention; and
FIG. 5 is a schematic vein of apparatus within the present invention.

BEST MODES FOR CARRYING OUT THE INVENTION

Referring now more particularly to the drawings, FIG. 1 is a simplified illustration of the earth 10 and one of its naturally occurring dipole magnetic field lines 11.

As will be understood, line 11 may be any one of the numerous naturally existing field lines and the actual geographical location, at which the ends 13 and 14 of line 11 intersect the earth's surface is documented and is readily ascertainable by those skilled in the art. Plasma 12 is naturally present along these field lines. This plasma consists of equal numbers of positively and negatively charged particles (i.e., electrons and ions) which are guided by the field line 11.

It is well established that a charged particle in a magnetic field will gyrate about field lines unless it collides with another particle. As the gyrating particle moves along a field line in a uniform field, it will follow a helical path about its guiding center, hence linear motion, and will remain on the field line. Electrons and ions both follow helical paths around a field line but rotate in opposite directions. The frequencies at which the electrons and ions rotate about the field line are called gyro magnetic frequencies or cyclotron frequencies because they are identical with the expression for the angular frequencies of gyration of particles in a cyclotron. The cyclotron frequency of ions in a given magnetic field is less than that of electrons, in inverse proportion to their masses.

As shown in FIG.1, the electrons in plasma 12 which lie at or above an altitude, e.g. at least about 66 kilometers, where the cyclotron frequency of the electrons are greater than the collision rate of the electrons will, in fact, follow helical paths around line 11. However, in region R, which includes those altitudes (e.g. less than about 50 kilometers) at which the collision rate of electrons exceed the cyclotron frequency of the electrons, individual electrons (not shown) will collide with other particles before they complete a helical path around line 11 and will be deflected there from. The charged particles which form plasma in region R move between collisions with other particles along similar helical paths around the field lines and although a particular particle may diffuse downward into the earth's lower atmosphere or lose energy and diverge from its original field line due to collisions with other particles, these charged particles are normally replaced by other available charged particles or by particles that are ionized by collision with said particle. The electron density (N.sub.e) of the plasma will vary with the actual conditions and locations involved. Also, neutral particles, ions, and electrons are present in proximity to the field lines.

As known in plasma physics, the characteristics of a plasma can be altered by adding energy to the charged particles or by ionizing or exciting additional particles to increase the density of the plasma. One way to do this is by heating the plasma which can be accomplished in different ways, e.g., ohmic, magnetic compression, shock waves, magnetic pumping, electron cyclotron resonance, and the like.

Since electron cyclotron resonance heating is involved in the present invention, a brief discussion of same is in order. Increasing the energy of electrons in a plasma by invoking electron cyclotron resonance heating, is based on a principle similar to that utilized to accelerate charged particles in a cyclotron. If a plasma is confined by a static axial magnetic field of strength B, the charged particles will gyrate about the lines of force with a frequency given, in hertz, as f.sub.g =1.54.times.10.sup.3 B/A, where: B=magnetic field strength in gauss, and A=mass number of the ion.

Suppose a time-varying field of this frequency is superimposed on the static field B confining the plasma, by passage of a radiofrequency current through a coil which is concentric with that producing the axial field, then in each half-cycle of their rotation about the field lines, the charged particles acquire energy from the oscillating electric field associated with the radio frequency. For example, if B is 10,000 gauss, the frequency of the field which is in resonance with protons in a plasma is 15.4 megahertz.

As applied to electrons, electron cyclotron resonance heating requires an oscillating field having a definite frequency determined by the strength of the confining field. The radiofrequency radiation produces time-varying fields (electric and magnetic), and the electric field accelerates the charged particle. The energized electrons share their energy with ions and neutrals by undergoing collisions with these particles, thereby effectively raising the temperature of the electrons, ions, and neutrals. The apportionment of energy among these species is determined by collision frequencies. For a more detailed understanding of the physics involved, see "Controlled Thermonuclear Reactions", Glasstone and Lovberg, D. Van Nostrand Company, Inc., Princeton, N.J., 1960 and "The Radiation Belt and Magnetosphere", Hess, Blaisdell Publishing Company, 1968.

However, before electron cyclotron resonant heating can be excited in the plasma of region R, the cyclotron frequency of the electrons therein has to be increased until it is greater than the collision rate of the electrons. This is accomplished in the present invention by establishing an artificial dipole magnet field 11a within region R which has sufficient field strength B to increase the cyclotron frequency of electrons 12a (FIG. 3) at the attitude of interest until it exceeds the collision rate of the electrons at that attitude.

A preferred means to establish artificial magnetic field 11a is shown in FIGS. 2, 3 and 4. A circular loop 30 (only half is shown) of an electrically-conductive cable is positioned at the earth's surface 10 at a location at which the artificial magnetic line 11b is to intersect the earth's surface. Loop 30 maybe positioned on an incline, e.g. mountain so that artificial line 11b will be projected outwardly at an angle respective to horizontal at the earth's surface and also with respect to naturally-occurring magnetic line 11. Electrical current at high amperage is supplied to loop 30 and flowed there through which then establishes artificial line 11b which extends outward from the center of loop 30.

The following is a typical example of an artificial magnetic line 11b which is to established in accordance with the present invention. A location is selected in the State of Alaska in an area commonly referred to as the North Slope. Plasma in region R at an altitude of about 35 kilometers is to be altered. The field strength B which is typical at this altitude along the naturally - occurring field line in this area is approximately 0.62 gauss. This strength B at this altitude is such that the collision rate of the electrons (FIG. 3) is greater than their cyclotron frequency and must be increased (for example, by 10 fold) to insure the cyclotron frequency becomes greater than the collision rate. The following known relationship for magnetic induction on the center line of a circular turn where the distance in the Z direction (i.e. altitude of R.) is equal to the radius r of loop 30 can be used to properly dimension loop 30 and determine the necessary amperage: ##EQU1##
wherein:

B=Desired field strength at 100 kilometer=1.1.times.10.sup.-3 webers/sq. meters

.mu.=4.pi..times.10.sup.-7

I=current in amps

r=radius of loop in meter

Substituting known values (i.e. radius of loop 30 is approximately equal to the altitude or 100 kilometers in this example), the above equation is solved to establish that 5.times.10.sup.8 amperes of current will need to be flowed through loop 30 having a radius of 100 kilometers to produce an artificial field line 11b which has a field strength of 1.1.times.10.sup.-3 webers/sq. meters. To transmit this current will require a superconducting cable having about a one-meter diameter and is within the art of superconducting power transmission, see Electrical Characteristics of a Superconducting Cable; Chowder, CRYOGENICS; April, 1982.

Once artificial magnetic line 11b is established, the cyclotron frequency of the charged particles in plasma 12a in region R.sub.1 will now be greater than the collision rate which permits the charged particles of plasma 12a to follow helical paths around line 11b so that it can now be altered further by exciting electron cyclotron resonance heating in plasma 12a to add energy to the charged particles or by exciting or ionizing additional particles to increase the density of the plasma.

To do this, antenna 15 is positioned as close as is practical to the center of loop 30. Antenna 15 may be of any known construction for high directionality, for example, a phased array, beam spread angle (O) type. See "The MST Radar at Poker Flat, Alaska", Radio Science, Vol. 15, No. 2, March-April 1980, pps. 213-223: which is incorporated herein by reference. Antenna 15 is coupled to transmitter 16 which generates a beam of high frequency electromagnetic radiation at a wide range of discrete frequencies, e.g., from about 10 kilohertz to about 30 gigahertz.

Transmitter 16 as well as loop 30 is powered by power generator means 17 which is preferably comprised of one or more large, commercial electrical generators. Some embodiments of the present invention require large amounts of power, e.g., up to 10.sup.9 to 10.sup.11 watts, in continuous wave or pulsed power. Generation of the needed power is within the state of the art. Although the electrical generators necessary for the practice of the invention can be powered in any known manner, for example, by nuclear reactors, hydroelectric facilities, hydrocarbon fuels, and the like, this invention, because of its very large power requirement in certain applications, is particularly adapted for use with certain types of fuel sources which naturally occur at strategic geographical locations around the earth. For example, large reserves of hydrocarbons (oil and natural gas) exist in Alaska and Canada. In northern Alaska, particularly the North Slope region, large reserves are currently readily available. Alaska and northern Canada also are ideally located geographically as to magnetic latitudes. Thus, in Alaska, there is a unique combination of large, accessible fuel sources at desirable field line intersections. Further, a particularly desirable fuel source for the generation of very large amounts of electricity is present in Alaska in abundance, this source being natural gas. The presence of very large amounts of clean-burning natural gas in Alaskan latitudes, particularly on the North Slope, and the availability of magneto-hydrodynamic electric generators which operate very efficiently with natural gas provides an ideal power source for the unprecedented power requirements of certain of the applications of this invention.

Referring now to FIG. 3, a first embodiment of how plasma 12a is altered is illustrated where a selected region R.sub.1 of plasma 12a is altered by electron cyclotron resonance heating to accelerate the electrons of plasma 12, which are following helical paths along artificial field line 11b which has been established as explained above.

To accomplish this result, electromagnetic radiation is transmitted at the outset, essentially parallel to artificial field line 11b via antenna 15 as right hand circularly polarized radiation wave 20. Wave 20 has a frequency which will excite electron cyclotron resonance with plasma 12 at its initial or original altitude. This frequency will vary depending on the electron cyclotron resonance of region R.sub.1 which, in turn, can be determined from available data based on the altitude of region R.sub.1, the strength B of the on artificial magnetic field 11b at said altitude, etc. Frequencies of from about 10 kilohertz to about 30 giga-hertz can be employed. Also, for any given application, there will be a threshold (minimum power level) which is needed to produce the desired result. The minimum power level is a function of the level of plasma production and movement required, taking into consideration any loss processes that may be dominant in a particular plasma or propagation path.

As electron cyclotron resonance is established in plasma 12a, energy is transferred from the electromagnetic radiation 20 into plasma 12a to heat and accelerate the electrons therein and, subsequently, ions and neutral particles. As this process continues, neutral particles which are present within R.sub.1 are ionized and absorbed into plasma 12a and this increases the electron and ion densities of plasma 12a. As the electron energy is raised to values of about 1 kilo electron volt (kev), the generated mirror force (explained below) will direct the excited plasma 12 upward along line 11a in the form of plume R.sub.2 at an altitude higher than that of R.sub.1.

Plasma acceleration results from the force on an electron produced by a nonuniform static magnetic field (B). The force, called the mirror force, is given by

F==-.mu...gradient.B

where .mu. is the electron magnetic moment and .gradient.B is the gradient of the magnetic field, being further defined as:

W.perp./B=mV.perp..sup.2 /2B

where W.perp. is the kinetic energy in the direction perpendicular to that of the magnetic field lines and B is the magnetic field strength at the line of force on which the guiding center of the particle is located. The force as represented by equation (2) is the force which is responsible for a particle obeying equation (1).

Since the magnetic field is divergent in region R.sub.1, it can be shown that the plasma will move upwardly from the heating region as shown in FIG. 1 and further it can be shown that

1/2M.sub.e V.sub.e .perp..sup.2 (x).perspectiveto.1/2M.sub.e V.sub.e .perp..sup.2 (Y)+1/2M.sub.i V.sub.iII.sup.2 (Y) (3)

where the left hand side is the initial electron transverse kinetic energy; the first term on the right is the transverse electron kinetic energy at some point (Y) in the expanded field region, while the final term is the ion kinetic energy parallel to B at point (Y). This last term is what constitutes the desired ion flow. It is produced by an electrostatic field set up by electrons which are accelerated according to Equation (2) in the divergent field region and pulls ions along with them. Equation (3) ignores electron kinetic energy parallel to B because V.sub.eII .degree.V.sub.iII, so the bulk of parallel kinetic energy resides in the ions because of their greater masses. For example, if an electromagnetic energy flux of from about 1 to about 10 watts per square centimeter is applied to region R, whose altitude is 100 km, a plasma having a density (N.sub.e) 10.sup.13 per cubic centimeter will be generated and moved upward with a verticle component of kinetic energy equal to 10.sup.7 ergs/cm.sup.2. The movement of electrons in the plasma is due to the mirror force while the ions are moved by ambipolar diffusion. This effectively "lifts" a layer of plasma 12a from region R.sub.1 to a higher elevation R.sub.2.

The electrons are accelerated to velocities required to generate the necessary mirror force to cause their upward movement. At the same time neutral particles which are present along line 11a in region R.sub.1 are ionized and become part of plasma 12a. As electrons move upward along line 11a, they drag ions and neutrals with them. Also, any particulates that may be present in region R.sub.1, will be swept upwardly with the plasma. As the charged particles of plasma 12a move upward, other particles such as neutrals within R.sub.1, move horizontally in to replace the upwardly moving particles. As plasma 12a is being moved upward with a very high kinetic energy in the vertical direction (e.g. 10.sup.7 ergs/cm.sup.2), the flow of the atmosphere particles to replace the rising plasma will have comparable kinetic energy in the horizontal direction. The horizontal kinetic energy so generated will be of the same order of magnitude as the total zonal kinetic energy of naturally-occurring stratospheric wind at altitudes of 22 to 32 kilometer; see "The Energetics of the Stratosphere during the Winter Warmings of 1970/71 and 1974/75;" E. Klinker, COSPAR SPACE RESEARCH, Vol. XVii, Pergamon Press, 1977. Since there is evidence that wind currents in the stratosphere appear to be linked to certain weather patterns on earth, such winds can be produced with the present invention at selected locations and altitudes which can be used in establishing such weather patterns.

FIG. 3 illustrates another embodiment wherein a selected region R of plasma 12a at a low altitude to increase the density thereof whereby a relatively stable layer 40 of relatively dense plasma is maintained within region R.sub.3. First artificial magnetic line 11b is established as disclosed above. Electromagnetic radiation is then transmitted at the outset essentially parallel to field 11b via antenna 15 as a right hand circularly polarized wave and at a frequency (e.g., 178 megahertz when the magnetic field at the desired altitude is 1.1.times.10.sup.-3 webers/sq. meter) capable of exciting electron cyclotron resonance in plasma 12b in Region R.sub.3. This causes heating of the particles (electrons, ions, neutrals, and particulates) and ionization of the uncharged particles adjacent line 11b, all of which are absorbed into plasma 12b to increase the density thereof. The power transmitted, e.g., 10.sup.-5 watts -cm.sup.2 for up to 10 minutes heating time, is less than that required to generate the mirror force F required to move plasma 12b upward as in the previous embodiment.

While continuing to transmit electromagnetic radiation 20 from antenna 15, a second electromagnetic radiation beam 31, which is at a defined frequency different from the radiation from antenna 15, is transmitted from one or more second sources via antenna 32 into layer 40 and is absorbed into a portion of layer 40 (cross-hatched area in FIG. 4). The electromagnetic radiation wave from antenna 32 is amplitude modulated to match a known mode of oscillation f.sub.3 in layer 30. This creates a resonance in layer 30 which excites a new plasma wave 33 which also has a frequency of f.sub.3 and which then propogates through region R. Wave 33 can be used to improve or disrupt communications or both depending on what is desired in a particular application. Of course, more than one new wave 33 can be generated and the various new waves can be modulated at will and in a highly nonlinear fashion.

FIG. 4 illustrates still a further embodiment of the present invention wherein more than one artificial magnetic field 11a is established at points spaced from each other on the earth's surface 10. Each magnetic field 11a is established as described in connection with FIG. 3 above and a stable layer 40 of relatively dense plasma is maintained on magnetic field line 11b of each field at approximately the same attitudes. A plasma wave 33 is excited as described above and propogates between the spaced layers 40 and can be used to enhance communications between the points at which the artificial magnetic fields are located and at points therebetween. That is, a communication signal can be transmitted onto wave 33 at any point along wave 33 and will be carried thereby throughout the wavepath. This signal can be retrieved by receivers (not shown) spaced at points on the earth's surface below the wavepath. This modification is particularly useful in establishing communications between points on the earth when communications via orbiting satellite 50 may become blocked by a dense layer D of high intensity, trapped charged particles at higher altitudes. Layers D of such particles have been shown to be possible as a result of the denotation of nuclear devices at such altitudes or the like.

FIG. 5 shows apparatus useful in this invention. In FIG. 5 there is shown the earth's surface 51 with a well 52 extending downwardly there into until it penetrates hydrocarbon producing reservoir 53. Hydrocarbon reservoir 53 produces natural gas alone or in combination with crude oil. Hydrocarbons are produced from reservoir 53 through well 52 and wellhead 54 to a treating system 55 by way of pipe 56. In treater 55 desirable liquids such as crude oil and gas condensates are separated and recovered by way of pipe 57 while undesirable gases and liquids such as water, H.sub.2 S, and the like are separated by way of pipe 58. Desirable gases such as carbon dioxide are separated by way of pipe 59, and the remaining natural gas stream is removed from treater 55 by way of pipe 60 for storage in conventional tankage means (not shown) for future use and/or use in an electrical generator 61 such as a magneto-hydrodynamic, gas turbine, fuel cell or EGD generator. Any desired number and combination of different types of electric generators can be employed in the practice of this invention.

The natural gas is burned in generator 61 to produce substantial quantities of electricity which is then stored and/or passed by way of wire 62 to a transmitter 63 which generates the electromagnetic radiation to be used in the method of this invention. The electromagnetic radiation is then passed by way of wire 64 to antenna 65 which is located at or near the end of artificial field line 66. Artificial field line 66 is generated by electromagnetic coil 67 which is powered by way of wire 68 from generator 61. Antenna 65 sends circularly polarized radiation wave 69 upwards along artificial field line 66 to carry out the various methods of this invention as described hereinabove.

The fuel source need not be used in its naturally-occurring state but could first be converted to another second energy source form such as hydrogen, hydrazine and the like, and electricity then generated from said second energy source form.

It can be seen from the foregoing that an artificial magnetic field line can be established at or near a large naturally-occurring hydrocarbon source and exceedingly large amounts of power can be very efficiently produced and used to generate magnetic field lines and to transmit radiation along said field lines. This is particularly so when the fuel source is natural gas and magneto-hydrodynamic generators are employed.

Only one set of equipment is shown in FIG. 5 for sake of simplicity. For a large hydrocarbon reservoir 53, a plurality of wells 52 can be employed to feed one or more storage means and/or treaters 55 and as large a number of generators 61 as needed to power one or more transmitters 63, antennas 65, and coils 67. Since all of the apparatus 55 through 68 can be employed and used essentially at the site where naturally-occurring fuel source 53 is located, all the necessary artificial field lines 66 and electromagnetic radiation 69 is generated essentially at the same location as fuel source 53. This provides for a maximum amount of usable energy since there are no significant storage or transportation losses to be incurred.

It can be seen from the foregoing that this invention can be applied to any artificial magnetic field or fields wherever located and whether uniform or non uniform in nature. This invention can be employed in any region of the atmosphere or space where an artificial magnetic field or fields can be generated after which the electron cyclotron resonance heating is carried out as described herein. Thus, this invention can be practiced with a very small localized uniform or irregular magnetic field or with a much larger artificial magnetic field such as those approaching the size and uniformity of naturally-occurring magnetic fields. Although it may not be practical in some cases to employ an artificial magnetic field approaching the size of the earth's natural magnetic field, this invention can be employed to augment, complement or otherwise utilize or improve upon such naturally-occurring fields.

Accordingly, this invention could be employed in a method for altering at least one region normally existing above the earth's surface with electromagnetic radiation using artificially generated and diverging magnetic field lines comprising generating the artificial field line or lines, transmitting first electromagnetic radiation from the earth's surface, said transmitting being conducted substantially parallel to and along at least one of said artificial field lines, adjusting the frequency of this first radiation to a value which will excite electron cyclotron resonance at an initial elevation above the earth's surface, whereby in the region in which the electron cyclotron resonance takes place, heating, further ionization, and movement of both charged and neutral particles is effected. In this process, artificial particles can be added to the region which is excited by the electron cyclotron resonance in any manner such as from a rocket or an orbiting satellite. In this method, sufficient electromagnetic radiation can be transmitted so that altered plasma in the region is trapped on the artificial field line or lines between mirror points and oscillates back and forth there between. If the electron cyclotron resonance excited region is energized sufficiently to cause a rising plasma region, this rising region can pull with it a substantial portion of neutral particles which exist in or near the plasma region. In this method, the electron cyclotron excitation of the region can be continued until the electron concentration of the region reaches a value of at least 10.sup.6 per cubic centimeter.

The method of this invention can also be employed for altering at least one selected region normally existing above the earth's surface by employing electromagnetic radiation along at least one artificially generated magnetic field line to excite electron cyclotron resonance in the region and wherein the electromagnetic radiation is generated at the site of a naturally-occurring hydrocarbon fuel source, said fuel source being located in at least one of northerly or southerly magnetic latitudes. In this method, the fuel source can be a hydrocarbon such as natural gas and electricity for generating the electromagnetic radiation is obtained by burning the hydrocarbon field in at least one of magneto-hydrodynamic, gas turbine, fuel cell, and EGD electric generators located at the site where the hydrocarbon fuel source naturally occurs in the earth. The hydrocarbon fuel source can be located anywhere in the world such as within the natural magnetic latitudes that encompass Alaska.

This invention also encompasses apparatus for altering at least one region normally existing above the earth's surface with electromagnetic radiation comprising a combination of a naturally-occurring fuel source, means for making the fuel source available for use, means for exploiting the fuel source to generate electricity, means for converting the generated electricity into electromagnetic radiation of a desired frequency, means for generating at least one artificial magnetic field line, and means for transmitting the electromagnetic radiation along the artificial magnetic field line. The apparatus can be employed so that the artificially generated magnetic field line intersects the earth's surface at or near the naturally-occurring fuel source. The naturally-occurring fuel source could be produced from the earth, treated for the removal of undesirable fluids and burned to generate electricity essentially at the site where the fuel source is produced from the earth.

This invention can also be employed with apparatus for generating electromagnetic radiation in very large amounts for propagation along artificially generated magnetic field lines which comprises providing a source of combustible fuel, means for burning the fuel essentially at its location of natural occurrence to form a plasma, means for employing the plasma to generate electricity, means for converting electricity into the desired electromagnetic radiation, and means for generating the required artificial magnetic field line or lines.

In addition, the method of this invention can be practiced so that the first electromagnetic radiation is modulated to excite additional plasma waves within the plasma region while the plasma region is undergoing electron cyclotron resonance excitation. The method can also be employed for exploiting a naturally-occurring underground fuel source by converting the fuel source to electricity at the site where the fuel source occurs, converting the electricity to at least one electromagnetic radiation wave of known frequency, generating at least one artificial magnetic field line, transmitting the at least one electromagnetic radiation wave into the earth's atmosphere along the artificial magnetic field line to an elevation where electron cyclotron resonance takes place at the frequency of the at least one electromagnetic radiation wave. Further, the frequency of the at least one electromagnetic radiation wave can be varied as desired, both linearly and nonlinearly. Reasonable variations and modifications are possible within the scope of this disclosure without departing from the spirit and scope of this invention.

United States Patent **5,777,476**
Papadopoulos **July 7, 1998**

Ground global tomography (CGT) using modulation of the ionospheric electrojets

Abstract

An apparatus and method for performing geological mapping utilizes an HF transmitter to heat ionospheric electrons to cause the current in an overhead electrojet to be modulated, thereby injected a low frequency EM signal into the Earth-ionosphere waveguide. A sensor measures vector values of electric and magnetic fields in an area to be surveyed. The measured vector values are provided to a processor that creates a conductivity map of the surveyed area based on the measured vector values.

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Field of Search: 324/334,335,338,344,345,348-350

References Cited [Referenced By]

U.S. Patent Documents

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Primary Examiner: Strecker; Gerard R.
Attorney, Agent or Firm: Rossi & Associates

Claims

What is claimed is:

1. An apparatus comprising:

transmitting means for transmitting a signal into the ionosphere of the Earth, wherein the transmitted signal generates heating of ionospheric electrons to cause current in an overhead electrojet to be modulated, thereby injecting an EM signal into the Earth-ionosphere waveguide;

sensing means for measuring vector values of at least one of electric and magnetic fields affected by the EM signal in an area of the earth to be surveyed; and

processing means for processing the vector values of the electric and magnetic fields measured by the sensing means in order to generate a map of the subsurface physical properties of the surveyed area.

2. An apparatus as claimed in claim 1, wherein the transmitting means includes an HF transmitter and modulation means for modulating a transmitted power of the HF transmitter.

3. An apparatus as claimed in claim 2, wherein the modulation means performs amplitude modulation of the transmitter power.

4. An apparatus as claimed in claim 2, wherein the modulation means performs frequency modulation of the transmitter power.

5. An apparatus as claimed in claim 2, wherein the modulation means performs phase modulation of the transmitter power.

6. An apparatus as claimed in claim 2, wherein the HF transmitter operates in a frequency range of about 2-15 MHz.

7. An apparatus as claimed in claim 2, wherein the modulation means modulates the transmitter power at a frequency of between about 0.001 Hz and 50 kHz.

8. An apparatus as claimed in claim 2, wherein the HF transmitter is positioned and directed to deposit energy at an altitude of between about 70-100 km.

9. A method of performing geological mapping comprising the steps of:

transmitting a signal into the ionosphere of the Earth with an HF transmitter to generate heating of ionospheric electrons to cause current in an overhead electrojet to be modulated, thereby injecting an EM signal into the Earth-ionosphere waveguide;

measuring vector values of at least one of electric and magnetic fields affected by the EM signal in an area of the earth to be surveyed with at least one sensor; and

processing the vector values of the electric and magnetic fields measured by the sensor with a processing unit to generate a map of the subsurface physical properties of the surveyed area.

10. A method of performing geological mapping as claimed in claim 9, wherein the step of heating ionospheric electrons includes the step of modulating a transmitter power of the HF transmitter.

11. A method of performing geological mapping as claimed in claim 10, wherein the step of modulating the transmitter power includes frequency modulation.

12. A method of performing geological mapping as claimed in claim 10, wherein the step of modulating the transmitter power includes amplitude modulation.

13. A method of performing geological mapping as claimed in claim 10, wherein the step of modulating the transmitter power includes phase modulation.

14. A method of performing geological mapping as claimed in claim 9, wherein the HF transmitter is operated at a frequency of about 2-15 MHz.

15. A method of performing geological mapping as claimed in claim 10, wherein the transmitter power is modulated at a frequency of between about 0.001 Hz and 50 kHz.

Description

FIELD OF THE INVENTION

The invention is directed in general to a method and apparatus for geophysical exploration. More specifically, the invention provides a method and apparatus for generating controlled low frequency electromagnetic pulses by causing controlled temporal interruptions in the ionospheric electrojets current and using the low frequency reradiated signal to map the conductivity structure of an underground or underwater structure.

BACKGROUND OF THE INVENTION

The objectives of geophysical surveys are to obtain information about the interior spatial distribution of one or more of the physical properties of the underground from a limited set of measurements of a related physical field made on the surface or any other accessible place. In electromagnetic (EM) techniques, which form the basis of the current invention, the most relevant ground property is the electrical conductivity and sometimes the electric and magnetic permeability. To determine the underground profile of any particular electrical property such as the conductivity, a low frequency electromagnetic signal remotely produced and propagating in the vicinity of the surveyed area is required. The signal induces current flow into the ground leading to the production of secondary EM fields, whose characteristics depend on the ground conductivity and wave frequency. The profile of the electrical property is then determined by measuring the vector electric and magnetic fields on the ground as a function of the temporal characteristics of the signal and inverting the data to provide tomographic maps of the underground conductivity distribution.

A key physical principle upon which all EM techniques are based is the dependence of the penetration depth .delta. of the EM signal into the ground at the frequency of the EM signal (or equivalently on the signal pulse length .tau.) and the ground conductivity. The value of the penetration depth is given:

.delta.=500(1/.sigma.f).sup.1/2 meters (1)

where .sigma. is the ground conductivity in mhos/m and f the wave frequency in Hertz. By changing the frequency or the pulse length depth investigation can be accomplished. As is clear from the graph provided in FIG. 1, very low frequencies, ranging from few MHz (milliherz) to tens of kHz (kiloherz) are required to achieve significant depth of investigation. This is especially true for ocean floor exploration due to the large value of the conductivity of the sea water as evidenced by the graph illustrated in FIG. 2.

Current EM exploration methods rely on either natural sources (NSEM) or controlled sources (CSEM) to provide the necessary waves. NSEM avoids the difficult problem of generating low frequency waves by relying on natural EM signals generated by lightning discharges or caused by magnetospheric currents. These methods, however, suffer from erratic and unpredictable signal form, strength, and polarization, poor coherence and lack power in critical frequency bands. The long stacking times required for low frequency data made them unattractive to commercial applications. Today they are of no use to commercial exploration and are primarily used as inexpensive low resolution deep exploration tool by University research groups.

The problems associated with NSEM led to the development of artificial sources and CSEM techniques. In these techniques electric or magnetic dipole sources are brought in the vicinity of the surveyed area to produce stronger and controlled signals. Such techniques are quite cumbersome and expensive since they require that power supplies and current control systems be brought to the surveyed site. For low frequencies and deep penetration large, truck mounted installations are required which causes logistics problems, restricted access to remote sites and can lead to undesirable environmental damage. Most importantly artificial sources lack frequency agility and the near field geometric character of the EM signal (i.e. non-plane wave) complicates and often makes impossible the structural definition of the conductivity.

In view of the above, it is an object of the invention to provide a novel apparatus and technique for underground and seafloor geophysical exploration having a wide range of applications, including petroleum, mineral, fossil and geothermal resource exploration, ground-water exploration and development, engineering and environmental investigations, archeological investigations, underwater target detection, imaging of underground structures and general geological tomographic mapping, that does not have the limitations of the conventional methods discussed above.

SUMMARY OF THE INVENTION

The invention presents an alternative to low frequency EM exploration without the drawbacks of the NSEM or CSEM techniques discussed above. In accordance with the invention, a source of the low frequency signal is located in the lower ionospheric plasma at altitudes between 70-100 km above the ground and can be located even thousands of kilometers from the surveyed site. The low frequency signal is triggered and its characteristics and frequency controlled by using a powerful HF transmitter in the frequency range 2-15 MHz which is frequency, phase or amplitude modulated.

The HF transmitter is optimally located in geographic areas whose ionosphere is permeated by electrical currents, known as ionospheric electrojets. Such areas are at northern latitudes (auroral electrojet) or in the equatorial zone (equatorial electrojet). The interaction of the modulated HF signals with the electrojet current results in the generation of secondary low frequency EM signals, as described in "Effect of the Ionosphere on Radiowave Systems", Chang et al., edited by J. M. Goodman, p. 91, U.S. Government Printing Office, Washington, D.C. (1981) and "Electrojet Modulation ELF Communications", Papadopoulos et al. , Proceedings of AGARD EEP Symposium, Bergen, Norway (1990), the contents of which are herein incorporated by reference, which are injected into the waveguide formed by the conducting ground and ionosphere, referred to as the Earth-Ionosphere Ionosphere (EIW). These low frequency signals propagate to the surveyed site in the EIW suffering low attenuation as described in "Excitation of the Earth Ionosphere Waveguide by an ELF Source in the Ionosphere", Tripathi et al., Radio Science, Vol. 17, pp. 1321-1326 (1982), the contents of which are herein incorporated by reference.

The underground conductivity profile is deduced by measuring the vector electric and magnetic fields on the ground as a function of the temporal characteristics of the HF modulation. The signal generated by the interaction of the modulated HF fields with the ionosphere has the ideal plane wave characteristics required for underground probing. A few properly selected sites with HF transmitters can therefore provide worldwide source coverage for exploration.

The invention combines the advantages of NSEM and CSEM techniques without their disadvantages and is preferably referred to as Global Ground Tomography or GGT.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in greater detail with reference to certain preferred embodiments and the accompanying drawings, wherein:

FIG. 1 illustrates a graph illustrating skin depth as a function of frequency for various conductivities and permitivities of most earth materials at normal temperatures and pressures are in the range of 10.sup.-4 -1 mhos/m;

FIG. 2 illustrates the skin depth and the attenuation rate in sea water with .sigma.=4 mhos/m;

FIG. 3 illustrates a system operating on the GGT principle according to the invention;

FIG. 4 illustrates the penetration of the low frequency signals generated remotely by the interaction of the HF with the ionospheric currents into the conducting ground of the surveyed site;

FIG. 5 illustrates the behavior of the phase of E.sub.x with depth if the phase of Hy on the ground is taken as a reference;

FIG. 6 illustrates the behavior of the inphase (I) and quadrature phase (Q) of E.sub.x and of the induced current as a function of depth, normalized to their values at the surface;

FIG. 7 illustrates the variation of the horizontal electric field as the wave propagates across regions of discontinuity in the conductivity value;

FIG. 8 illustrates the characteristic signature of the apparent resistivity of the x-direction for the case of FIG. 7;

FIG. 9 illustrates the characteristic response of horizontal two layer structure, wherein Model A corresponds to resistive basement while model B to conductive basement;

FIG. 10 illustrates the response of a long conductive body buried in a resistive medium; and

FIG. 11 illustrates the effect on apparent resistivity of anisotropy on the second layer of a three layer model, wherein Theta is the dip of the smaller principal resistivity axis.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A schematic of the invention set up is illustrated in FIG. 3. A powerful HF transmitter 10, preferrably with a frequency in the range of 2-15 MHz, is located underneath the auroral or the equatorial electrojet and is used to modulate the natural overhead ionospheric current by heating ionospheric electrons thereby injecting low frequency EM signals into the EIW. The transmitter 10 includes modulation circuitry 11 that modulates the output from the transmitter 10 using either frequency, phase (for example by sweeping a beam) or amplitude modulation. For example, the HF Active Auroral Research Program (***HAARP***) facility located at Gakona, Ak., described in "***HAARP*** Research and Applications: A Joint Program of Phillips Laboratory and the Office of Naval Research", Naval Research Laboratory, Washington, D.C. (1995), has a transmitter that can be utilized in accordance with the invention. The frequency and pulse shape of the signals are controlled by the modulation characteristics of the radiated HF waves transmitted by the transmitter 10. These signals propagate with weak attenuation in the EIW to the surveyed site and penetrate into the underground. The electric and magnetic fields are measured over the surveyed site, using one or more conventional electric and magnetic sensors 12. The sensors can be located on the surface, on low flying airplanes or underground. Both the amplitude and the phase of the fields are measured.

The data from the sensors 12 are supplied to a processing unit 14, which can be located at a site remote from the sensors 12. The data are then inverted to provide the desired conductivity profiles. The inversion algorithms utilized by the processing unit 14 are based on the physical principle that the signal penetration depth depends on the structure of the underground conductivity profile and the temporal characteristics of the HF modulation.

The key embodiments of the present invention can be understood by referring to FIGS. 3-8. The ground based transmitter 10 illustrated in FIG. 3 has a frequency .sup..omega. HF in the HF frequency band and radiates upwards amplitude or frequency modulated signals at a lower frequency .omega.. The modulated signal interacts with the ionospheric plasma carrying the electrojet current and is demodulated. The demodulated low frequency signal has temporal characteristics of the modulation amplitude. It couples to the EIW and propagates with low attenuation to the surveyed site. The EM signals generated by the interaction of the ionosphere with the modulated HF signal are equivalent to those generated by a Horizontal Magnetic Dipole (HMD) source located in the interaction region. At large distances from the source the EM fields measured near the surface of an infinitely conductive ground, consist of a vertical electric field component E.sub.z and a horizontal magnetic field component Hy, where we have assumed that at great distances from the HF transmitter the curvature of the earth and of the field components, on a local scale are negligible, and the local EM field components can be viewed as those of a plane wave impinging at grazing angle on the Earth's surface. For an infinitely conducting ground the electric and magnetic fields do not penetrate into the ground, but they are totally reflected.
The situation changes when the low frequency signal propagates over a ground with uniform finite conductivity .sigma.. In this case the horizontal magnitude field diffuses into the ground inducing a changing horizontal electric field at right angles, through Faraday's law (FIG. 4). The behavior of the fields below the ground is a standard textbook problem. See, for example, Jackson, J. D., Classical

Electrodynamics, John Wiley & Sons, New York (1962). The orthogonal electric and magnetic fields below a homogeneous ground with uniform conductivity .sigma. due to a signal with frequency .omega. are

E.sub.x (z,t)=H.sub.o (2.sigma./.mu..omega.).sup.-1/2 exp(-iz/.delta.) exp(-z/.delta.)exp(i .omega.t) (2a)

Hy(z,t)=H.sub.o exp(-iz/.delta.)exp(-z/.delta.exp(i.omega.t(exp (-i.pi./4)(2b)

where H.sub.o is the value of the magnetic field on the surface (z=0). It can be easily shown that H.sub.o has a value equal to twice the value of the free space horizontal magnetic field. Equations (2a) and (2b) provide the algorithm necessary to extract information about the underground conductivity by measuring the fields on the surface (z=0). If the complex ground impedance Z.sub.xy is defined as described by Vozzof in Electromagnetic Methods in Applied Geophysics, Volume 1, pp. 641-711, Tulsa, Okla.: SEG (1987):

Z.sub.xy =E.sub.x /H.sub.y

then

Z.sub.xy =(1+I)(.mu..omega..multidot.2.sigma.).sup.1/2 (3)

or solving for the resistivity .rho.=1/.sigma. we find that

.rho..sub.xy =(Z.sub.xy Z* xy)/(.mu..omega.) (4)

where Z* is the complex conjugate of Z. The quantity .rho.xy is known as the apparent resistivity. The phase .phi. of Z is the phase difference between E and H. From Eqs. (2a), (2b) or (3) it can be seen that for a uniform half space E.sub.x must lead Hy by 45 degrees. In this uniform half space model the resulting .rho.xy will be the same at all frequencies and for all directions, i.e., invariant on interchanging x and y. FIG. 5 illustrates the behavior of the phase of E.sub.x and of the induced current as a function of depth, normalized to their values at the surface.

For more complicated underground structures, the relationships between the E and H fields becomes more complex. FIG. 7 illustrates the variation of the fields measured on the ground as a function of measurement location for the case that the conductivity has a variation along the x-direction but is uniform in depth. The location of the conductivity discontinuities is easily recognized from the discontinuity in the value of the apparent resistivity as shown in FIG. 8.

For the case of horizontal layers some energy is reflected at each interface in addition to internal reflections. The fields remain horizontal and at right angles to each other unless there is anisotropy in the horizontal plane. The field behavior for this case is illustrated in FIG. 9 for the case of two layers. One with resistive and the other with conductive basement, while the top layer is the same for both models. The figure shows the expected behavior of the phase and the amplitude of the resistivity as a function of frequency At high frequencies when the skin depth is smaller than the layer thickness the apparent resistivity is equal to the resistivity of the top layer. With decreasing frequency the skin depth increases and the second layer is sensed. For very low frequencies the influence of the top layer becomes negligible and the apparent resistivity approaches the value of the resistivity of the bottom layer. The overshoots and undershoots in the apparent resistivity and phase with decreasing frequency allow for localization of the interface.

The principles of the two layer field structure can be easily extended to the multilayer structures and to conductive or resistive bodies embedded in a uniform ground as shown in FIG. 10. In anisotropic media the apparent conductivity varies with the direction of the electric field of the signal, or equivalently with the signal polarization with respect to the direction of the anisotropy. In this case Ohm's law has a tensor for and, using the standard summation convention, the current density j is given by

jmn=.sigma.mlE.sub.ln (5)

As a result the current and the electric will no longer be in the direction perpendicular to H. The effect of anisotropy is illustrated in FIG. 11 for a three horizontal layer medium. The apparent resistivity is a function of the measurement direction.

While the above considerations refer to the case of harmonic modulation, it is straightforward to extend them to the case other temporal modulation forms by examining the field behavior for step function excitation. The time domain analogs of Eqs. (2a), (2b) for a step function excitation at t=0 with magnetic field amplitude h are

e.sub.x (z,t)=(h/.sigma.)(.sigma..mu./.pi.t).sup.1/2 exp›-(.sigma..mu./2t) (z.sup.2 /2)(z.sup.2 /2)! (6a)

hy(z,t)=h erfc›(.sigma..mu./t).sup.1/2 (z/2)! (6b)

where erfc is the complementary error function. From Eqs. (6a), (6b) it is clear that the penetration depth depends on the pulse length t, and is equivalent to Eq. (1) with t replaced by 1/.omega., with .omega.=2.pi.f. Conductivity profiles on the time domain are obtained by varying the pulse length and measuring the decay of the induced currents (fields) on the ground. More detailed analysis of the interaction of low frequency EM waves with inhomogeneous and anisotropic ground and the relevant inversion techniques can be found in Nabighian, N., Electromagnetic Methods in Applied Geophysics, Vols. 1 & 2, Tulsa, Okla.: SEG (1987).

The invention has been described with reference to certain preferred embodiments thereof. It will be understood, however, that modifications and variations are possible within the scope of the appended claims. For example, the data from the sensors can either be directly supplied to a processing unit or stored for later processing.

FACTS & FIGURES-APPLICATIONS IN SCIENCE

Applications:

Intelligence, Counterintelligence, Behavior Modification and Accelerated Reality Re-Generalization

Script: A carefully constructed series of words arranged in the form of posthypnotic patter. The script will generally consist of four separate parts;

(1) **an identifier** - *Subject's name, description, or other identifying factor*

(2) **trigger activation condition or conditions** - *When, what or how the suggestion will trigger*

(3) **the content** -*What the trigger will precipitate in the perception of the subject*

(4) **and a duration** - *when or under what conditions will it stop or finish* additional reinforcing scripts are usually added to strengthen or reinforce the central posthypnotic command

Thought labels - an itch, clothing tug or even an innocent sneeze can be used to label a thought….all involuntary muscle spasms that are performed during subconscious interrogation. Currently, to optimize efficiency and accommodate the variety of languages on the planet, phonetic elements from each language and distinct dialect are sampled, digitally edited to optimize them for hypnotic delivery. The empty space between words is minimized; pitch rise is compressed and filtered. Repetitive sine waves are also removed from the phonetic element's acoustic wave train thus reducing the actual number of sine waves making up a word by 50% or more. This reduces the actual length of the time it takes the phoneme to be delivered prior to accelerating (speeding up) the delivery (FFW). This helps the message to be played at higher speeds and reduces the subject's ability to recognize it as accelerated speech. The technique of using optimized digitally sampled and edited phonemes appended together to form words and the sentences structured as hypnotic suggestions commonly termed "Computer Simulated Subconscious Speech Language" or "S".

Subconscious Mind Operating Speed: 1200 to 1400 Words per minute
Conscious Mind Operating Speed: 250 to 450 wpm
Accelerated Speech is also known as A.S.

The Subconscious Mind is very sensitive. It often hears things the mind ignores. Reconstructing the missing sine waves from the acoustic wave train and slowing down the message to investigate its content.

- Professional State of the art recording equipment
- Digital Acoustic Wave Editing Equipment
- Advanced engineering knowledge, Phonetics and linguistics expertise
- Hypnosis theory & Scripting

"Human hearing works as good as eyesight in accepting subliminal messages" Preliminary theory work was transferred to fort mead NSA who had expertise in characterizing language in analog domains where a sampled phoneme could be edited (shortened b removing excessive waveforms from the acoustic wavetrain) and electronically reconstructed back into shortened words of language. Some early experiments Included remote viewing. Early research at Singer-Kearfott Division/Subliminally Implanted Posthypnotic Suggestion- Acoustically delivered phonetically edited language elements combined into scripts without somnambulistic preparation in the subject.

Behavioral Modification Process:

Multiple Posthypnotic Delivery Techniques used to apply negative reinforcement into the subject. The patterns fall into three different categories - Real time deliveries, Prescheduled deliveries via preprogrammed computer and posthypnotic or "Conditional deliveries "

Behavioral modification generally occurs fastest when using negative reinforcement continuously. Using all three delivery patterns confuses the subject maximizing behavioral change over time through continuous pressure.

(*Post Hypnotic Event Triggered Reinforcement*) Using negative and/ or positive reinforcement, degree of reinforcement, the duration of the reinforcing event and the conditions of the trigger.

REAL TIME OBSERVATION
INTERROGATION SCENARIOS
CROWD CONTROL
PTOSIS

Scientific understanding and practical applications experience in the fields of psychology, hypnosis, pharmacology and problem analysis are considered risks in the subject that may complicate or inhibit subsequent behavioral modification processes. Now there's " TEMPEST " Millimeter Wave technology.

Even now we have actions happening globally. An Organization of U.S. International Broadcasters Bringing News and Information to People around the World in 61 Languages. http://www.bbg.gov/bbg

On October 1, 1999, the Broadcasting Board Governors (BBG) became the independent, autonomous entity responsible for all U.S. government and government sponsored, non-military, international broadcasting. This was the result of the 1998 Foreign Affairs Reform and Restructuring Act (Public Law 105-277), the single most important legislation affecting U.S. international broadcasting since the early 1950s. Let's not forget that with the potentials of subliminal programming, bbg reaches everyone.

Every week, more than 100 million listeners, viewers, and internet users around the world turn-on, tune-in, and log-on to U.S. international broadcasting programs. Little do they know that PSYOP's are nestled nicely among these broadcasting bands. Listeners are unaware, oftentimes ignorant of it's effects. The first Gulf war was won by bombarding iraqi troops with negative programmming. While the "Broadcasting Board of Governors" is the legal name given to the Federal entity encompassing all U.S international broadcasting services, the day-to-day broadcasting activities are carried out by the individual BBG international broadcasters: the Voice of America (VOA), Radio Sawa, Radio Farda, Radio Free Europe/Radio Liberty (RFE/RL), Radio Free Asia (RFA), Radio and TV Marti, and WORLDNET Television, with the assistance of the International Broadcasting Bureau (IBB) but in reality it's real mission is TOP SECRET. The broadcasters and the IBB are described below. If you would like to find out more fake information about the individual organizations and their broadcast activities, please visit their websites. If you want to know what they are really up to, good luck !!!

TOMMORROW'S THOUGHTS TODAY

Eventually there will be a way to get "Information" to everyone on the planet. A way and means to disseminate a generalized reality orientation for all to live from. Check out some ways below…

The Voice of America

The Voice of America broadcasts around the world in 53 languages to an estimated audience of 91 million people each week. VOA broadcasts to all regions of the world, with the exception of Western Europe and the United States. VOA programming is carried on shortwave and medium wave from 22 IBB stations around the world and is rebroadcast through a global network of approximately 900 local affiliate stations. VOA is also available on the internet in all 53 languages and broadcasts 14 television hours per week via satellite. Since its first broadcast on February 24, 1942, VOA has provided its audience with accurate and objective programming. The VOA Charter, written in 1960 and signed into law (Public Law 94-350) on July 12, 1976, upholds this standard. It requires VOA broadcasts to be accurate, objective, and comprehensive; to represent all segments of American society and to present a balanced and comprehensive view of significant American thought and institutions; and clearly present the policies of the United States.

Radio Sawa

Radio Sawa, a 24-hour, seven-day-a-week Arabic-language network, is unique in the Middle East. It broadcasts an upbeat mix of Western and Arabic pop music along with up-to-the-minute news, news analysis, interviews, opinion pieces, sports, and features on a wide variety of political and social issues. Radio Sawa (www.radiosawa.com) originates its programming from Washington and is broadcast across the region, using a combination of medium wave (AM) and FM transmitters, digital audio satellite, short wave and Internet. Radio Sawa will ultimately have six streams tailored to specific parts of the region. Radio Sawa is supervised by the Broadcasting Board of Governors (BBG).

Radio Farda

Radio Farda, which means "Radio Tomorrow" in Persian, is a joint effort of two BBG entities: Radio Free Europe/Radio Liberty (RFE/RL) and Voice of America (VOA). Operated from Washington, D.C. and Prague, Czech Republic, Radio Farda produces fresh news and information at least twice an hour, with longer news programming in the morning and the evening. Radio Farda also broadcasts a combination of popular Persian and Western music. The station operates 24 hours a day on medium wave (AM 1593 and AM 1539), digital audio satellite, and on the Internet as well as 21 hours a day on shortwave. Radio Farda complements the VOA's Persian-language radio and television broadcasts into Iran.

Radio Free Europe/Radio Liberty (RFE/RL)

Radio Free Europe/Radio Liberty is the principal U.S. surrogate, BBG grantee, broadcaster to the former Soviet Union and Eastern Europe. With the recent addition of two new services operating under the trade names Radio Free Iraq and the RFE/RL Persian Service, RFE/RL broadcasts in 26 languages for approximately 850 hours per week. All RFE/RL broadcasts are also streamed live over the Internet from its website, http://www.rferl.org

More than 20 million listeners in countries stretching from Belarus to Bosnia and from the Arctic Sea to the Persian Gulf rely on RFE/RL's daily news, analysis, and current affairs programming to provided a coherent, objective account of events in their region and the world.

Radio Free Asia

Radio Free Asia (RFA) is the principal U.S. surrogate, BBG grantee, broadcaster in Asia. Founded in 1996, RFA broadcasts in 10 languages to China, Tibet, Burma, Vietnam, Laos, Cambodia, and North Korea. RFA broadcasts about 200 hours per week. RFA also audio streams broadcasts in all 10 languages over the Internet.

RFA broadcasts news, information, and commentary and provides a forum for a variety of opinions and voices from within Asian countries. RFA broadcasts in ten languages on shortwave. Its broadcasts seek to promote the rights of freedom of opinion and expression, including the freedom to seek, receive, and impart information and ideas through any medium regardless of frontiers.

The Office of Cuba Broadcasting (Radio and TV Marti)

The Office of Cuba Broadcasting directs the operations of Radio and TV Marti: two broadcast services that provide Spanish-language news, features, and entertainment programs to Cuba. In accordance with the Broadcasting to Cuba Act of 1983 (Public Law 98-111), Radio Marti follows Voice of America journalistic standards and guidelines for presenting a variety of news and information in an accurate and objective manner.

The station broadcasts seven days a week, 24 hours a day on medium wave (AM) and short wave.

TV Marti programming includes four-and-a-half hours of daily newscasts as well as programs about public affairs, culture, music, sports, and entertainment. The station broadcasts commentary and information about events in Cuba and elsewhere to promote the free flow of information and ideas in that country.

WORLDNET Television

WORLDNET Television and Film Service broadcasts news and public affairs reports, programs that reflect American life, and discussions on United States foreign and domestic policies. Program formats include feature magazines, news reports, and live call-in shows. WORLDNET programs are available 24 hours a day, seven days a week by satellite through broadcast outlets, cable systems, and direct-to-home satellite receivers.

The International Broadcasting Bureau (IBB)

The International Broadcasting Bureau (IBB) is composed of the Voice of America (VOA), WORLDNET Television and Film Service, and the Office of Cuba Broadcasting (OCB) and 12 support offices, including the Office of Engineering and Technical Services and the Office of Affiliate Relations. The IBB is responsible for administrative and oversight functions for VOA, the Office of Cuba Broadcasting, and WORLDNET and provides marketing and transmission support for RFA and RFE/RL. With the advent of digital broadcasting, technology, brainwashing becomes that much easier. The best part is no one knows…

Trance-forming the history of mankind

The mathematical languages of Artificial Intelligence**:** *Patents, the future and the strategy of being you*

Artificial Intelligence was huge in 1968. It was a Top Secret Functional Hypnotic Model of Intelligence created in the back of on old classroom at the University of Illinois. This calculus of the human mind had been derived by Air Force Psy-Ops. With that being said, if you were to understand its use in shaping behavior, you could understand it's relevance to global mind control. This model is part of a formula used to create a strategic plan started many years earlier by JCR Licklider. In 1962 he was asked by the director of DARPA to work on special projects based on his paper Man-Computer Symbiosis. He was the architect for project MAC at MIT. In order to understand the future, we must understand ourselves; we're ALIVE!!! Artificial Intelligence has a living language and structure evolving right here, right now, today…

CHARLES SHERWOOD

Humboldt and the Cartesian Tradition

Author Unkown

There is a remarkable consistency to Noam Chomsky's linguistic work. In this domain, Chomsky has distinguished himself by moving forward in his research on the basis of new data. Nevertheless, much of what has come to be considered Chomsky's major contribution to the field he produced quite early in his career: *Morphophonemics of Modern Hebrew,* his 1956 paper with Halle and Lukoff, his (unpublished) 1959 Texas-conference paper on contemporary generative phonology, and the linguistic parts of *The Logical Structure of Linguistic Theory*. Linguistic research has since been deemed a scientific area of study, and has been enriched by new insights into the nature of speech and language. But this innovation owes a great deal to Chomsky, who had the courage to reconceive the implications of what he had learned in the academy.

The details of Chomsky's early contribution to the field are complex, and have caused much confusion among historians (especially linguistic historians), particularly when it comes to the relationship between his early work and other work undertaken in the field. This confusion may be somewhat alleviated if we consider that except for "Systems of Syntactic Analysis," his 1953 article on procedural-constructional approaches that appeared in the *Journal of Symbolic Logic,* virtually all of Chomsky's work is a rejection of the Bloomfield-Harris school, particularly in terms of his emphasis on the generativity of human language and the tenet that any theory of grammar must account for the speaker's ability to understand sentences that he or she hears for the first time. This is not to suggest that there is in Chomsky's work an emphasis on the often-mentioned "distinction" between grammatical and ungrammatical sentences; in fact, as Chomsky points out, in *Logical Structure* and *Syntactic Structures* "there is no such bifurcation: there are just varying degrees of grammaticalness." Every expression "falls among them somewhere and there is no special two-way split" (27 June 1995). In the area of discovery procedures, another frequently discussed issue is that "a linguistic theory should not be identified with a manual of useful procedures, nor should it be expected to provide mechanical procedures for the discovery of grammars" (*Syntactic Structures* 55n6). The aim, instead, becomes to develop a grammar that is able to generate sentences, just as the speaker of a language is able to produce a virtually infinite number of sentences using the finite number of words and grammatical rules known to him.

Antibehaviorism

There is another difference between Chomsky and the Bloomfieldians who preceded him that ultimately proves to be of monumental importance: Bloomfield's model was based on behaviorism and its associated learning theory. Chomsky's rejection, political and intellectual, of such a notion became clear, and public, in the course of his "savage and exhilarating review" of B. F. Skinner's 1957 book Verbal Behavior (Goreing 15). This review appeared in 1959 in the journal Language, and it received a considerable amount of attention. The thirty-year-old Chomsky was taking on an established and well-entrenched figure, and, in so doing, was putting into question an entire school of psychological enquiry.

B. F. Skinner's work had been presented to specialists in the field ten years earlier in the context of the William James Lectures, and when Chomsky first arrived at Harvard in 1951 his ideas were in vogue. Six years later, the entire behaviorist program had gained significant currency at Harvard (where Skinner taught) and far beyond: Skinner had become the leading proponent of behaviorism by the early 1950s. He believed that human behavior, especially verbal behavior, can be explained and controlled by the same external processes (reinforcement, for example) as those employed to predict and control the behavior of animals.

This, in Chomsky's view, denies a fundamental characteristic of human behavior, creativity, which allows even very young children to comprehend a great variety of utterances when hearing them for the very first time. Furthermore, Chomsky felt that the application to language processes of behaviorist-psychology terminology, such as "stimulus," "response," "habit," "conditioning," and "reinforcement," was so ambiguous and empirically vapid that it could be made to cover anything. What, for example, does paraphrasing "X wants Y" with "X is reinforced by Y" suggest? In Chomsky's view, "reinforced" can imply such a wide variety of responses that it is meaningless; the notion of reinforcement does not clarify or objectify descriptions of liking, wishing, wanting. John Lyons writes: "In the absence of any overt `response,' the behaviorist takes refuge in an unobserved and unobservable `disposition to respond'; and having accounted, in principle, for the association of words (as `responses') with objects (as `stimuli') and for the learning of a limited set of sentences in the same way, he either says nothing at all about the formation of new sentences or at this point appeals to some undefined notion of `analogy'" (84 -- 85). In short, the examination of external conditions to explain verbal behavior "is simply dogma, with no scientific basis." Raphael Salkie summarizes Chomsky's viewpoint well:

If we want to account for the fact that the language of English speakers has certain regularities in it, we must look at the external environment and at the internal structure of English speakers -- that is, their knowledge of the language. If we want to look at how English speakers acquire knowledge of their language, we need to take into account their innate knowledge, genetically determined changes, and changes due to their experience. Insisting at the outset that one of these factors cannot be relevant is simply dogmatism, and has no place in science. The point of Chomsky's critique of Skinner was not, as many believed, to attack behaviorism, because this would import to the project a credibility that Chomsky denies. He writes: "It wasn't Skinner's crazy variety of behaviorism that interested me particularly, but the way it was being used in Quinean empiricism and `naturalization of philosophy,' a gross error in my opinion. That was important, Skinner was not. The latter was bound to collapse shortly under the weight of repeated failures"(31 Mar. 1995).

Kenneth MacCorquodale published a counterattack called "On Chomsky's Review of Skinner's *Verbal Behavior*" in a 1970 issue of the *Journal of the Experimental Analysis of Behavior.* He fails, however, to address the issues raised by Chomsky relating to language and verbal behavior: "The hypothesis of Verbal Behavior is simply that the facts of verbal behavior are in the domain of the facts from which the system has been constructed. Skinner's stratagem is to find plausible referents in the speech episode for the laws and terms in his explanatory system: stimulus, response, reinforcement, and motivation. The relevance of these laws and their component variables for the verbal events is hypothesized only; it is not dogmatically claimed" (185). Chomsky himself replied in the journal *Cognition* that "MacCorquodale assumes that I was attempting to disprove Skinner's theses, and he points out that I present no data to disprove them. But my point, rather, was to demonstrate that when Skinner's assertions are taken literally, they are wrong on the face of it . . . or else quite wrong.

1. MacCorquodale, K. (1969). B.F. Skinner's Verbal behavior: A retrospective appreciation. *JEAB,* **12,** 831-841.
2. MacCorquodale, K. (1970). On Chomsky's review of Skinner's *Verbal Behavior. JEAB,* **13**, 83-99.

The Founding of MIT's Graduate Program in Linguistics

At thirty-one, Chomsky seemed to be on the brink of a glittering career in the academy. As well, he and Carol were becoming deeply involved in domestic life; they were determined to provide a serene and comfortable environment for their young children. But the Skinner review in *Language* had been a first step towards the establishment of Chomsky as a controversial public figure, and the political views for which he would soon become infamous were rapidly taking shape, fueled by his voracious reading habit. Chomsky had managed to maintain his interest in Jewish cultural issues, as well; he was still close to his parents and brother, and during his frequent treks home to Philadelphia to see them, he was able to renew his involvement in these issues.
In the spring of 1959, Chomsky began working on a project involving generative phonology, applying to the English language theories that he had previously developed for analyzing Hebrew in *Morphophonemics of Modern Hebrew*. He also continued to explore the wider implications of his work, and was therefore becoming a point of reference for researchers in numerous fields, including philosophy, psychology, and, of course, linguistics. Chomsky's growing eminence was also the result of his having begun a graduate program in linguistics at mit with like-minded colleagues, notably Morris Halle. The time was ripe for such a program. An evolution was occurring within the field of linguistics, and MIT was prepared to allow Chomsky and Halle to circumvent the usual red tape. As Chomsky recalls:

> [W]e were able to develop our program at MIT because, in a sense, MIT was outside the American university system. There were no large departments of humanities or the related social sciences at MIT. Consequently, we could build up a linguistics department without coming up against problems of rivalry and academic bureaucracy. Here we were really part of the Research Laboratory of Electronics. That permitted us to develop a program very different from any other and quite independent. (*Language and Responsibility* 134)

The program immediately attracted a number of gifted scholars, including Robert Lees, who had by then completed his Ph.D. in electrical engineering at MIT; Jerry Fodor and Jerry Katz, graduates of the Ph.D. program at Princeton; and Paul Postal, who had completed his Ph.D. at Yale. All were eventually named to the mit faculty - Lees and Postal in linguistics, Fodor and Katz in philosophy; Lees, of course, was hired to work on the mechanical translation project. There were also John Viertel, a personal friend of Chomsky's who was not, and never had been, a graduate student ("an interesting guy - an associate of Brecht's, among other things" [31 Mar. 1995]), and M. P. Schützenberger, a well-established mathematician and biologist who had often visited re at MIT ("where we became friends and to a certain extent colleagues, applying mathematical ideas of his to formal languages in published work" [31 Mar. 1995]). Fodor comments upon this era:

> It's not much of a hyperbole to say that all of the people who were interested in this kind of linguistics were at MIT. That's not quite true. There were others scattered around. But for a while, we were pretty nearly all there was. So communication was very lively, and I guess we shared a general picture of the methodology for doing, not just linguistics, but behaviorial science research. We were all more or less nativist, and all more or less mentalist. There was a lot of methodological conversation that one didn't need to have. One could get right to the substantive issues. So, from that point of view, it was extremely exciting. (qtd. in R. A. Harris 68)

At the age of thirty-three, Chomsky was made professor of foreign languages and linguistics at mit. He found himself emerging from the shadows of what had initially been a personal hobby and entering the newly revitalized and promising field of linguistic studies.

Chomsky's "Classic Period"

In his 1993 history of linguistics, P. H. Matthews characterizes the early-to-mid-1960s as "Chomsky's classic period," a time of enormous productivity (see *Grammatical Theory*). In 1962, Chomsky gave a paper at the Ninth International Congress of Linguists entitled "The Logical Basis of Linguistic Theory," which outlined an approach to language known as transformational generative grammar. The plenary speaker for this congress - who was, in a sense, supposed to represent American linguistics - was to have been Zellig Harris, but Harris delayed deciding whether to accept the invitation, and finally turned it down shortly before the congress was scheduled to take place. Three of the congress organizers, Morris Halle, Roman Jakobson, and William Locke (all mit linguists), convinced Chomsky to replace Harris. "Chomsky, never an avid conference goer, agreed, though his entire contact with the meeting was limited to the drive into Cambridge the morning of his presentation, staying for a late afternoon reception, and driving back that evening" (Anderson et al. 692).
Chomsky was suddenly thrust into the position of being "*de facto* spokesperson for American linguistics" (Anderson et al. 692). He did not disappoint; he gave a paper that introduced the topics covered in *Current Issues in Linguistic Theory* to an international audience and represented a clean break from structural linguistics of all varieties. This paper turned out to be "the initial germ of the research programme which was to lead to the principles-and-parameters modular theory, which in fact amounts to a discovery procedure, `a scientific advance of the highest importance' that seemed to be `hopelessly out of the question' at that time" (Otero, "Chomsky and the Challenges" 14). There was, however, a negative backlash to his presentation. Otero reports: "As often happens, some of the participants, including a variety of European professors, were apparently more concerned with defending what they took to be their territory than with any intellectual issues" ("Chomsky and the Challenges" 14).

In June of 1964, Chomsky delivered a series of lectures at the Linguistic Institute of the Linguistic Society of America (published in 1966 as *Topics in the Theory of Generative Grammar*). He also published *Aspects of the Theory of Syntax* (1965) and *Cartesian Linguistics: A Chapter in the History of Rationalist Thought* (1966). He gave another set of lectures to a general audience, in Berkeley, in January of 1967, which was expanded and published as *Language and Mind* in 1968 (an enlarged edition - several later essays were added - came out in 1972). And he completed *The Sound Pattern of English* with Halle in 1968. In Matthews's words, "few scholars can have published so much, of such value and on such varied topics, in such a short time" (*Grammatical Theory* 205).

But this "classic period" was also a time of mounting worldwide tensions; the Cuba Crisis erupted and was defused, bringing the world to the brink of nuclear war. That very year, the United States began a systematic bombardment of rural Vietnam. Chomsky was to become increasingly discontent in the wake of such upheaval, and the seed of what was to be a lifelong commitment to active political resistance were sown. Chomsky offers a snapshot of his activities at this time: "Those were pretty hectic days. I was often giving many political talks a day all over the place, getting arrested, going to meetings about resistance and other things, teaching my classes, playing with my kids, etc. I even managed to plant a lot of trees and shrubs, somehow. Looking back, I can't imagine how it was possible" (13 Feb. 1996).

Cartesian Linguistics

The topics that were of interest to Chomsky during this period are interconnected in various ways. In *Cartesian Linguistics,* for example, Chomsky elaborates the relationship between empiricist and rationalist approaches. The book is part of the Studies in Language Series, which Chomsky and Halle edited for Harper and Row, and which was intended "to deepen our understanding of the nature of language and the mental processes and structures that underlie its use and acquisition" (*Cartesian Linguistics* ix).

Chomsky wrote the text while he was a fellow of the American Council of Learned Societies; he did so with the assistance of the National Institutes of Health at Harvard University, the Center for Cognitive Studies, and a grant from the Social Science Research Council. Prior to publication, he presented his findings in the context of the Christian Gauss Seminars in Criticism at Princeton at the invitation of R. P. Blackmur and on the suggestion of Edward Cone from the music department and Richard Rorty from philosophy. His presentation took the form of six weekly lectures, running from 25 February until 8 April 1964. Chomsky had been asked to link his interests in formal language and the analysis of syntax to literature; but since he did not consider himself to be "in a position to say anything significant relating to literature," he instead offered to address "the topic of structure of language and philosophy of mind, and, in particular, to try to develop some notions that were extensively discussed in the seventeenth through early nineteenth centuries, though rarely since" (Otero, "Chomsky and the Challenges" 15). Seminar participants made some useful comments in response to the lectures, as did several of Chomsky's friends and colleagues, such as William Bottiglia, Roman Jakobson, Louis Kampf, Jerry Katz, and John Viertel. According to Otero, "the audience included very sophisticated people and . . . the lectures were well received" ("Chomsky and the Challenges" 16).

In a letter he wrote to Chomsky a few weeks after the seminars had ended, Cone wrote: "It's almost unheard of for a man to keep his entire audience through all six sessions. Your ideas are still resounding through the halls of the Philosophy Department here. Please come again!" (qtd. in Otero, "Chomsky and the Challenges" 15 - 16). The resulting text, which was substantially written up in a number of weeks, is an extremely original piece of research, and ranges beyond the field of linguistics; it stands as a contribution to the field of intellectual history, what is sometimes called the history of ideas. And it created a tremendous stir at the time - as it did later on.

US 5,507,291 - *Methods and Apparatus for Remotely Determining Information as to a persons Emotional State*

United States Patent ***5,507,291***
Stirbl , et al. **April 16, 1996**

Method and an associated apparatus for remotely determining information as to person's emotional state

Abstract

In a method for remotely determining information relating to a person's emotional state, an waveform energy having a predetermined frequency and a predetermined intensity is generated and wirelessly transmitted towards a remotely located subject. Waveform energy emitted from the subject is detected and automatically analyzed to derive information relating to the individual's emotional state. Physiological or physical parameters of blood pressure, pulse rate, pupil size, respiration rate and perspiration level are measured and compared with reference values to provide information utilizable in evaluating interviewee's responses or possibly criminal intent in security sensitive areas.

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Claims

What is claimed is:

1. A method for remotely determining information relating to a person's emotional state, comprising:

generating waveform energy having a predetermined frequency and a predetermined intensity, the generating of said waveform energy being implemented at a location remotely spaced from a target individual;

automatically monitoring the position of the individual;

wirelessly transmitting said waveform energy towards the individual;

detecting energy emitted from a predetermined point on the individual in response to the waveform energy;

automatically tracking the location of said point; and

automatically analyzing the emitted energy to derive information relating to the individual's emotional state.

2. The method defined in claim 1 wherein said step of analyzing includes the steps of:

determining a value related to a physiological parameter taken from the group consisting of blood pressure, pulse rate, respiration rate, pupil size, and perspiration; and

comparing the value with a stored reference value to identify a change in said parameter.

3. The method defined in claim 2 wherein said parameter is respiration rate and said emitted energy is reflected from the individual's chest wall, further comprising the steps of:

processing the emitted energy to determine location of the individual's chest wall; and

automatically monitoring the individual's position and compensating for changes in the individual's position in determining changes location of the individual's chest wall.

4. The method defined in claim 3 wherein said waveform energy is taken from the group consisting of modulated electromagnetic radiation and pressure waves.

5. The method defined in claim 2 wherein said reference value includes a previously measured value for said parameter, further comprising the step of storing said parameter in encoded form in a memory.

6. The method defined in claim 1 wherein said waveform energy is collimated modulated electromagnetic radiation, said step of generating including the steps of:

producing an electromagnetic waveform of said predetermined frequency;

modulating said electromagnetic waveform; and

collimating the modulated electromagnetic waveform, said step of transmitting including the step of directing said electromagnetic waveform to said predetermined point on said individual.

7. The method defined in claim 6, further comprising the step of processing said emitted energy to derive a measure of perspiration on the individual at a predetermined location.

8. The method defined in claim 1 wherein said step of monitoring includes the steps of deriving a contour of said individual and comparing said contour with previously determined generic contour data.

9. The method defined in claim 1 wherein said step of analyzing includes the step of measuring the emitted energy to determine at least one parameter selected from the group including frequency, amplitude or intensity, phase, and

polarization, said step of analyzing also including the step of automatically comparing the determined parameter with a reference value.

10. The method defined in claim 9 wherein said reference value incorporates at least one prior measurement of the selected parameter with respect to the individual.

11. The method defined in claim 1, further comprising the step of changing a frequency of said waveform during a sequence of successive measurements.

12. A system for remotely determining information relating to a person's emotional state, comprising:

generator means for generating waveform energy having a predetermined frequency and a predetermined intensity, said generator means being remotely spaced from a target individual;

transmitter means operatively connected to said generator means for wirelessly transmitting said waveform energy towards the individual, said transmitter means including directional means for directing said waveform to a predetermined point on said individual;

detector means for detecting energy emitted from the individual in response to the waveform energy;

processing means operatively connected to said detector means for analyzing the emitted energy to derive information relating to the individual's emotional state, said processing means being operatively connected to at least one of said generator means and said transmitter means for controlling emission of energy towards the individual; and

monitoring means operatively connected to said processing means for monitoring the location of the individual, said monitoring means being operatively connected to said directional means for controlling the operation thereof.

13. The system defined in claim 12 wherein said processing means includes first means for determining a value related to a physiological parameter taken from the group consisting of blood pressure, pulse rate, respiration rate, pupil size, and perspiration and second means operatively connected to said first means for comparing the determined value with a stored reference value to identify a change in said parameter.

14. The system defined in claim 13 wherein said parameter is respiration rate and said emitted energy is reflected from the individual's chest wall, said processing means including third means for processing the emitted energy to determine location of the individual's chest wall and means for automatically monitoring the individual's position and compensating for changes in the individual's position in determining changes in location of the individual's chest wall.

15. The system defined in claim 14 wherein said waveform energy is taken from the group consisting of modulated electromagnetic radiation and ultrasonic pressure waves, said generator means including at least one of means for generating electromagnetic energy and means for generating ultrasonic pressure waves.

16. The system defined in claim 13 wherein said parameter is blood pressure, said waveform energy is a first ultrasonic pressure wave and said emitted energy is a second ultrasonic pressure wave, said processing means including means for processing said second ultrasonic pressure wave to derive a rate of blood flow in a preselected blood vessel of the individual, said processing also including means for automatically calculating a blood pressure parameter from the derived blood flow rate.

17. The system defined in claim 13 wherein said parameter is pupil size, said waveform energy being electromagnetic radiation, said detector means including pixel receptors of a camera, said processing means including means for automatically counting pixels corresponding to a diameter of the individual's pupil.

18. The system defined in claim 13 wherein said reference value includes a previously measured value for said parameter, further comprising memory means for storing said parameter in encoded form.

19. The system defined in claim 12 wherein said waveform energy is collimated modulated electromagnetic radiation, said generator means including means for producing an electromagnetic waveform of said predetermined frequency and means for collimating said electromagnetic waveform.

20. The system defined in claim 19, further comprising means for processing said emitted energy to derive a measure of perspiration on the individual at a predetermined location.

21. The system defined in claim 12 wherein said monitoring means includes means for deriving a contour of said

individual and means connected thereto for comparing said contour with previously determined generic contour data.

22. The system defined in claim 12 wherein said detector means includes means for measuring the emitted energy to determine at least one parameter selected from the group including frequency, amplitude or intensity, phase, and polarization, said processing means including means for comparing the determined parameter with a previously determined reference value.

23. The system defined in claim 22 wherein said reference value incorporates at least one prior measurement of the selected parameter with respect to the individual, said processing means including means for deriving said reference value from said prior measurement.

24. The system defined in claim 12 wherein said generator means includes means for changing a frequency of said waveform during a sequence of successive measurements.

25. A method for remotely determining information relating to a person's emotional state, comprising:

generating waveform energy having a predetermined frequency and a predetermined intensity, the generating of the waveform energy being implemented at a location remotely spaced from a target individual;

wirelessly transmitting said waveform energy towards the individual;

detecting energy emitted from the individual in response to the waveform energy; and

automatically analyzing the emitted energy to derive information relating to the individual's emotional state, the analyzing of the emitted energy including determining a value related to pulse rate and comparing the value with a stored reference value to identify a change in pulse rate,

wherein said emitted energy emanates from a predetermined point on the individual overlying or on a blood vessel, further comprising processing the emitted energy to determine (1) a change in a parameter taken from the group consisting of intensity, change in intensity, change in polarization, and fluorescence of the emitted energy and (2) amount of transdermal absorption, said waveform energy being modulated electromagnetic radiation in a suboptical range of the electromagnetic spectrum.

26. The method defined in claim 25, further comprising the steps of:

automatically measuring emitted radiation at an additional point proximate to said predetermined point to determine a level of surface moisture; and

compensating for surface absorption due to surface moisture in determining said amount of transdermal absorption.

27. The method defined in claim 25, further comprising the step of automatically monitoring the individual's position and tracking consequent changes in position of said predetermined point.

28. A method for remotely determining information relating to a person's emotional state, comprising:

generating waveform energy having a predetermined frequency and a predetermined intensity, the generating of the waveform energy being implemented at a location remotely spaced from a target individual;

wirelessly transmitting said waveform energy towards the individual;

detecting energy emitted from the individual in response to the waveform energy; and

automatically analyzing the emitted energy to derive information relating to the individual's emotional state, the analyzing of the emitted energy including determining a value related to blood pressure and comparing the value with a stored reference value to identify a change in blood pressure,

wherein said waveform energy is a first ultrasonic pressure wave and said emitted energy is a second ultrasonic pressure wave, further comprising processing said second ultrasonic pressure wave to derive a rate of blood flow in a preselected blood vessel of the individual, the analyzing of the energy emitted from the individual including automatically calculating a blood pressure parameter from the derived blood flow rate.

29. A method for remotely determining information relating to a person's emotional state, comprising:

generating waveform energy having a predetermined frequency and a predetermined intensity, the generating of the waveform energy being implemented at a location remotely spaced from a target individual;

wirelessly transmitting said waveform energy towards the individual;

detecting energy emitted from the individual in response no the waveform energy; and

automatically analyzing the emitted energy to derive information relating to the individual's emotional state, the analyzing of the emitted energy including determining a value related to a physiological parameter and comparing the value with a stored reference value to identify a change in said parameter,

wherein said parameter is perspiration, said waveform energy being modulated electromagnetic radiation, the determination of surface moisture being implemented by measuring an intensity of radiation emitted from a predetermined point on the individual.

30. A system for remotely determining information relating to a person's emotional state, comprising:

generator means for generating waveform energy having a predetermined frequency and a predetermined intensity, said generator means being remotely spaced from a target individual;

transmitter means operatively connected to said generator means for wirelessly transmitting said waveform energy towards the individual;

detector means for detecting energy emitted from the individual in response to the waveform energy; and

processing means operatively connected to said detector means for analyzing the emitted energy to derive information relating to the individual's emotional state, said processing means being operatively connected to at least one of said generator means and said transmitter means for controlling emission of energy towards the individual, said processing means including first means for determining a value related to pulse rate and second means operatively connected to said first means for comparing the determined value with a stored reference value to identify a change in pulse rate,

wherein said emitted energy emanates from a predetermined point on the individual overlying or on a blood vessel, said first means including means for deriving (1) a change in a parameter taken from the group consisting of intensity, change in intensity, change in polarization, and fluorescence of the emitted energy and (2) amount of transdermal absorption, said waveform energy being modulated electromagnetic radiation in a suboptical range of the electromagnetic spectrum.

31. The system defined in claim 30, wherein said processing means includes means for automatically measuring emitted radiation at an additional point proximate to said predetermined point to determine a level of surface moisture and means for compensating for surface absorption due to surface moisture in determining said amount of transdermal absorption.

32. The system defined in claim 30, further comprising means operatively connected to said processing means for automatically and remotely monitoring the individual's position, thereby enabling said processing means to track changes in position of said predetermined point.

33. A system for remotely determining information relating to a person's emotional state, comprising:

generator means for generating waveform energy having a predetermined frequency and a predetermined intensity, said generator means being remotely spaced from a target individual;

transmitter means operatively connected to said generator means for wirelessly transmitting said waveform energy towards the individual;

detector means for detecting energy emitted from the individual in response to the waveform energy; and

processing means operatively connected to said detector means for analyzing the emitted energy to derive information relating to the individual's emotional state, said processing means being operatively connected to at least one of said

generator means and said transmitter means for controlling emission of energy towards the individual, said processing means including first means for determining a value related to perspiration and second means operatively connected to said first means for comparing the determined value with a stored reference value to identify a change in perspiration, said waveform energy being modulated electromagnetic radiation, said detector means including means for measuring an intensity of radiation emitted from a predetermined point on the individual.

Description

BACKGROUND OF THE INVENTION

This invention relates to a method and an associated apparatus for remotely determining information pertaining to an individual's emotional and/or metabolic state.

In many situations, to make decisions it would be helpful to have objective information regarding a person's emotional state. Such information is useful in ascertaining the person's thoughts and intentions. For example, in an interview situation, objective information as to the interviewee's emotional state provides a better basis on which to judge the truthfulness of the interviewee's responses to questions. Such information has been conventionally obtained, in certain applications, by so-called lie detectors. A problem with such devices is that the interviewee is necessarily aware of the testing. This introduces a complication in evaluating the results of the lie detector testing. Accordingly, it would be desirable to provide a means for objectively determining emotional state parameters without the knowledge of the subject.

Such technology would also be useful for medical purposes, to determine, for example, whether a person is in danger of a life-threatening heart attack. Some of the physiological parameters which indicate emotional stress are also indicative of the physical stress of a heart condition. Such physiological parameters include blood pressure and pulse rate. An irregular pulse is especially indicative of a cardiac arrythmia which may be a prelude to myocardial infarction.

Technology which serves to objectively identify emotional state without the knowledge of the subject is also useful in security applications. It would be beneficial, for example, to detect an individual contemplating a robbery or hijacking prior to entry of that individual into a bank or an airplane.

OBJECTS OF THE INVENTION

An object of the present invention is to provide a method for obtaining information pertinent to a person's emotional state, without the person's knowledge.

Another object of the present invention is to provide such a method for use in determining the truthfulness or sincerity of the person during an interview.

An alternative object of the present invention is to provide such a method for use in checking the health of the person.

Another alternative object of the present invention is to provide such a method for use in detecting those contemplating a criminal act.

Another, more particular, object of the present invention is to provide such a method which is implemented remotely, without touching the subject.

Yet another object of the present invention is to provide an associated apparatus or system for obtaining information pertinent to a person's emotional state, without the person's knowledge.

These and other objects of the present invention will be apparent from the drawings and detailed

descriptions herein.

SUMMARY OF THE INVENTION

A method for remotely determining information relating to a person's emotional state, comprising the steps of (a) generating waveform energy having a predetermined frequency and a predetermined intensity, the step of generating being implemented at a location remotely spaced from a target individual, (b) wirelessly transmitting the waveform energy towards the individual, (c) detecting energy emitted or reflected from the individual in response to the waveform energy, and (d) automatically analyzing the emitted or reflected energy to derive information relating to the individual's emotional state.

According to another feature of the present invention, the step of analyzing includes the steps of determining a value related to a physiological parameter taken from the group consisting of blood pressure, pulse rate, respiration rate, pupil size, and perspiration, and comparing the value with a stored reference value to identify a change in the parameter.

Where the parameter is respiration rate and the detected energy is reflected from the individual's chest wall, the method further comprises the steps of processing the reflected energy to determine location of the individual's chest wall, and automatically monitoring the individual's position and compensating for changes in the individual's position in determining changes in location of the individual's chest wall.

Alternatively, respiration rate may be determined by monitoring the differential remote absorption of the individual subject's exhalation gases. Invisible electromagnetic radiation from a source such as a light emitting diode (e.g., a laser diode) is directed towards the subject's mouth. The diode generated radiation is modulated at a high rate with a phase-locked component. Radiation returning from the subject and particularly from gases at the subject's mouth are filtered via an electro-optical modulating polarization component. This polarization component may take the form of a filter wheel rotating, for example, at a speed between 300 and 1,000 Hz. An opto-electric detector senses the radiation penetrating the filter wheel. An amplifier phase-locked with the modulator component serves to detect signals only at the frequency of modulation. Any ambient constant energy which is not part of the measuring signal is filtered out.

In remotely monitoring a person's respiration rate, the waveform energy may be modulated electromagnetic radiation or ultrasonic or subsonic pressure waves. Where the measuring waveform is electromagnetic, the measurement may be effectuated using the principles of differential backscatter absorption or interferometery to detect phase changes owing to a change in position of the subject surface (the individual's chest wall). The wavelength or frequency of the modulated electromagnetic radiation is selected from the infrared and near-millimeter portions of the spectrum so as to penetrate clothing material and be reflected from the underlying skin surface. Where the measuring waveform is an ultrasonic or subsonic pressure wave, changes in position of the chest wall may be detected via phase changes and/or by changes in travel time.

Where the monitored parameter is pulse rate, the measuring energy may be modulated electromagnetic radiation, in the near-ultraviolet, infrared or near-millimeter ranges. A collimated beam of radiation is generated and directed or aimed towards a predetermined point on the individual overlying or on a blood vessel. The emitted or reflected energy is processed to determine (1) intensity, change in intensity or change in polarization or fluorescence of the emitted or reflected energy and (2) amount of transdermal absorption. Changes in transdermal absorption can be tracked to determine changes in volume of blood and, accordingly, the pulse of the target individual. If necessary, variance in the emitted or reflected radiation due to surface moisture (perspiration) can be compensated for by automatically measuring emitted or reflected radiation at an additional point proximate to the predetermined point to determine a level of surface moisture. Any differential owing to varying surface moisture can be isolated and removed or used as an indication of metabolic activity or emotional state.

The surface moisture is detected by measuring the intensity of the radiation returning to a detector from a selected point on the skin surface of the target individual. Surface moisture is indicative of stress, as is known by galvanic skin response, the electrical measure which forms the basis for conventional lie

detection.

It is to be noted that some measurements made in accordance with the present invention can be improved by taking into account movements of the subject. For example, where pulse rate is measured by monitoring changes in transdermal radiation absorption, the individual's position can be automatically monitored. Thus, the radiation beam's direction can be adjusted to track the target blood vessel. The individual's position and configuration (posture) can be tracked by a simple pattern recognition program analyzing input from a camera (e.g., charge coupled device).

Where the parameter is blood pressure, the measuring medium may be ultrasonic or subsonic pressure waves. An incoming ultrasonic or subsonic pressure wave which has been reflected from a blood vessel below the skin surface of the subject (e.g., at the temple or in the retina) is monitored to determine the instantaneous blood flow rate or velocity. The principles of this measurement procedure are known from conventional ultrasonic Doppler devices. These devices are generally placed in contact with a patient or inserted into the body and only determine blood flow rate. In accordance with the present invention, ultrasonic measurements of blood flow rate are implemented remotely, i.e., the ultrasonic wave generator and the detector are spaced by at least several feet from the individual subject. In addition, in analyzing the incoming ultrasonic waves, a blood pressure parameter is automatically calculated using Bernoulli's equation.

An alternative technique for measuring blood pressure utilizes Doppler speckle interferometery. The speed of the measurement pulses are matched to the average speed of the blood so that there is a modulation in the self interference term of the emitted or reflected light and the reference light. Basically, this is a kind of temporal interferometry.

Where the monitored parameter is pupil size, detection may be implemented by counting pixel receptors of a camera corresponding to the subject's pupil. In this case, the measuring energy is electromagnetic (infrared, near-millimeter).

Generally, a monitored physiological or emotional-state parameter is compared with a reference value which includes a previously measured value for the parameter. For example, the pressure value obtained through calculations based on blood vessel flow rate is compared with previous blood pressure values computed seconds or minutes before by the same technique. An average value for the pressure parameter may be computed and used to detect rises or falls in blood pressure possibly indicative of emotional stress. Such emotional stress may be connected with prevarication, with criminal intent, or with a cardiovascular malfunction. Where people entering a bank or airplane, for example, are being monitored, the blood pressure parameter must be correlated with other measured parameters, such as pulse rate and respiration rate, and with average ranges for those parameters, based on age, size and sex.

Similarly, the pulse rate may be measured and compared with prior pulse rates of the individual test subject or with an average pulse rate for people of the same age, sex and size. These prior values of the monitored parameter or of average ranges are stored in encoded form in a memory.

Changes in any physiological or physical parameter measured or monitored as described herein can be used at least as indicators or alert signals that an emotional state exists or has come into being in the targeted individual. Where the individual is an interviewee, the parametric changes may be correlated with the subjects of the conversation with the interviewee. This correlation may be executed subsequently to the interview, where the interview is recorded on audio and/or video tape.

Where the waveform energy is collimated modulated electromagnetic radiation, the step of generating includes the steps of producing an electromagnetic waveform of the predetermined frequency and collimating the electromagnetic waveform. Then the step of transmitting includes the step of directing the waveform to a predetermined point on the individual. This target point may overlie a preselected blood vessel (pulse rate, blood pressure). Alternatively, it may lie in the retina or carotid artery of the targeted individual or test subject (pulse rate, blood pressure). It may be the subject's chest wall (respiration rate). In the case of perspiration rate, the target point is preferably a point having a characteristically high number of

sweat glands.

According to another feature of the present invention, the directing of the collimated beam of (modulated) electromagnetic radiation includes the steps of monitoring the location of the individual. Thus, the direction of the beam is controlled to take into account the individual's voluntary and involuntary movements so that the selected target point is effectively tracked.

This monitoring of the individual's position and configuration may be implemented via video processing technology, for example, by deriving a contour of the individual and comparing the contour with previously determined generic contour data. Such technology is similar to that used in so-called "smart bombs" in military applications.

According to an additional feature of the present invention, the step of analyzing the incoming emitted or reflected waveform energy includes the step of measuring the emitted or reflected energy to determine at least one parameter selected from the group including frequency, fluorescence, amplitude or intensity, change in intensity, change in phase, and change in polarization. The step of analyzing also includes the step of automatically comparing the determined parameter with a reference value, which may incorporate at least one prior measurement of the selected parameter with respect to the individual.

Pursuant to another feature of the present invention, the methodology further comprises the step of changing a frequency of the waveform during a sequence of successive measurements. A system for remotely determining information relating to a person's emotional state comprises, in accordance with the present invention, a waveform generator for generating waveform energy having a predetermined frequency and a predetermined intensity, the generator being remotely spaced from a target individual. A transmitter is operatively connected to the waveform generator for wirelessly transmitting the waveform energy towards the individual. A detector is provided for detecting energy emitted or reflected from the individual in response to the waveform energy. A processor is operatively connected to the detector for analyzing the emitted or reflected energy to derive information relating to the individual's emotional state. The processor is also operatively connected to at least one of the waveform generator and the transmitter for controlling emission of energy towards the individual. The processor is thus able to correlate the incoming energy with that transmitted towards the targeted individual.

In accordance with another feature of the present invention, the processor includes first componentry for determining a value related to a monitored physiological or physical parameter taken from the group consisting of blood pressure, pulse rate, respiration rate, pupil size, skin fluorescence, and perspiration. The processor further includes second componentry operatively connected to the first componentry for comparing the determined value with a stored reference value to identify a change in the parameter.

Where the monitored parameter is respiration rate, the transmitter is controlled in one particular embodiment by the processor to direct the measuring energy towards the individual's chest wall. The first componentry of the processor includes means for processing the emitted or reflected energy to determine location of the individual's chest wall and means for automatically monitoring the individual's position and compensating for changes in the individual's position in determining changes in location of the individual's chest wall. In measuring respiration rate, the measuring waveform energy is modulated electromagnetic radiation or ultrasonic or subsonic pressure waves. The waveform generator includes either an electromagnetic energy generator or an electro-acoustic transducer for producing ultrasonic or subsonic pressure waves.

Where the monitored parameter is pulse rate, the waveform energy is modulated electromagnetic radiation, in the near-ultraviolet, infrared or near-millimeter ranges and the transmitter is controlled by the processor to direct the waveform energy towards a predetermined point on the individual overlying or on a blood vessel. The first processing componentry of the processor then includes means for deriving (1) intensity of the emitted or reflected energy and (2) amount of transdermal absorption. In addition, the processor may include structure and/or programming for automatically measuring emitted or reflected radiation at an additional point proximate to the predetermined point to determine a level of surface moisture (e.g., perspiration) and means for compensating for surface absorption due to surface moisture in determining the

amount of transdermal absorption.

In accordance with another feature of the present invention, the system further comprises tracking circuitry operatively connected to the processor for automatically and remotely monitoring the individual's position, thereby enabling the processor to track changes in position of the predetermined point from which measurements are remotely taken.

Where the monitored parameter is blood pressure, the waveform energy takes the form of an ultrasonic or subsonic pressure wave. The processor then includes architecture and programming for processing a reflected, incoming ultrasonic or subsonic pressure wave to derive a rate of blood flow in a preselected blood vessel of the individual. The processor also includes means for automatically calculating a blood pressure parameter from the derived blood flow rate. In analyzing the incoming ultrasonic or subsonic waves, the processor automatically calculates a blood pressure parameter using Bernoulli's equation or Doppler speckle interferometery. In the latter case, the speed of the measurement pulses are matched to the average speed of the blood so that there is a modulation in the self interference term of the emitted or reflected light and the reference light. Basically, this is a kind of temporal interferometry.

Where the monitored parameter is pupil size and the waveform energy is electromagnetic radiation, the detector includes pixel receptors of a camera. The processor includes means for automatically counting pixels corresponding to a diameter of the individual's pupil.

Generally, the processor compares a monitored physiological or emotional-state parameter with a reference value which includes a previously measured value for the parameter. The reference value is stored in a memory of the processor. A pressure value obtained through calculations based on blood vessel flow rate is compared with previous blood pressure values computed and stored by the processor during the same testing or measurement session. The processor may compute an average value for the pressure parameter and use the average value to detect rises or falls in blood pressure possibly indicative of emotional stress.

Where the parameter is perspiration, the waveform energy is modulated electromagnetic radiation and the detector includes means for measuring a change in polarization or intensity at the incident or fluorescent wavelength of the radiation emitted or reflected from a predetermined point on the individual. Generally the amount emitted or reflected will vary as a function of the amount of perspiration on the skin surface.

Where the waveform energy is collimated modulated electromagnetic radiation, the waveform generator includes a source for producing an electromagnetic waveform of the predetermined frequency and elements for collimating the electromagnetic waveform. The transmitter includes components (e.g., lens, directional antennae, mechanical drives) for directing the waveform to a predetermined point on the individual.

In accordance with a further feature of the present invention, the system also comprises a monitoring unit operatively connected to the processor for monitoring the location of the individual, the monitoring unit being operatively connected to the directional components of the transmitter for controlling the operation thereof. The location monitoring unit may include means for deriving a contour of the individual and means connected thereto for comparing the contour with previously determined generic contour data. More specifically, the position and configuration of the target may be tracked by processing video input from a camera such as a charge coupled device. The techniques of pattern recognition may be utilized to track changes in location of a selected target point as the individual subject moves during the course of the testing period. Ultrasonic or subsonic waves may also be used to determine the position of the individual subject.

In an actual application of the instant invention, the transmitter and detector may be located in a wall of a room and camouflaged by decorative features. Of course, multiple transmitters and detectors may be located in different locations about the subject individual. Where an individual is moving along a path, multiple transmitters and detectors may be necessary to obtain sufficient information. Input from a series of detectors is analyzed to obtain information as to emotional or physical state of the individual.

In accordance with yet another feature of the present invention, the detector includes means for measuring the emitted or reflected energy to determine at least one parameter selected from the group including frequency, fluorescence, amplitude or intensity, change in intensity, change in phase, and change in polarization, while the processor includes means for comparing the determined parameter with a previously determined reference value. As discussed above, the reference value may incorporate at least one prior measurement of the selected parameter with respect to the individual. The processor then includes means for deriving the reference value from the prior measurement.

Where the waveform energy is electromagnetic, several frequencies may be used to collect data. The different frequencies may be multiplexed or transmitted in sequence from a single transmitter or generated and transmitted simultaneously in the case of multiple transmitters. Where a single waveform generator is used, the generator includes means for changing a frequency of the waveform during a sequence of successive measurements.

A method and associated apparatus in accordance with the present invention enable information pertinent to a person's emotional state to be obtained without the person's knowledge. This information is useful in determining the truthfulness or sincerity of an interviewee. Thus, people being interviewed for sensitive job positions or in connection with a criminal investigation may be monitored to elicit information pertinent to their veracity. Of course, legal limitations may exist in using the garnished information as evidence in criminal trials.

A method and associated apparatus in accordance with the present invention are also useful for automatically checking health of individuals. A company may have the apparatus installed for checking the health of employees. Hospitals may use the invention for an additional check on patients.

A method and apparatus in accordance with the present invention can provide information useful in evaluating people entering a high security area for purposes of determining whether anybody is possibly contemplating a criminal act. Usually, people with such criminal intent will betray themselves by elevated pulse rates, increased blood pressure, heightened respiration rates, and/or excessive amounts of perspiration. In the event that one or more of these physiological/physical parameters exceed pre-established limits, an alert signal is automatically given to security personnel who can then attend to the suspected individuals. The alert signal may take the form of an indicator on a video monitor. An arrow pointing to the suspect or a circle about the suspect may be generated on the monitor. In addition, the processor or computer may provide details on the monitor, such as which physiological parameters are involved and the magnitude by which those parameters exceed the respective pre-established limits.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a system in accordance with the present invention for remotely collecting data pertaining to an individual's emotional state.

FIG. 2 is a flow-chart type diagram showing programming blocks of a computer illustrated in FIG. 1.

FIG. 3 is partially a block diagram and partially a schematic plan view showing a particular use of the system of the present invention.

FIG. 4 is partially a block diagram and partially a schematic plan view showing a another particular use of the system of the present invention.

FIG. 5 is a block diagram of supplemental components includable in the system of FIG. 1, for remotely collecting data as to a subject's respiration rate.

DETAILED DESCRIPTION

As illustrated in FIG. 1, a system for remotely determining information relating to a subject's emotional state comprises a waveform generator or source 10 for generating electromagnetic waveform energy having a predetermined frequency and a predetermined intensity. Waveform generator 10, as all the other components of the system described herein, is remotely spaced from a target individual or subject (see FIGS. 3 and 4). The frequency of the waveform energy produced by generator 10 may be adjusted within limits by a tuning circuit 12 in response to control signals from a signal processing unit in the form of a computer 14. The intensity or amplitude of an electromagnetic waveform produced by generator 10 may be varied by the generator pursuant to signals from computer 14.

Connected to generator 10 is a phase-locked modulation component 15 which provides the waveform from generator 10 with an information component which facilitates filtering of extraneous ambient waveform energy. The modulation provides a signature which facilitates detection of radiation reflected from or emitted or reflected by the individual subject in response to the testing energy produced by generator 10.

A collimating lens or other elements 16 are provided downstream of generator 10 and modulation component 15. Further downstream is a transmitter 18. Transmitter 18 may take the form of an antenna or may simply be an aperture at an output side of collimating elements 16. Focusing elements 19 may be provided about transmitter 18 for focusing the measuring radiation at a predetermined target point on the individual subject. Focusing elements 19 may be controlled by computer 14 to adjust the target point.

Computer 14 is connected at an output to a drive assembly 20 which is operatively coupled to one or more of the energy producing components, i.e., generator 10, collimating elements 16 and/or transmitter 18, for controlling the direction of an output radiation beam 22. As discussed below, computer 14 controls the direction of transmission of parameter monitoring or measuring radiation to ensure that the radiation falls on a selected target point on the individual subject, whether the individual is still or moving, and whether the target point itself varies.

As further illustrated in FIG. 1, a detector 24 in the form of a photoelectric cell is provided for detecting incoming electromagnetic energy 26 emitted or reflected from the individual subject in response to output radiation beam 22. On an input side of detector 24 is a telescoping component 27 for limiting the field of view or to a predetermined area of the individual subject under observation. At an output of photoelectric detector 24 are connected an analog-to-digital (A/D) converter 28 and, for noise reduction, a phase-locked amplifier with digital filters 30. Computer 14 is operatively connected to detector 24 via A/D converter 28 and amplifier/filters 30 for analyzing the incoming reflected energy 26 to derive information relating to the individual's emotional state. Because computer 14 is operatively connected to waveform generator 10 and transmitter 18, the computer is able to correlate specific parameters characteristic of incoming energy 26 with corresponding parameters of output radiation beam 22. Such parameters include amplitude or intensity and phase and possibly polarization and wavelength or frequency.

A polarization detector 32 including a polarization analyzer (not shown), an analog-to-digital converter (not shown), phase locked amplifier (not shown), and digital filters (not shown) is connected to computer 14 for providing that unit with polarization data. On an input side of detector 32 is a telescoping component 33 for limiting the field of view or to a predetermined area of the individual subject under observation. A polarization analyzer (not shown) may be disposed in front of detector 24 for providing computer 14 with data relating to change in polarization. In that event, the functions of polarization detector 32 are performed by the analyzer, detector 24, analog-to-digital converter 28, and phase locked amplifier with digital filters 30. The polarization of the output radiation beam 22 may be controlled in accordance with known techniques.

As discussed hereinafter with reference to FIG. 2, computer 14 includes componentry and/or programming for determining values related to one or more monitored physiological or physical parameters including blood pressure, pulse rate, respiration rate, pupil size, and perspiration. Computer 14 further includes componentry and/or programming for comparing the determined values with one or more stored reference

values to identify changes in the monitored parameters. The parametric changes thus determined can be correlated with topics of an interview with the individual subject to provide interviewers with data concerning the veracity of the interviewee. The determined changes in monitored parameters can also be correlated with one another to determine with a selected individual is possibly entertaining criminal intent or is possibly a victim of a heart attack.

As further illustrated in FIG. 1, the system further comprises an ultrasonic or subsonic frequency generator 34 which is triggered or controlled by computer 14 and which is linked at an output to a piezoelectric electroacoustic transducer 36. Transducer 36 produces an ultrasonic or subsonic output wave 38 of a predetermined wavelength. Output wave 38 may be concentrated or focused by pressure wave modification elements 39 provided downstream of transducer 36.

An incoming ultrasonic or subsonic pressure wave 40 reflected from an individual and particularly from a selected target point on the individual is detected by a piezoelectric acousto-electric transducer array 42. A telescoping component 41 (as in a shot-gun microphone) may be provided on an input side of the individual acoustico-electric transducer of array 42, for limiting the field of view of the transducers.

Electrical signals produced by transducer array 42 in response to incoming ultrasonic or subsonic pressure wave 40 are fed to analog-to-digital (A/D) converters 44. Converters 44 are operatively tied to digital filters 46 which in turn are connected at an output to preprocessing circuitry 48. Preprocessing circuitry 48 aids computer 14 in analyzing incoming ultrasonic or subsonic pressure wave 40 to isolate desired data pertaining to one or more pre-selected target points.

FIG. 1 also shows a video camera 50 (e.g., a charge coupled device) which converts incoming electromagnetic waves 52 to an electrical video signal fed to a video recording unit 54 and to computer 14. Generally, camera 50 is responsive to radiation in the optical portion of the spectrum. However, it is also possible for camera to be alternatively or additionally responsive to radiation in the infrared and/or microwave portions of the spectrum.

A microphone 56 for sensing acoustic-frequency pressure waves 58 is connected to video recording unit 54 for enabling the storage of voice-frequency utterances of an individual subject in tandem with or as a part of a video recording. Microphone 56 is operatively connected to computer 14 for providing that unit with data pertaining, for example, to voice-frequency utterances of the subject.

To monitor pulse rate, computer 14 controls tuning circuit 12 and generator 10 so that output radiation beam 22 has a wavelength in a suboptical range of the electromagnetic spectrum, i.e., in the infrared or near-millimeter range. Transmitter 18 is controlled by computer 14 via drive assembly 20 to direct output radiation beam 22 towards a predetermined point on the individual overlying or on a blood vessel. The blood vessel may be, for example in the temple or in the eye of the test subject.

As illustrated in FIG. 2, for determining pulse rate, computer 14 makes a determination of the intensity or amplitude of output radiation beam 22 in a programming routine 60. In another step 62, computer 14 detects or measures the intensity of incoming reflected energy 26. In a subsequent series of steps 64 66, computer 14 derives a change in intensity between the output radiation beam 22 and the incoming reflected energy 26 and calculates a transdermal absorption value characteristic of the amount of blood in the monitored blood vessel underlying the target point on the skin surface or the retina of the individual. Each successively calculated transdermal absorption value is stored in a step 68 and used in a later computation 70 to determine a substantially instantaneous pulse rate of the individual subject.

A computed pulse rate is compared in a step 72 with a reference value (represented by input arrow 74) to ascertain information relevant to the emotional status of the person being monitored. The reference value may take the form of a previously determined average or normal pulse rate or may be calculated from a series of pulse rates of the individual during the same test session, or even during prior test sessions with the same subject. An average or normal pulse rate used as a reference value in comparison step 72 may be a function of various physical characteristics of the individual test subject, such as age and weight, and immediate history, such the exercise status. If the individual is walking, the average pulse rate will be

higher than if the individual has been sitting for several minutes. The different average pulse rate values, as well as parameters pertaining to the age, weight and history of the individual test subject, may be fed to computer 14 via a keyboard 76 (FIG. 1).

In determining transdermal radiation absorption incident to computing the pulse rate of the individual test subject, computer 14 may compensate for changes in surface moisture (perspiration). Surface moisture is measured, as discussed immediately below, at a point adjacent to the pulse rate target point, but not overlying a blood vessel. Computer 14 controls drive assembly 20 to adjust the location of the target point.

As further illustrated in FIG. 2, computer 10 includes programming or hard-wired componentry for making a surface moisture calculation 78 indicative of perspiration rate. A change in intensity between the output radiation beam 22 and the incoming reflected energy 26, derived at 64, is used in calculation 78. The results of surface moisture calculation 78 are compared in a step 80 with a reference value 82. Reference value 82 may be a predetermined value characteristic, for example, of an average reflectivity of dry skin. This value is provided to computer 14 via keyboard 76. Alternatively, reference value 82 may be determined on the basis of a series of calibrating calculations of the surface moisture of the individual test subject, at the test or target point along or at a plurality of spaced points on the skin of the individual subject.

Pulse rate may alternatively be measured via a change in phase or a frequency change (Doppler) measurement. Generally, such information is obtained through ultrasonic or subsonic pressure waves, as discussed in detail hereinafter. However, the potential for obtaining such information via an electromagnetic measuring radiation is contemplated. To that end, computer 14 makes a determination 84 of the outgoing frequency of output radiation beam 22 and detects at 86 the frequency of incoming reflected energy 26. In a step 88, computer 14 derives a frequency change indicative of the velocity of a moving surface, e.g., a wall of a blood vessel in the retina of the individual test subject. A succession of velocities may be integrated to derive position values. (See steps 96, 100, and 102, discussed below).

To monitor respiration rate, computer 14 energizes frequency generator 34 and transducer 36 to emit an ultrasonic or subsonic pressure wave of a known wavelength towards the individual test subject and particularly towards the chest wall of the individual subject. As depicted in FIG. 2, computer 14 uses input from preprocessing circuitry 48 in a step 90 to isolate ultrasonic or subsonic pressure wave data corresponding the chest wall of the individual test subject. The results of this isolation 90 are used in a step 92 to derive a frequency change of ultrasonic or subsonic pressure wave 40 with respect to ultrasonic or subsonic output wave 38 (frequency determined at 94). In a step 96, computer 14 uses the frequency change data to determine position of the chest wall via an integration technique taking into account previously computed positional data at 98. In a further computation 100, computer 14 determines respiration rate. The computed respiration rate is compared in a step 102 with a reference value 104 to derive information pertinent to the contemporaneous or real-time emotional state of the individual test subject. Reference value 104 may be an average respiration rate input into computer 14 via keyboard 76. Alternatively, reference value 104 may be determined on the basis of a series of calibrating calculations of the respiration of the individual test subject. A reference value 104 in the form of a predetermined average may vary in accordance with the immediate exercise history of the individual test subject. If the individual is walking, the reference value for the respiration rate will be higher than if the individual has been sitting for a time. In addition, the reference value may vary depending on the size and apparent athleticism of the individual. People who exercise a great deal tend to have lower respiration rates (and pulse rates) than those who do not exercise. These variables may be entered into computer 14 via keyboard 76.

Respiration rate may be similarly measured by monitoring a change in frequency of incoming reflected energy 26 with respect to output radiation beam 22. In that case, of course, computer 14 controls drives 20 to direct the output radiation beam 22 toward the chest of the individual test subject.

To obtain a measurement related to blood pressure, results of isolation step 90 are used in a step 106 to calculate a Doppler effect from fluid moving in a targeted subsurface blood vessel. In step 90, computer 14 isolates ultrasonic or subsonic data corresponding to the targeted subsurface blood vessel. The Doppler effect calcuation of step 106 produces a velocity value which is used by computer 14 to compute a pressure parameter at 108. This computation is based on Bernoulli's fluid flow equation or Doppler speckle

interferometery. In the latter case, the speed of the measurement pulses are matched to the average speed of the blood so that there is a modulation in the self interference term of the emitted or reflected light and the reference light.

In a subsequent step 110, the computed pressure value is compared with a reference value (112) to determine information pertaining to the contemporaneous or real-time emotional state of the individual test subject. As discussed above with respect to the evaluation of other measured parameters, the reference value 112 for blood pressure may be an average or normalized value predetermined in accordance with known blood pressure data derived from known populations.

To determine the size of a pupil of the individual test subject, the detector is camera 50 (FIG. 1). An image from camera 50 is subjected to pattern recognition processes in a step 114 (FIG. 2) so as to identify the individual's pupil in the image. In a subsequent step 116, computer 14 calculates the individual test subject's contemporaneous or real-time pupil size effectively by counting pixel receptors of camera 50 which correspond to a diameter or area of pupil. In another step 118, the calculated pupil size is compared with a reference value 120, e.g., a predetermined average.

Results of pattern recogition processes 114 are also utilizable by computer 14 to track the location and posture of the individual test subject. In a step 122, computer 14 calculates position of the individual test subject based on the pattern recognition data from processes 114. The results of these calculations 122 are used by computer 14 in a step 124 to track the selected target point (e.g., over a blood vessel, in the retina). Computer 14 controls directional drive assembly 20 (FIG. 1) in a step 126 in accordance with the position of the target point as determined in step 124.

Pattern recognition processes 114 may include steps for deriving a contour of the individual test subject and for comparing the contour with previously determined generic contour data. The techniques of pattern recognition may be utilized to track changes in location of a selected target point as the individual subject moves during the course of the testing period. Ultrasonic or subsonic waves may also be used to determine the position of the individual subject.

It is contemplated that other information such as polarization and phase contained in an electromagnetic output radiation beam 22 and incoming reflected energy 26 may be used for remotely obtaining information pertaining to the emotional state of the individual test subject. To that end, for example, computer 14 determines the polarization (and/or phase) of output radiation beam 22 at 128 and of incoming reflected energy 26 at 130. A polarization change is derived in step 132.

Another source of remotely obtainable data about the emotional and/or metabolic state of a subject is skin fluorescence. An activating or stimulus wavelength in the ultraviolet range is produced by generator 10 and directed from transmitter 18 towards a predetermined target spot on the individual subject. The target spot is scanned by photoelectric detector 24 to determine the fluorescent output of the target spot. A filter wheel (not shown) may be provided at the input of detector 24 for facilitating determination of the wavelength of fluorescent energy.

If in one or more of the comparison steps 72, 80, 102, 110, 118, computer 14 determines that the respective computed value for the blood pressure, perspiration rate, respiration rate, blood pressure and/or pupil size has exceeded or fallen below the respective reference value, the computer issues an alert signal in a step 133. That alert signal may take a visually perceptible form. For example, computer 14 may generate a message on a monitor 135 (FIG. 1). The message may include particulars as to the detected anomaly in the monitored physiological signs of the individual under observation. The identity of the anomalous parameters, as well as the kind and amount of deviation may be displayed on monitor 135.

As depicted in FIG. 3, in an actual application of the system of FIGS. 1 and 2, transmitter 18 and photoelectric detector 24 are located in a wall 134 of a room 136 and camouflaged by decorative features such as wall sculptures or paintings (not shown). FIG. 3 only shows some of the componentry of the system of FIG. 1, for purposes of simplicity. An individual test subject TSI is seated in a chair 138 in room 126. Camera 50 is one of a pair of cameras 50 and 140, which are connected to a video processing circuit 142 (e.g., computer 14). The dual input facilitates triangulation of the position of individual test subject TSI in room 136.

FIG. 4 shows multiple electromagnetic radiation transmitters 144 and multiple photoelectric detectors 146 spaced from one another along a path 148 followed by a selected individual test subject TSU. Input from detectors 146 are analyzed to obtain information as to emotional or physical state of the individual TSU. The modified system of FIG. 4 also includes multiple ultrasonic or subsonic frequency generators 150a, 150b connected to respective piezoelectric transducers 152a, 152b. Generators 150a and 150b generally produce pressure waves of different wavelengths or frequencies to facilitate differentiation and processing of ultrasonic or subsonic input at spaced points along path 148. A single array of piezoelectric acousto-electric transducers 154 may be used to detect the ultrasonic or subsonic signals from individual test subject TSU. Transducers 154 are connected to A/D converters 158. The system of FIG. 4 also includes multiple video cameras 160a, 160b spaced along path 148. A video processing unit 162 receives signals from cameras 160a, 160b. The signals from cameras 160a, 160b are used as discussed above to determine pupil size and subject location.

With respect to the system of FIG. 1, computer 14 may be programmed to control tuning circuit 12 so that generator 10 produces different frequencies in an interdigitated or multiplexed pattern for augmenting the obtainable information.

FIG. 5 illustrates components for monitoring the differential remote absorption of the individual subject's exhalation gases, in order to determine respiration rate. Invisible electromagnetic radiation 164 from a source such as a light emitting diode (e.g., a laser diode) 166 is directed towards the subject's mouth. The diode generated radiation is modulated at a high rate with a phase-locked component 168. Focusing elements 170 may be controlled by computer 14 to adjust the target point.

Radiation 172 returning from the subject and particularly from gases at the subject's mouth are filtered via an electro-optical modulating polarization component exemplarily in the form of a filter wheel 174 rotating at a speed between 300 and 1,000 Hz. An opto-electric transducer or detector 176 senses the radiation penetrating filter wheel 174. An amplifier 178 phase-locked with modulator component 168 serves to detect signals only at the frequency of modulation. Any ambient constant energy which is not part of the measuring signal is filtered out.

Although the invention has been described in terms of particular embodiments and applications, one of ordinary skill in the art, in light of this teaching, can generate additional embodiments and modifications without departing from the spirit of or exceeding the scope of the claimed invention. Accordingly, it is to be understood that the drawings and descriptions herein are profferred by way of example to facilitate comprehension of the invention and should not be construed to limit the scope thereof.

US 5,539,705 - *Ultra-Sonic Speech Translator and Communication System*

United States Patent ***5,539,705***
Akerman , et al. **July 23, 1996**

Ultrasonic speech translator and communications system

Abstract

A wireless communication system undetectable by radio frequency methods for converting audio signals, including human voice, to electronic signals in the ultrasonic frequency range, transmitting the ultrasonic signal by way of acoustical pressure waves across a carrier medium, including gases, liquids, or solids, and reconverting the ultrasonic acoustical pressure waves back to the original audio signal. The ultrasonic speech translator and communication system (20) includes an ultrasonic transmitting device (100) and an ultrasonic receiving device (200). The ultrasonic transmitting device (100) accepts as input (115) an audio signal such as human voice input from a microphone (114) or tape deck. The ultrasonic transmitting device (100) frequency modulates an ultrasonic carrier signal with the audio signal producing a frequency modulated ultrasonic carrier signal, which is transmitted via acoustical pressure waves across a carrier medium such as gases, liquids or solids. The ultrasonic receiving device (200) converts the frequency modulated ultrasonic acoustical pressure waves to a frequency modulated electronic signal, demodulates the audio signal from the ultrasonic carrier signal, and conditions the demodulated audio signal to reproduce the original audio signal at its output (250).

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Goverment Interests

This invention was made with Government support under Contract DE-AC05-840R21400 awarded by the U.S. Department of Energy to Martin Marietta Energy Systems Inc., the Government has certain rights to this invention.

Claims

What is claimed is:

1. A wireless communication system for transmitting and receiving audio signals via ultrasonic acoustical pressure waves comprising an ultrasonic transmitting device and an ultrasonic receiving device;

wherein the ultrasonic transmitting device further comprises:

a source for producing audio signals;

a voltage controlled oscillator for receiving the audio signal, producing a carrier signal in the ultrasonic frequency range, frequency modulating the carrier signal with the audio signals, and producing a frequency modulated carrier signal;

a transmitting converter for receiving a frequency modulated carrier signal and transforming the frequency modulated carrier signal to produce a frequency modulated acoustic pressure wave signal; and

wherein the ultrasonic receiving device further comprises:

a receiving converter for receiving frequency modulated acoustic pressure wave signals and transforming the frequency modulated acoustic pressure wave signals to produce a frequency modulated electronic carrier signal;

a demodulator for receiving a frequency modulated electronic carrier signal, demodulating the modulating audio signal from the ultrasonic carrier signal, and producing a demodulated audio signal; and

an output device for receiving the demodulated audio signal.

2. A wireless communication system in accordance with claim 1, wherein the ultrasonic receiving device further comprises a signal conditioner for receiving a frequency modulated electronic carrier signal, conditioning the frequency modulated electronic carrier signal for frequency demodulation, and producing a conditioned frequency modulated carrier signal that is received by the demodulator.

3. A wireless communication system in accordance with claim 1, wherein the ultrasonic receiving device further comprises a filter for receiving a demodulated audio signal, removing unwanted electronic noise and producing a filtered audio signal that is received by the output device.

4. A wireless communication system in accordance with claim 1, wherein the ultrasonic receiving device further comprises an audio amplifier for receiving a demodulated audio signal and amplifying the demodulated audio signal to produce a final audio signal that is received by the output device.

5. A wireless communication system in accordance with claim 1, wherein the demodulator for receiving a conditioned modulated carrier signal on the ultrasonic receiving device comprises an integrated circuit phase-locked loop further comprising:

a phase detector for receiving the conditioned frequency modulated carrier signal and a control signal, and for comparing the frequency of the conditioned frequency modulated carrier signal with the frequency of the control signal to produce a phase error signal, such that the phase error signal is the frequency difference between the two input signals;

a low-pass filter for receiving said phase error signal and filtering out the high frequency noise components to produce a filtered phase error signal;

an amplifier for receiving the filtered phase error signal and amplifying it to produce both the demodulated audio signal output of the demodulator and a feedback control voltage; and

a voltage controlled oscillator for receiving the feedback control voltage, adjusting the frequency of the voltage controlled oscillator in the direction of the incoming conditioned frequency modulated carrier signal of the phase detector to produce the control signal input to the phase detector.

6. A wireless communication system in accordance with claim 1, wherein the source for producing audio signals on the ultrasonic transmitting device comprises a microphone.

7. A wireless communication system in accordance with claim 1, wherein the source for producing audio signals on the ultrasonic transmitting device comprises a recording tape deck.

8. A wireless communication system in accordance with claim 1, wherein the converter on the ultrasonic transmitting device for receiving a frequency modulated carrier signal and producing a frequency modulated acoustic pressure wave signal further comprises:

a power amplifier; and

an electroacoustic transducer.

9. A wireless communication system in accordance with claim 1, wherein the converter on the ultrasonic receiving device for receiving frequency modulated acoustic pressure wave signals and producing a frequency modulated electronic carrier signal further comprises an electroacoustic-transducer.

10. A wireless communication system in accordance with claim 1, further comprising a signal conditioner on the ultrasonic receiving device for producing a conditioned frequency modulated carrier signal that is received by the demodulator, said signal conditioner comprising:

a filter for receiving a frequency modulated electronic carrier signal, filtering unwanted ambient acoustic noise from the carrier medium producing a filtered frequency modulated carrier signal; and

a pre-amplifier for receiving the filtered frequency modulated carrier signal and amplifying the filtered frequency modulated carrier signal to produce a conditioned frequency modulated carrier signal.

11. A wireless communication system in accordance with claim 10, wherein the filter for receiving a frequency modulated electronic carrier signal and producing a filtered frequency modulated carrier signal comprises a band-pass filter.

12. A wireless communication system in accordance with claim 10, wherein the filter for receiving a frequency modulated electronic carrier signal and producing a filtered frequency modulated carrier signal comprises a high-pass filter.

13. A wireless communication system in accordance with claim 1, further comprising a filter for receiving the demodulated audio signal to produce a filtered audio signal that is received by the output device, said filter comprising a low-pass filter.

14. A wireless communication system in accordance with claim 1, wherein the output device for receiving the final audio signal comprises an audio speaker.

15. A wireless communication system in accordance with claim 1, wherein the output device for receiving the final audio signal comprises a set of headphones.

16. A wireless two-way ultrasonic communication system comprising two or more matching devices each further comprising both an ultrasonic transmitting device and an ultrasonic receiving device in accordance with claim 1, whereby each device both transmits signals to and receives signals from the matching device.

17. A wireless communication system in accordance with claim 1, wherein the ultrasonic transmitting device further comprises an adjustable tuner for altering the ultrasonic carrier frequency to create a multi-channel transmitting device such that a signal may be transmitted on various channels to reach variously tuned ultrasonic receiving devices.

18. A wireless communication system in accordance with claim 1, wherein the source for producing audio signals on the ultrasonic transmitting device comprises:

a digital-to-analog converter for receiving digital electronic signals and converting the digital electronic signals to analog to produce the audio signal input; and

wherein the output device on the ultrasonic receiving device comprises:

an analog-to-digital converter for receiving the final audio signal and converting said final

audio signal to digital electronic signals; such that the system may be used as a wireless computer network.

19. A wireless communication system for transmitting and receiving audio signals via ultrasonic acoustical pressure waves comprising an ultrasonic transmitting device and an ultrasonic receiving device;

wherein the ultrasonic transmitting device further comprises:

a source for producing audio signals;

a pre-amplifier for receiving the audio signals and amplifying the audio signals to produce an amplified audio signal;

a frequency modulator for receiving the amplified audio signal, frequency modulating an ultrasonic carrier signal with the amplified audio signal, and producing a frequency modulated carrier signal;

a converter for receiving a frequency modulated carrier signal and transforming the frequency modulated carrier signal to produce a frequency modulated acoustic pressure wave signal; and

wherein the ultrasonic receiving device further comprises:

a converter for receiving frequency modulated acoustic pressure wave signals and transforming the frequency modulated acoustic pressure wave signals to produce a frequency modulated electronic carrier signal;

a signal conditioner for receiving a frequency modulated electronic carrier signal, conditioning the frequency modulated electronic carrier signal for frequency demodulation, and producing a conditioned frequency modulated carrier signal;

a phase-locked loop demodulator for receiving a conditioned frequency modulated carrier signal, demodulating the modulating audio signal from the ultrasonic carrier signal, and producing a demodulated audio signal;

a filter for receiving a demodulated audio signal, removing unwanted electronic noise and producing a filtered audio signal;

an audio amplifier for receiving a filtered audio signal and amplifying the filtered audio signal to produce a final audio signal; and

an output device for receiving the final audio signal.

20. A wireless communication system in accordance with claim 19 wherein the source for producing audio signals on the ultrasonic transmitting device comprises a microphone.

21. A wireless communication system in accordance with claim 19, wherein the source for producing audio signals on the ultrasonic transmitting device comprises a recording tape deck.

22. A wireless communication system in accordance with claim 19, wherein the converter on the ultrasonic transmitting device for receiving a frequency modulated carrier signal and producing a frequency modulated acoustic pressure wave signal further comprises:

a power amplifier; and

an electroacoustic transducer.

23. A wireless communication system in accordance with claim 19, wherein the converter on the ultrasonic receiving device for receiving frequency modulated acoustic pressure wave signals and producing a frequency modulated electronic carrier signal further comprises an electroacoustic transducer.

24. A wireless communication system in accordance with claim 19, wherein the signal conditioner on the ultrasonic receiving device for producing a conditioned frequency modulated carrier signal further comprises:

a filter for receiving a frequency modulated electronic carrier signal, filtering unwanted ambient acoustic noise from the carrier medium producing a filtered frequency modulated carrier signal; and

a pre-amplifier for receiving the filtered frequency modulated carrier signal and amplifying the filtered frequency modulated carrier signal to produce a conditioned frequency modulated carrier signal.

25. A wireless communication system in accordance with claim 24, wherein the filter for receiving a frequency modulated electronic carrier signal and producing a filtered frequency modulated carrier signal comprises a band-pass filter.

26. A wireless communication system in accordance with claim 24, wherein the filter for receiving a frequency modulated electronic carrier signal and producing a filtered frequency modulated carrier signal comprises a high-pass filter.

27. A wireless communication system in accordance with claim 19, wherein the filter for receiving the demodulated audio signal to produce the filtered audio signal further comprises a low-pass filter.

28. A wireless communication system in accordance with claim 19, wherein the output device for receiving the final audio signal comprises an audio speaker.

29. A wireless communication system in accordance with claim 19, wherein the output device for receiving the final audio signal comprises a set of headphones.

30. A wireless two-way ultrasonic communication system comprising two or more matching devices each further comprising both an ultrasonic transmitting device and an ultrasonic receiving device in accordance with claim 19, whereby each device both transmits signals to and receives signals from the matching device.

31. A wireless communication system in accordance with claim 19, wherein the ultrasonic transmitting device further comprises an adjustable tuner for altering the ultrasonic carrier frequency to create a multi-channel transmitting device such that a signal may be transmitted on various channels to reach variously tuned ultrasonic receiving devices.

32. A wireless communication system in accordance with claim 19, wherein the source for producing audio signals on the ultrasonic transmitting device comprises:

a digital-to-analog converter for receiving digital electronic signals and converting the digital electronic signals to analog to produce the audio signal input; and

wherein the output device on the ultrasonic receiving device comprises:

an analog-to-digital converter for receiving the final audio signal and converting said final audio signal to digital electronic signals;

such that the system may be used as a wireless computer network.

Description

BACKGROUND OF THE INVENTION

The present invention relates generally to the art of wireless communication and, more particularly, to a system which utilizes ultrasonic acoustical pressure waves to transmit and receive audio signals across a medium such as gas, liquid, or solid material. The invention further relates to the art of modulation of audio signals to the ultrasonic frequency range, and to the art of demodulation of audio signals from frequency modulated ultrasonic carrier signals. The invention further relates to the art of inaudible communication, whereby the information contained in the signals is secure and undetectable by radio frequency monitoring.

Radio frequency waves, or electromagnetic radiation in the frequency range of approximately 10 kilohertz to 100 gigahertz, has been utilized for wireless communication systems by civilian and military personnel for decades. Numerous applications of radio frequency communication methods include, to name a few, radio broadcasting, air traffic control, and cellular telecommunications. Radio frequency communication is limited, for practical purposes, to operation within mediums such as air and space. Furthermore, radio frequency methods are inappropriate in some circumstances where communication is required, such as within blasting zones where explosives may be susceptible to unplanned detonation due to radio interference. In addition, radio frequency methods are limited in their ability to provide a secure system to ensure confidentiality of information, which is required by many applications for communication.

Sound waves, or acoustical pressure waves, have likewise been successfully employed as a method of wireless ultrasonic communication across various mediums. Ultrasonic communication is most often utilized in underwater applications because the physical properties of solids and liquids tend to allow waves traveling via molecular vibrations to cover relatively long distances, on the order of the kilometer range. It has been similarly employed for communication over structural matter such as beams or pipes. Ultrasonic communication has generally not been utilized in air for long range communication because radio frequency methods are particularly suitable in air for long range communication, offering suitable and efficient means for most applications.

Some applications, however, require security and inaudibility by radio detectors. Examples of these applications include undercover operations where it is necessary not only that the communication be uninterpretable, but also that the communication be undetectable so as not to alert the presence of such communication. Other applications requiring inaudibility include situations where radio frequency methods are inappropriate, such as, for example, in a blasting zone where the presence of radio frequency waves could unexpectedly set off a detonator or in a factory with sensitive electronics or other components sensitive to electromagnetic radiations.

In applications requiring confidentiality and a high degree of security, numerous schemes have been employed to minimize detection and eavesdropping. These schemes often include scrambling a signal prior to broadcasting and then unscrambling the signal after reception, as well as continual switching from frequency to frequency. The main problem with these existing techniques is that the simple detection of any radio frequency transmission whatsoever, even if the transmitted signals are not decoded or interpreted, indicates the presence of existing communication. Thus, such schemes may not provide sufficient security in operations requiring complete inaudibility. It is desirable, therefore, to provide a communication system which is inaudible by radio frequency detectors.

The invention is disclosed herein in the context of utilizing ultrasonic waves for relatively long range, secure, wireless communication through air. However, by way of example, and not limitation, the disclosed invention is useful in a variety of applications including undercover operations, industrial applications, and many commercial uses in various media.

Prior art ultrasonic communication systems involving the conversion of audio signals to ultrasonic acoustical pressure waves encompass a variety of methods and applications. In the context of the present invention, it may be noted that there are no known prior art communication systems which employ ultrasonic acoustical pressure waves for signal transmission through air for relatively long distances.

Prior art ultrasonic communication systems employ a means of carrying a modulated ultrasonic frequency signal from a transmitter to a receiver. One approach has been disclosed for use in electrical power networks, whereby a two-tone control signal frequency modulates an ultrasonic subcarrier which is then used to frequency modulate the broadcast of a local FM station. The frequency modulated ultrasonic signal is demodulated from the FM broadcast program on the receiving end by receiver circuitry. In this particular approach, however, communication is entirely through radio frequency waves and telephone lines, whereby although a signal is used to modulate an ultrasonic subcarrier, the modulated ultrasonic subcarrier is never transformed from radio frequency signals to acoustical pressure waves. The communication thus remains detectable by radio frequency detectors. It is desirable to employ an alternate communication carrier other than radio frequency waves such that the system is not limited to the use of radio facilities or wire lines.

Another prior art approach for transmitting a modulated ultrasonic frequency signal across a medium is through the conversion of the electronic audio signals to acoustical pressure waves. This technique is employed in many communication systems where radio waves cannot travel useful distances due to the attenuation caused by the properties of the carrier medium, as in underwater communication.

Prior art ultrasonic communication systems employ a means of modulating an ultrasonic frequency signal with an audio frequency signal. Methods utilized have included both amplitude modulation and angle modulation, which encompasses both frequency and phase modulation.

The amplitude modulation techniques used in prior art have encountered the inherent limitation that medium disturbance, e.g. air or water currents, causes additional amplitude modulation of a carrier signal. Thus, unwanted signals from medium disturbance become superimposed on the amplitude modulated carrier, which often results in difficulty recovering a clean original audio signal. Furthermore, amplitude modulation, even when superimposed on a carrier of ultrasonic frequency, may still be audible.

Another prior art approach for modulating an ultrasonic frequency signal with an audio signal is through frequency modulation. One prior art technique feeds an audio signal through a modulator to produce a frequency modulated (FM) radio frequency signal at a predetermined intermediate center frequency. The FM radio frequency signal is then fed into one input of a balanced modulator having a second input of fixed frequency from a local oscillator. The balanced modulator produces two outputs including the sum and the difference of the two input signals, whereby proper selection of the fixed intermediate frequency for the first input and the fixed frequency for the second input produces at the difference output the frequency modulated signal in the ultrasonic range. It would be desirable to eliminate the additional intermediate carrier frequency step.

Prior art techniques for demodulating audio signals from frequency modulated ultrasonic carrier signals in ultrasonic communication systems have utilized digital integrated circuit techniques.

The present invention reveals a technique for inaudible, long range communication through air, as well as other media such as water or solid pipes and beams. Prior art techniques have involved limitation to liquid or solid media or to very short ranges in air.

The present invention also reveals a technique for simple, direct modulation of audio signals onto ultrasonic frequency carrier signals for use in ultrasonic communication systems. Prior art techniques have always involved indirect techniques resulting from the high cost of quality components required to build systems with high noise immunity operating at high frequency with a wide bandwidth.

Similarly, the present invention reveals a technique for simple, direct demodulation of audio signals from ultrasonic frequency carrier signals for use in ultrasonic communication systems. Again, prior art techniques have involved more complicated, indirect techniques for demodulation.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide a transmitting device capable of converting audio signals to frequency modulated ultrasonic acoustical pressure waves using a simple, direct method of frequency modulation.

It is another object of the invention to provide a receiving device capable of converting frequency modulated ultrasonic acoustical pressure waves into audio signals using a simple, direct method of signal demodulation.

It is yet another object of the invention to provide a wireless communication system which may be employed where radio frequency is prohibited.

It is yet another object of the invention to provide a secure communication system to protect confidential information against eavesdropping.

It is yet another object of the invention to provide a system for communicating in a noisy environment.

It is yet another object of the invention to provide a portable convenient method of wireless communication.

Briefly, in accordance with one aspect of the invention, there is provided an ultrasonic transmitting device which includes an input device such as a microphone which converts audio acoustical pressure waves to electronic audio signals, or an audio input for accepting electronic audio signals such as from a tape deck. A pre-amplifier raises the audio signal to an acceptable power level without significant degradation in the signal-to-noise ratio. The amplified audio signal produced by the pre-amplifier feeds into the input of a voltage controlled oscillator, having a fixed carrier frequency set in the ultrasonic range and producing at its output an ultrasonic carrier signal which is frequency modulated by the audio signal. A power amplifier amplifies the frequency modulated carrier signal to a sufficient power level to produce an amplified frequency modulated Carrier signal. The amplified frequency modulated carrier signal drives an electroacoustic transducer, which converts the amplified frequency modulated carrier signal to frequency modulated acoustical pressure waves for transmission across a carrier medium, such as air, water, or pipes and beams. Preferably, the transducer is designed to unique size and performance specifications such that it contains linear characteristics in the desired ultrasonic frequency range, as well as sufficient power for the desired application.

In accordance with another aspect of the invention, there is provided an ultrasonic receiving device which includes an electroacoustic transducer to convert the frequency modulated acoustical pressure waves to a frequency modulated electronic carrier signal. Preferably, the linear frequency and power characteristics of the receiving transducer match the characteristics of the transmitting transducer. A signal conditioner receives the frequency modulated electronic carrier signal for conditioning to produce a conditioned frequency modulated carrier signal. Preferably this includes an amplifier which receives the frequency modulated electronic carrier signal and amplifies it to produce an amplified frequency modulated carrier signal of a suitable level for filtering without degradation of the signal-to-noise ratio. The amplified frequency modulated carrier signal may contain amplitude modulated noise due to natural carrier medium disturbance such as wind in air or currents in water. Preferably, a bandpass filter removes the unwanted ambient acoustic noise from the amplified frequency modulated carrier signal to produce a filtered frequency modulated carrier signal. Preferably, a main signal amplifier device receives the filtered frequency modulated carrier signal, amplifying it in preparation for demodulation, to produce a conditioned frequency modulated carrier signal. A phase-locked loop demodulator performs the actual direct demodulation of the audio signal from the ultrasonic carrier signal. Complicated phase-locked loop techniques were impractical or uneconomical in the past. However, in accordance with one aspect of the invention, a direct method of demodulation is used, whereby the input of the phase-locked loop is a conditioned frequency modulated carrier signal, and the output is the recovered audio signal. An audio signal conditioner device, preferably including a low-pass filter, removes unwanted noise from the receiver electronics to produce a conditioned audio signal. A power amplifier amplifies the conditioned audio signal to the appropriate level to drive the desired output device such as a speaker or headphone set.

The ultrasonic speech translator and communication system provides an elegant solution for secure, long-range, inaudible, and wireless communication through air and various other mediums. The invention may be applicable in a wide variety of applications. As one example of an application for the ultrasonic speech translator and communication system, directional receivers in the form of a small button may be mounted on a hat which feeds to earphones, whereby the user can detect which direction the signal is coming from as well as what the person is saying.

As another example, the reception and transmission could be in a plane just above the ground.

As yet another example, multiple sets may be utilized, where each user transmits at a different frequency and receives one or more frequencies at a time.

As another example, communication may occur throughout a rigid structure by connecting the transmitter and receiver to it, said rigid structures including, but not limited to, piping, concreted beams or floors, and building steel, as in a house or building or the space station or shuttle.

As another example, in communicating data signals rather than voice signals, the system may operate as a wireless computer network within a building.

As another example, the ultrasonic speech translator and communication system may be very portable, taking the form of quick temporary hookups at numerous suitable locations in an office building, industrial facility, and others. This concept may be applied to areas such as space shuttle or space station internal communication through the vessel structural members.

As yet a further example, the invention may be employed in circumstances where radio interference is prohibited but close communication is necessary, such as in a blasting site containing explosive detonators.

As another example, in areas where high audible noise levels are present, this system may operate as a wireless voice communicator between personnel working in the area.

As another example, the invention may provide secure and discrete communication for military, security, and law enforcement applications. Applications of this technique include communication through air when radio frequencies are monitored and communication must be secure and undetected.

As another example, this communication scheme may be miniaturized and integrated for use in binoculars or rifles or concealed in clothing. An inexpensive toy based on this ultrasonic communication technique may be designed and mass marketed as a non-radio based walkie-talkie, allowing discrete communication through air, water pipes, or solid walls, without detection by radio frequency scanners.

BRIEF DESCRIPTION OF THE DRAWINGS

While the novel features of the invention are set forth with particularity in the appended claims, the invention, both as to organization and content, will be better understood and appreciated, along with other objects and features thereof, from the following detailed description of a preferred embodiment, taken in conjunction with the drawings, in which:

FIG. 1 depicts a block diagram of the ultrasonic speech translator and communication system in accordance with the invention;

FIG. 2 depicts a block diagram of the ultrasonic transmitting device along with the corresponding output signal waveforms for each device.

FIG. 3 depicts a block diagram of the ultrasonic receiving device along with the corresponding output signal waveforms for each device.

FIG. 4 depicts example uses for the ultrasonic speech translator and communication system.

FIG. 5 depicts a the circuit diagram for the specific embodiment of the ultrasonic transmitting device herein described.

FIG. 6 depicts a the circuit diagram for the specific embodiment of the ultrasonic receiving device herein described.

FIG. 7 depicts a graph of transmitted power level versus distance actually achieved by the specific embodiment herein described.

DETAILED DESCRIPTION

Turning now to the drawings in greater detail, there is illustrated in FIG. 1 an ultrasonic speech translator and communication system 20 embodying the invention. The embodiment herein described is particularly well-suited for focused directional communication through air for distances of approximately 100 to 150 feet. However, it will be understood that the ultrasonic communication system 20 may be utilized in other carrier media as well as in applications in air with broader directional requirements such as for transmitting throughout a closed room among several people with receiving devices 200. Accordingly, the principles of the present invention may be variously applied.

FIG. 1 is a block diagram of the ultrasonic speech translator and communication system 20 comprising an ultrasonic transmitting unit 100 and an ultrasonic receiving unit 200.

With references to FIG. 1, FIG. 2, and FIG. 5, the ultrasonic transmitting unit may be constructed in any suitable form or in any container 110, with provisions for acceptable power input 111 provided by a source of power including but not limited to a power supply or battery pack 112. The ultrasonic transmitting device described in this specific embodiment utilizes a metal chassis the approximate volume of a cigarette pack.

Included in the ultrasonic transmitting device 100 is an input device 115 capable of receiving electronic audio signals in the range 20 hertz to 20 kilohertz. The audio signals may be derived from an external device such as a tape deck or a microphone 114 which converts sound such as voice to electronic audio signals. Alternatively, a device for converting sound to electronic audio signals such as a microphone 114 may be built into the system.

Also included in the ultrasonic transmitting device is a pre-amplification device 120 which preferably includes a variable gain microphone control switch 116. The pre-amplification device 120 may be constructed using any suitable operational amplifier designed for the desired output gain. In the specific embodiment, said pre-amplifier consists of a 741-type operational amplifier with a variable input gain of approximately 100.

The actual modulation of the ultrasonic carrier by the audio signal is performed by a voltage controlled oscillator 130. Any suitable voltage controlled oscillator which operates in the ultrasonic range may be utilized to perform the modulation. Suggested voltage controlled oscillators include model number 566 or equivalents, as well as any suitable newer voltage controlled oscillators. The specific embodiment utilizes a NE 566 voltage controlled oscillator integrated circuit with the ultrasonic carrier frequency set at approximately 21.8 kilohertz, but it may be set at any desired ultrasonic carrier frequency that the specific voltage controlled oscillator 130 is capable of producing. Thus, the practical ultrasonic carrier frequency ranges from 20 kilohertz to 100 kilohertz in air, and 20 kilohertz to 1000 kilohertz in liquids and solids. In the specific embodiment, the 21.8 kilohertz carrier signal is frequency modulated by the amplified audio input signal from the audio input 115, and appears at the output of the voltage controlled oscillator 130.

The output of the voltage controlled oscillator 130 is connected directly to the input of the power amplifier 140. The power rating of the power amplifier 140 is application specific, depending on the load rating of the electroacoustic transducer 150 and the desired output power in watts.

The output of the power amplifier 140 drives the electroacoustic transducer 150 to transmit the frequency modulated ultrasonic carrier signal across the carrier medium via acoustical pressure waves. Through a careful selection of transmitter and receiver subcomponents, voice and music have been transmitted over 100 feet in air using less than 1 mW of electrical power. FIG. 7 illustrates the distances actually achieved using the specific embodiment, along with predicted distances with more applied power. Subcomponents in the specific embodiment include signal translation and detection circuits based on frequency-modulation (FM) where carrier is 21.8 kHz, efficient electroacoustic transducers 152, specially-designed parabolic dish reflectors 151, parabolic dish collectors 216, and sensitive microphone element 217. Analytical models predict a useful range of 250 ft can be achieved with less than 5 watts input power. The application for the

specific embodiment was to achieve distance with small output power. The transducer chosen was of piezoelectric material with a linear response in the range of 21.8 kilohertz, modified by increasing the gain in the linear response band, and narrowing the parabolic dish elements 216, 151 for a more focused directional sensitivity. Additional engineering may be carried out to optimize the transducer, collector, and frequency combination for specific applications having unique requirements. For example, higher power with an optimized collector dish may be employed to achieve extended distance; miniaturization of transmitter and receiver devices may be accomplished for concealment in clothes, or for integration in other equipment such as binoculars or rifles. Each application may utilize transducers specially-designed to unique size and performance specifications. The transducers may be made of any suitable material including, by way of example and not limitation, piezoelectric material. The output of the transducer 150 is the frequency modulated ultrasonic carrier signal converted to acoustical pressure waves which travel across the medium.

With references to FIG. 1, FIG. 3, and FIG. 6, the ultrasonic receiving device 200 may be constructed in any suitable form or in any container 210, with provisions for acceptable power input 211 provided by a source of power including but not limited to a power supply or battery pack 212. The ultrasonic receiving device described in this specific embodiment utilizes a metal chassis.

The ultrasonic receiving device 200 includes an receiving transducer 215, which receives the frequency modulated acoustical pressure waves transmitted across the carrier medium. In the preferred embodiment, the linear frequency and power characteristics match that of the electroacoustic transducer 150 of the ultrasonic transmitting unit 100. In the specific embodiment, the receiving transducer 215 matched the transmitting transducer 150 with its linear frequency range near 21.8 kilohertz and its specially-designed narrow parabolic collector dish 216 and sensitive microphone element 217. The frequency modulated acoustical pressure waves are converted by the receiving transducer 215 to a frequency modulated electronic carrier signal.

The frequency modulated electronic carrier signal from the receiving transducer 215 feeds directly into a signal conditioner 220 depicted in FIG. 1. The frequency modulated electronic carrier signal at this stage may contain unwanted amplitude modulation generated by disturbance in the carrier medium, and it may contain added ambient noise. Disturbance may be caused by natural air currents, water currents, or unrelated vibration in solids. Preferably, the signal conditioner 220 includes a pre-amplifier 221, a band-pass filter 222, and a main signal amplifier 223.

In the preferred embodiment, the frequency modulated carrier signal from the receiving transducer 215 connects directly to the pre-amplifier 221, which increases the power without changing the signal-to-noise ratio in preparation for filtering the unwanted noise caused by carrier medium disturbance. The preferred embodiment utilizes a variable-gain operational amplifier, preferably with means of adjusting the gain via a gain control knob 213. In the specific embodiment, the preamplifier 221 utilized a 741-type operational amplifier with a variable gain of approximately 100.

The output of the pre-amplifier 221 ideally electrically connects directly to a band-pass filter 222, which actually removes the unwanted noise. Alternatively, a high-pass filter with a cutoff frequency passing only ultrasonic frequency signals may be used. The specific embodiment actually utilizes a high-pass filter built from 741-type operational amplifiers designed with a cutoff frequency of approximately 20 kilohertz. The output of the filter 222 contains the filtered frequency modulated ultrasonic carrier signal having the desired frequency bandwidth. Amplitude modulations will still be present in the signal at this stage.

The output from the band-pass filter 222 electrically connects directly into the main signal amplifier 223 for pre-demodulation conditioning. The specific embodiment utilizes a 741-type operational amplifier with a gain of 100, producing the conditioned frequency modulated carrier signal at its output.

Demodulation of the audio signal from the ultrasonic carrier signal is performed via a phase-locked loop. The phase-locked loop, an electronic servo system, attempts to maintain a fixed phase relationship with the input signal. Typically, a phase-locked loop contains a phase detector, a low-pass filter, and a voltage controlled oscillator. The phase detector compares the frequency of an input signal with the frequency of

the voltage controlled oscillator. The voltage output from the phase detector is the measure of their phase difference, called the phase error signal. The phase error signal feeds into a low-pass filter and is amplified to adjust the control voltage of the voltage controlled oscillator, which feeds into the second input of the phase detector. In this manner, the voltage controlled oscillator attempts to "lock" to the input carrier frequency signal. It will be noted that the output of the low-pass filter is the desired demodulated audio signal. Phase locked loops built with discrete components are complex to build and fairly unreliable. Phase-locked loops built as integrated circuits are easy to use due to small packaging, have high immunity to amplitude modulations, and are reliable when utilized properly in a design. Typical general purpose phase-locked loops available from many manufacturers provide two outputs. One output is a square wave oscillator output, which is equal to the incoming carrier frequency when the signals are locked. The other output is a voltage proportional to the frequency of the incoming signal. This is the modulating signal output of the demodulator, which, in this application, is the desired recovered original audio signal. The preferred embodiment of the ultrasonic receiving device 200 utilizes any integrated circuit phase-locked loop which accepts at its input a carrier signal in the anticipated ultrasonic range, and produces the output of the low-pass filter at one of its outputs.

The phase-locked loop 230 receives the frequency modulated ultrasonic carrier signal from the main signal amplifier 223. The specific embodiment utilizes a Signetics LM 565 phase-locked loop 230, and locks on to the carrier signal frequency of 21.8 kilohertz. The phase-locked loop 230 low-pass filter output is the demodulated audio signal.

The output of the phase-locked loop 230 electrically connects directly to the input of the final signal conditioning unit 240. Included in the final signal conditioning unit 240 is a filter 241 which filters out unwanted receiver noise, and an audio amplifier 242 which amplifies the final audio signal to a suitable power level to drive the output device.

The filter 241 receives the demodulated audio signal from the phase-locked loop demodulator 230. In the preferred embodiment, the unwanted electronics circuitry noise is filtered using a low-pass filter. The specific embodiment implements a low-pass filter employing a 741-type operational amplifier. The output of the filter 241 contains a reproduction of the original audio input signal. This output is fed directly into the audio amplifier 242 which increases the power of the audio signal while maintaining the signal-to-noise ratio. The specific embodiment utilizes a 741-type operational buffer amplifier circuit with a gain of 10, feeding to the output 250, which drives a set of headphones 251 or a powered speaker 252.

Considering now exemplary uses by which the ultrasonic speech translator and communication system 20 may be employed, FIG. 4 illustrates several applications. These include by way of example and not limitation communication between two people, between two cars, between a person and a car, between two buildings, between a car and a building, between a person and a building, and between locations within the same building. Furthermore, the system may be designed for use with various carrier media, including air, liquids, and solids.

From the foregoing description of the invention, it will be appreciated that the ultrasonic speech translator and communication system encompasses a wide range of desirable and useful applications. While specific embodiments of the invention have been illustrated and described herein, it is realized that numerous modifications and changes will occur to those skilled in the art. It is therefore to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit and scope of the invention.

US 6,011,991 *- Communications System and Method Inducing Brain Wave Analysis and/or use of brain activity*

United States Patent ***6,011,991***
Mardirossian **January 4, 2000**

Communication system and method including brain wave analysis and/or use of brain activity

Abstract

A system and method for enabling human beings to communicate by way of their monitored brain activity. The brain activity of an individual is monitored and transmitted to a remote location (e.g. by satellite). At the remote location, the monitored brain activity is compared with pre-recorded normalized brain activity curves, waveforms, or patterns to determine if a match or substantial match is found. If such a match is found, then the computer at the remote location determines that the individual was attempting to communicate the word, phrase, or thought corresponding to the matched stored normalized signal.

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Claims

I claim:

1. A method of communicating comprising the steps of:

providing a first human being at a first location;

providing a computer at a second location that is remote from the first location;

providing a satellite;

providing at least one sensor on the first human being;

detecting brain activity of the first human being using the at least one sensor, and transmitting the detected brain activity to the satellite as a signal including brain activity information;

the satellite sending a signal including the brain activity information to the second location;

a receiver at the second location receiving the signal from the satellite and forwarding the brain activity information in the signal to the computer;

comparing the received brain activity information of the first human being with normalized or averaged brain activity information relating to the first human being from memory; and

determining whether the first human being was attempting to communicate particular words, phrases or thoughts, based upon the comparing of the received brain activity information to the information from memory.

2. The method of claim 1, further including the following steps:

asking the first human being a plurality of questions and recording brain activity of the first human being responsive to the plurality of questions in the process of developing said normalized or averaged brain activity information relating to the first human being stored in the memory.

3. The method of claim 2, wherein the plurality of questions are the same question.

4. The method of claim 2, wherein the plurality of questions are different questions.

5. The method of claim 2, further comprising the step of normalizing or averaging recorded brain activity responsive to a given question or set of questions in developing the normalized or averaged brain activity information relating to the first human being.

6. A method of communicating words from a first location to a second location, the method comprising the steps of:

providing a first human being at the first location;

providing a computer at the second location that is remote from the first location;

providing at least one sensor on the first human being;

detecting brain activity of the first human being using the at least one sensor wherein the brain activity is indicative of words to be communicated by the first human being, and forwarding the detected brain activity indicative of words to be communicated to the computer at the second location;

comparing the received brain activity of the first human being indicative of words to be communicated with normalized or averaged brain activity information relating to the first human being from memory; and

determining words being communicated by the first human being based upon the comparing of the received brain activity information to the information from memory.

7. The method of claim 6, further including asking the first human being a plurality of questions and recording brain activity of the first human being responsive to the plurality of questions in a process of developing the normalized or averaged brain activity information relating to the first human being.

8. The method of claim 6, further comprising the step of the computer outputting words determined in said determining step to a second human being so that words thought or stated by the first human being are communicated by the first human being to the second human being via the computer.

Description

This invention relates to a system and method for enabling human beings to communicate with one another by monitoring brain activity. In particular, this invention relates to such a system and method where brain activity of a particular individual is monitored and transmitted in a wireless manner (e.g. via satellite) from the location of the individual to a remote location so that the brain activity can be computer analyzed at the remote location thereby enabling the computer and/or individuals at the remote location to determine what the monitored individual was thinking or wishing to communicate.

In certain embodiments this invention relates to the analysis of brain waves or brain activity, and/or to the remote firing of select brain nodes in order to produce a predetermined effect on an individual.

BACKGROUND OF THE INVENTION

It is known to monitor brain activity by way of electroencephalograph (EEG) methods, magnetoencephalograph (MEG) methods, and the like. For example, see U.S. Pat. Nos. 5,816,247 and 5,325,862, the disclosures of which are both hereby incorporated herein by reference. As discussed in the '247 patent, an EEG may be recorded from a number of pairs of scalp electrodes and processed according to known software. Such software and/or hardware acquires both processed and unprocessed EEG data and may record it on a disk. The records may be replayed and statistics of the on-line measures made on suitable sections placed in categories predefined by a user. This may utilize the form of database of statistical measures of brain activity. Unfortunately, neither the '862 nor the '247 patents disclose or suggest any methods by which humans can communicate with one another by way of monitoring brain activity.

U.S. Pat. No. 5,719,561 discloses a communications device and method, the entire disclosure of the '561 patent hereby being incorporated herein by reference. The '561 patent discusses a method and device for vibromechanical tactile communications adaptable for use by individuals to recognize alpha numeric messages in a language or in other symbols known to them. The '561 patent discusses using a series of sequentially firing vibromechanical stimulators vibrating against a suitably tactile sensitive surface of the wearer (e.g. skin) to induce a phenomenon of illustration of linear continuity. Unfortunately, the '561 patent requires the use of burdensome and complex vibromechanical tactile devices, and is not suitable for long distance communication.

It is a purpose of this invention to address any or all of the above-identified problems in the prior art, as well as other problems which will become apparent to the skilled artisan from the following detailed description of this invention.

SUMMARY OF THE INVENTION

Generally speaking, this invention fulfills the above described needs in the art by providing a method of communicating comprising the steps of:

providing a first human being at a first location;

providing a computer at a second location that is remote from the first location;

providing a satellite;

providing at least one sensor (preferably a plurality--e.g. tens, hundreds, or thousands, with each sensor monitoring the firing of one or more brain nodes or synapse type members) on the first human being;

detecting brain activity of the first human being using the at least one sensor, and transmitting the detected brain activity to the satellite as a signal including brain activity information;

the satellite sending a signal including the brain activity information to the second location;

a receiver at the second location receiving the signal from the satellite and forwarding the brain activity information in the signal to the computer;

comparing the received brain activity information of the first human being with normalized or averaged brain activity information relating to the first human being from memory; and

determining whether the first human being was attempting to communicate particular words, phrases or thoughts, based upon the comparing of the received brain activity information to the information from memory.

In certain embodiments, the invention includes the following step: asking the first human being a plurality of questions and recording brain activity of the first human being responsive to the plurality of questions in the process of developing said normalized or averaged brain activity information relating to the first human being stored in the memory. A database in a memory may include, for each of a plurality (e.g. one hundred or thousands) of individuals, a number of prerecorded files each corresponding to a particular thought, attempt to communicate a word, attempt to communicate a phrase or thought, or mental state. Measured brain activity of a given individual may be compared to files from that database of that individual to determine what the individual is attempting to communicate or what type of mental state the individual is in.

In certain embodiments, the plurality of questions are the same question.

In certain embodiments, the plurality of questions are different questions.

In certain embodiments, the invention includes the step of normalizing or averaging recorded brain activity responsive to a given question or set of questions in developing the normalized or averaged brain activity information relating to the first human being.

It is an object of this invention to enable brain activity of a first human being to be monitored, with the activity being transmitted to a remote location so that individuals and/or a computer at the remote location can determine what the first human being was thinking or intending to communicate. In such a manner, human beings can communicate with one another via monitoring of brain activity, and transmission of the same.

It is another object of this invention to communicate monitored brain activity from one location to another in a wireless manner, such as by IR, RF, or satellite.

It is another object of this invention to provide a system capable of identifying particular nodes in an individual's brain, the firings of which affect characteristics such as appetite, hunger, thirst, communication skills (e.g. which nodes are utilized to communicate certain words such as "yes", "no", or phrases such as "I don't know", "I'm not sure", or numbers such as "one", "two", "ten", "one hundred" and the like), thought processes, depression, and the like). When such nodes are identified, they may be specifically monitored by one or more sensors to analyze behavior or communication or words, phrases, or thoughts. In other embodiments, devices mounted to the person (e.g. underneath the scalp) may be energized in a predetermined manner or sequence to remotely cause particular identified brain node(s) to be fired in order to cause a predetermined feeling or reaction in the individual, such as lack of hunger, lack or depression, lack or thirst, lack of aggression, lack of alzheimer's disease effects, or the like.

Brain node firings are the basis of thought and mind processes of individuals. Certain embodiments of this invention enable such brain firings and behavior to be captured by an external device. It is an object of this invention to utilize a normalization or normalizing curve (or waveform or pattern) based upon monitored brain activity to detect or determine thought processes by the monitored individual. In such a manner, individuals can transmit by satellite what they are thinking or intending to think via their monitored brain activity, without the need to talk or write down information.

Each individual has a distinct pattern of brain node firings or brain activity. Each person is believed to be different in this regard. Thus, a separate brain activity file may be stored in a memory for each individual, and analyzed or compared to received brain activity from the monitored individual in order to determine what that individual is thinking or attempting to communicate.

It is an object of this invention to utilize brain monitoring and transmission of monitored brain activity for lie detection and/or human communication.

It is another object of this invention to formulate or build-up a file for each individual based upon patterns recorded in response to that individual answering or responding to numerous predetermined questions with known intended responses. Subsequently, monitored brain activity from that individual may then be compared to information stored corresponding to that individual to determine whether the individual is lying or what the individual is intending to communicate in the monitored brain activity. The higher the level of detail of the file, the higher the level of potential communication by certain embodiments of this invention.

At least one sensor on the scalp or skin in certain embodiments provides signals representative of physiological activity generated in the brain of a monitored individual. A data acquisition device receives the signals representative of the physiological activity generated in the monitored brain, and transforms the signals into a pattern or curve corresponding to the monitored brain activity. This is then transmitted (e.g. by satellite) to a computer located at a remote location, with the monitored brain activity pattern or curve

being stored in a memory at the remote location. The computer then causes the received pattern or curve information to be compared with stored brain activity pattern information relating to the monitored individual in order to determine (a) whether the monitored individual is lying in response to a particular question, or (b) what the monitored individual is communicating or attempting to communicate.

Another object of this invention is to utilize normalization curves representative of received brain activity patterns from the monitored individual, and to compare the received normalized data with normalized brain activity pattern or curve data stored in memory relating to that individual. The use of normalization curves in one or both of the individual's file and received brain activity improves reliability, accuracy, and efficiency.

In certain embodiments of this invention, the computer located at the remote location includes a neural network suitably programmed in accordance with known neural network techniques, for the purpose of receiving the monitored brain activity signals, transforming the signals into useful forms, training and testing the neural network to distinguish particular forms and patterns of physiological activity generated in the brain of the monitored individual, and/or comparing the received monitored brain activity information with stored information relating to that individual in order to determine what the individual is attempting to communicate.

This invention further fulfills the above described needs in the art by providing a method of affecting a mental or physiological state of an individual, the method comprising the steps of:

providing at least one firing device capable of being energized on an individual; and

energizing the firing device to cause the firing device to cause a particular or group of brain nodes to be fired in the individual in order to affect the mental or physiological state of the individual.

In certain embodiments, the method including the step of providing the at least one firing device on or under the scalp of the individual in proximity of the brain of the individual.

In certain embodiments, the method including the step of identifying at least one brain node related to the mental or physiological state intended to be affected, targeting the identified brain node, and energizing the firing device or devices to cause the identified node to be fired in order to affect the mental or physiological state of the individual.

In certain embodiments, the method is utilized to cause the individual to be one of less hungry, less thirsty, less anxious, and less depressed.

In certain embodiments, the remote node firing devices are electrically energized and generate electromagnetic waves which cause a plurality of brain nodes to be fired.

This invention will now be described with respect to certain embodiments thereof, along with reference to the accompanying illustrations.

IN THE DRAWINGS

FIG. 1 is a block diagram illustrating the system and method according to a first embodiment of this invention.

FIG. 2 is a block diagram illustrating the neural network inclusive computer of the FIG. 1 embodiment of this invention.

FIGS. 3(a)-3(f) are exemplary graphs of monitored brain activity of different individuals, with, for example, FIG. 3(a) illustrating monitored brain activity of a particular individual who is attempting to communicate the word "no" and FIG. 3(b) illustrating monitored brain activity of the same individual when that individual is attempting to communicate the word "yes."

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS OF THIS INVENTION

Referring now more particularly to the accompanying drawings in which like reference numerals indicate like parts throughout the several views.

There are significant individual differences in electrical and magnetic activity in the brain. Brain node or synapse firings are chemically and/or electrically caused and/or related. Some characteristics of brain activity may be relatively stable when measured from day to day. Brain responses to sensory stimulation (e.g. visual, audible, olfactory, gustatory, etc.) as well as higher order cognitive processing (e.g. decision-making or thought/word communication), can be examined in great detail using a variety of recording procedures. A recording of brain electrical activity is called an electroencephalograph (EEG), and a comparable record of magnetic activity is called a magnetoencephalogram (MEG). When human sensory systems are stimulated by a particular event (a given sound or optical effect) or when a human wishes to communicate a particular word or phrase (e.g. the word "yes" or the word "no"), there is a predictable sequence of processing that occurs in the brain. This processing generates an event related potential that can be recorded from the scalp beginning shortly after the onset of the stimulation, and lasting for approximately 0.5-4 seconds after the stimulation. These potentials can be repeatedly generated from individuals given the same stimulus or wishing to communicate the same word or phrase. In certain embodiments of this invention, brain activity may be repeatedly sampled, and response patterns averaged by way of a normalization curve or the like. Comparable recordings of averaged or normalized magnetic activity may be referred to as evoked fields. Neuroelectric and neuormagnetic recordings are subsets of general measurings referred to as bioelectric and biomagnetic measures. These measures refer to recordings which may be made from different types of tissue including neural, muscle, heart, etc. For example, EEG, evoked potentials (EP), MEG, position emission tomography (PET) of glucose, or single photon emission computed tomography (SPECT) may be used to monitor brain activity in different embodiments of this invention.

Event related potentials have been shown to be stable and unique to individuals. See U.S. Pat. No. 5,325,862, which is incorporated herein by reference. Although the actual shape of such potentials varies considerably from individual to individual, there is stability within individuals over time for individual waveforms. Sources of these potentials and variations thereof include individual differences in brain anatomy and differences in the way in which information is processed by each individual. Thus, it is feasible herein to utilize monitored brain waveforms for the purpose of determining whether an individual is lying or not, or what word or phrase a particular individual is attempting to communicate (without the need for writing information down or speaking).

Thus, evoked fields and/or event related potentials can be utilized as classifiers for several purposes. For example, because these potentials and/or fields are relatively unique to individuals, an individual's evoked field or event related potential (or brainprint) can be utilized to determine what thoughts an individual is communicating or attempting to communicate given knowledge of the identification of that individual and previously recorded patterns associated with that individual communicating predetermined words, phrases or thoughts. Because there is a remarkable degree of stability in individual waveforms of a person over time, it is possible to identify changes in individual event related potentials and evoked field patterns which can be utilized to determine when an individual is lying, or impaired in any way.

There are numerous neural networks in the brain, these networks having complex inner connections and non-linear response patterns. Relationships between the latencies and amplitudes of event related potentials and evoked field waveform features have become well understood. In addition, there are many individual variations in waveform morphology. Computing techniques modeled after brain neural functions are known in the art. They are typically referred to as neural network analysis techniques or computers. Neural network analysis computing technology offers a method for finding complex, non-linear relationships in large data sets, even when the nature of the relationships is not known in advance. Neural network technology is implemented sometimes using computer software programs, but may also be hardware implemented. Neural network theory, and detailed descriptions of specific techniques, are available in numerous books and articles set forth in the aforesaid '862 patent, as well as in, for example, any of U.S.

Pat. Nos. 5,136,687; 5,059,814; 5,461,699; 5,737,485; 5,224,203; and 5,640,493, the entire disclosures of which are all hereby incorporated herein by reference. Such neural computing systems have a capability to learn features of data sets and classify same into either unknown or predetermined categories. A variety of neural network techniques may be utilized to classify event related potentials, evoke fields, or any other type of pattern corresponding to monitored brain behavior. In most neural networks, input values are adjusted through a series of layers by a series of transforms and weighted so that output categories are correctly predicted. Thus, a neural computing system herein may be utilized to receive monitored brain activity and based upon predetermined stored and/or learned information, determine based upon the received information what word, phrase, or thoughts the monitored individual is attempting to communicate. In such a manner, the monitoring of brain activity may be utilized to allow individuals to communicate from one location to another, with the neural computer or any other type of computer analyzing the monitored brain information (e.g. via comparison with previously recorded brain activity of that person) and outputting information indicative of the word, phrase, or thoughts which the monitored individual is attempting to communicate.

FIG. 1 illustrates a particular monitored individual 3 according to an embodiment of this invention. Individual 3 includes a head 5. As illustrated, sensors 7 may be attached or otherwise disposed adjacent to the scalp or skin of the individual 3. Sensors 7 detect and monitor brain activity of individual 3. Sensors 7 can detect event related potentials and/or event related fields (i.e. ERPs or ERFs). Optionally, sensor 7 may be utilized to detect any other type of "brainprint" indicative of brain activity of individual 3.

The monitored "brainprint" of individual 3 is forwarded to a small transmitter 9 which is preferably embedded in the skin of individual 3, or in close proximity to individual 3. Transmitter 9 causes the monitored "brainprint" information detected by sensor 7 to be transmitted by way of antenna 11 as wireless signals 13. In certain embodiments of this invention, signals 13 propagate through atmospheric free space in the form of uplink satellite signals toward satellite 15. Satellite 15 receives signals 13 and then redirects those signals back toward Earth as signals 17 which include information therein (analog or digital) indicative of the monitored brain activity of individual 3. Signals 17 are received by antenna 19. Antenna 19 and individual 3 are both preferably located on Earth at different locations. In certain embodiments, antenna 19 is located at a location remote from individual 3. For example, individual 3, sensor 7, transmitter 9, and antenna 11 may all be located in Europe while receiving antenna 19 and computer 21 may be located in the United States.

FIG. 1 illustrates both a digital embodiment 23 and an analog embodiment 25 of receiving systems. Either may be utilized. When signals 17 include digital information, they are received by antenna 19 and forwarded to tuner 27. The signals are processed through equalizer 29, demodulator 31, parallel to serial converter 33, deinterleaver 35, decoder 37, descrambler 39, digital estimator 41, and finally to neural network analysis or other type of computer 21. Monitored firings of brain nodes may be broken down into digital form (e.g. the firing of a node is equivalent to a "1" and nonfiring to a "0"). These 1s and 0s, which are digital, may be modulated onto a carrier and then transmitted to the satellite so that the monitored brain activity in the signal is in digital form. When the computer receives this monitored signal from the satellite, the demodulating system analyzes the received digital information (e.g. 1s and 0s) which is indicative of the firing of select brain nodes of the monitored individual. These digital signals may be transformed, in certain embodiments, into analog form similar to the illustrations of FIG. 3, or alternatively may be kept in digital form and compared with prestored digital signals to determine what the monitored person was intending to communicate.

In analog embodiments, signal 17 is received by antenna 19, and the information forwarded to tuner 27, amplifier 43, and the analog information inclusive signal 45 is forwarded to computer 21. In analog embodiments, the signals received by the monitoring sensors are in the form of waves similar to those shown in FIG. 3 herein.

FIG. 2 is a block diagram of computer 21 in certain embodiments of this invention. The input thereto may be in either analog or digital form. Computer 21 includes processor 51, RAM 53, comparing device 55, and memory 57 for storing a plurality of files or patterns of measured brain activity or responses of particular individuals. For example, memory or storage 57 may include one file for individual X which includes hundreds of monitored brain activity (e.g. ERPs or ERFs) that were measured when individual X was attempting to communicate the word "no." Another file in storage or memory 57 may have stored therein hundreds or thousands of monitored brain patterns or activities of individual X when individual X was attempting to communicate the word "yes." Storage or memory 57 may also include similar files for individual X including patterns which were measured when the individual was attempting to communicate different words or phrases. Each of these files may have a normalized curve, waveform or pattern formed or developed for each word, phrase, or thought for each individual, based upon all of the recorded patterns or curves for that word, phrase, or thought (e.g. 1,000 such recordings for the phrase "help me," and 1,000 for the phrase "I've been caught." Memory 57 further includes in certain embodiments many different files for many different individuals, all including files for each individual's past communicating of particular words, phrases, or thoughts.

Normalized curves or patterns corresponding to each individual's attempt to communicate a particular word, thought, or a pattern may be stored in storage or memory 57. Thus, for individual X attempting to communicate the word "no", a normalized curve, waveform, or a pattern may be stored in memory 57 indicative or such a communication. Likewise, a normalized curve, waveform, or pattern may be stored in memory 57 for individual Y attempting to communicate the word "no" and another distinct normalized curve, waveform, or pattern may be stored in memory 57 for individual Y attempting to communicate the word "yes." In a similar manner, a normalized curve, waveform or pattern may be stored in memory 57 for individual Y attempting to communicate the phrase "I don't know" or "I'm not sure." Thus, if one hundred different human beings have files in memory 57 corresponding to each of these individual's attempt to communicate the phrase "I don't know", then one hundred different normalized waveforms, curves or patterns would be stored in memory 57, each corresponding to a particular individual. A normalized curve, waveform, or pattern may be developed by repeatedly asking an individual tens, hundreds, or thousands of times a particular question or group of questions which evoke a known response such as "I don't know," or "no" or "yes." Each time the response is made, a curve, waveform, or a pattern is recorded. After tens, hundreds, or even thousands of these patterns have been recorded, a normalized curve, waveform or pattern is formed based upon same so as to be indicative of that particular individual's attempt to communicate the phrase. In a similar manner, if it is desired to store normalized curves, waveforms, or patterns for ten different words, phrases or thoughts communicated by a particular individual, then a normalized curve, waveform, or pattern is developed for each of the different ten items so that ten different normalized curves, waveforms or patterns are stored in memory 57 for that individual and classified accordingly. Thus, when computer 21 receives signals indicating brain activity from that monitored individual, the received signals are compared by device 55 to the ten different normalized signals in memory 57 in order to determine what the individual is attempting to communicate.

FIGS. 3(a)-3(f) illustrate different normalized curves which may be stored in memory 57. FIG. 3(a) shows a normalized curve indicative of individual "Joe" attempting to communicate the word "no." FIG. 3(b) shows a normalized curve indicative of individual "Joe" attempting to communicate the word "yes." FIG. 3(c) shows a normalized curve indicative of another individual "Steve" attempting to communicate the word "no", while FIG. 3(d) shows a normalized curve indicative of individual "Steve" attempting to communicate the word "yes." Finally, FIG. 3(e) shows a normalized curve indicative of still another individual "Anita" attempting to communicate the word "no", while FIG. 3(f) illustrates a normalized curve of "Anita" attempting to communicate the word "yes."

Thus, if computer 21 receives a signal including monitored brain information identified as being from individual "Steve", then computer 21 causes the received signal to be compared by device 55 with the normalized curves or waveforms shown in FIGS. 3(c) and 3(d) and all others normalized stored signals of "Steve." If a match or a close match is found between the received monitored signal and the normalized curve of FIG. 3(c), then the computer determines that "Steve" was attempting to communicate the word "no." Meanwhile, if no match is found with the normalized curve of FIG. 3(c), but a match or a substantial match is found with regard to the normalized curve or waveform of FIG. 3(d), then the computer

determines that "Steve" was attempting to communicate the word "yes." If no match is found between the received "Steve" signal and any normalized curve or waveform of either FIG. 3(c) or FIG. 3(d), or with any other normalized curve stored in memory 57 corresponding to "Steve", then the computer determines that it is unclear what "Steve" was attempting to communicate.

Thus, different embodiments of this invention may be utilized to help individuals communicate with one another without having to send faxes, make telephone calls, speak, or the like. For instance, military personnel located in the Middle East or Europe can communicate with superiors in the Pentagon, simply by use of monitored brain activity being transmitted by satellite to the Pentagon. Alternatively, a special operations individual (e.g. a spy) located in Europe could be asked a question by way of a telephone call, fax, or the like, and that individual can respond to that question simply by thinking the answer so that that individual's monitored brain activity which is transmitted back to the United States can be analyzed to determine the individual's response. In further embodiments of this invention, twoway human communication is possible, provided that human beings at both locations have equipment capable of analyzing and monitoring received monitored brain activity. In such a manner, individuals at two remote locations may communicate with one another without either individual having to speak a word, write anything down, or the like. In other embodiments, devices mounted to the person (e.g. underneath the scalp) may be energized in a predetermined manner or sequence to remotely cause particular identified brain node(s) to be fired in order to cause a predetermined feeling or reaction in the individual, such as lack of hunger, lack or depression, lack or thirst, lack of aggression, lack of alzheimer's disease effects, or the like. In an example of such an embodiment, the sensors may be replaced with remote firing devices. The computer may cause satellite signals to be sent to a receiver on or proximate an individual, which receiver forwards instructions to the remote firing devices that are mounted, e.g. under the scalp of the individual, in order to selectively cause same to fire or be energized. Such energizing of the device(s) under or near the scalp in a predetermined manner tend to cause identified brain nodes to fire a predetermined number of times. This is useful, for example, in the following scenarios. For example, the system can be used to identify which brain node(s) in a particular individual are typically fired causing that individual to not be hungry. If that individual has an eating disorder or problems with obesity, then the firing devices can be remotely energized thereby causing the identified brain node(s) to be fired at predetermined or random times in order to cause the individual to not be hungry (even if the individual has not eaten for several hours or several days).

In a similar manner, brain nodes which cause an individual to be jovial or not depressed can be identified, and caused to be remotely fired by the computer and firing devices 7 mounted under the scalp in a predetermined manner or sequence(s) in order to minimize or prevent depression of the individual. This may eliminate the need for drugs such a Prozac. Alternatively, such drug(s) may be administered after such remote node firings, and the nodes at issue thereafter being monitored as discussed above and a biofeedback being performed to determine the effectiveness of the drug(s) or alternatively to enable a system to be utilized combining drug treatment with remote node firings to more effectively prevent or minimize depression of the individual. Thus, the biofeedback may enable the identified nodes to be fired by the firing devices and/or drug treatment at the proper level to most efficiently treat the disease, illness or state. This invention, including remote firings and/or monitoring, is not limited to these examples, and its potential uses are almost endless. Brain node firings can be remotely controlled in a predetermined manner or sequence(s) (even random or sequential) to reduce, minimize, or eliminate undesirable behavior or mental characteristics. This may eliminate or reduce the need for burdensome drug treatments and the like. Brain node firings of a normal person, or of a particular person in a given mental or physical state, may be monitored and the brain activity stored and analyzed in the computer 21 memory. This stored brain activity may then be caused by remotely causing the firing devices to cause particular brain node(s) to be fired at given times or intervals in a predetermined manner or sequence. The computer may be programmed to instruct the brain sensors and/or firing devices to identify which brain nodes are responsible for which types of physical or mental behavior, and then the computer transmits firing instructions to the firing devices for those nodes to cause them to be fired in a predetermined manner to effect such physical or mental behavior. Once given the above disclosure, many other features, modifications, and improvements will become apparent to the skilled artisan. Such other features, modifications, and improvements are, therefore, considered to be a part of this invention, the scope of which is to be determined by the following claims.

United States Patent **6,017,302**
Loos **January 25, 2000**

Subliminal acoustic manipulation of nervous systems

Abstract

In human subjects, sensory resonances can be excited by subliminal atmospheric acoustic pulses that are tuned to the resonance frequency. The 1/2 Hz sensory resonance affects the autonomic nervous system and may cause relaxation, drowsiness, or sexual excitement, depending on the precise acoustic frequency near 1/2 Hz used. The effects of the 2.5 Hz resonance include slowing of certain cortical processes, sleepiness, and disorientation. For these effects to occur, the acoustic intensity must lie in a certain deeply subliminal range. Suitable apparatus consists of a portable battery-powered source of weak subaudio acoustic radiation. The method and apparatus can be used by the general public as an aid to relaxation, sleep, or sexual arousal, and clinically for the control and perhaps treatment of insomnia, tremors, epileptic seizures, and anxiety disorders. There is further application as a nonlethal weapon that can be used in law enforcement standoff situations, for causing drowsiness and disorientation in targeted subjects. It is then preferable to use venting acoustic monopoles in the form of a device that inhales and exhales air with subaudio frequency.

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Primary Examiner: Gilbert; Samuel

Claims

I claim:

1. Apparatus for manipulating the nervous system of a subject, the subject having an ear, comprising:

generator means for generating voltage pulses;

induction means, connected to the generator means and responsive to the voltage pulses, for inducing at the ear subliminal atmospheric acoustic pulses with a pulse frequency less than 15 Hz.

2. The apparatus according to claim 1, further comprising means for automatically controlling the voltage pulses.

3. The apparatus according to claim 1, further comprising means for monitoring the voltage pulses.

4. The apparatus according to claim 1, for exciting in the subject a sensory resonance that occurs at a resonance frequency less than 15 Hz, the apparatus further comprising tuning means for enabling a user to tune the pulse frequency to the resonance frequency.

5. The apparatus according to claim 4, further including a casing for containing the generator means, the induction means and the tuning means.

6. The apparatus according to claim 1, wherein said induction means comprise:

means for generating in the atmosphere a gas jet, the latter having a momentum flux; and

modulation means, connected to the generator means and responsive to said voltage pulses, for pulsing the momentum flux with a frequency less than 15 Hz;

whereby subaudio acoustic pulses are induced in the atmosphere.

7. Apparatus for manipulating the nervous system of a subject, the subject having an ear, comprising:

generator means for generating voltage pulses;

a source of gas at a pressure different from the ambient atmospheric pressure;

a conduit having an orifice open to the atmosphere for passing a gaseous flux;

valve means, connected to the source of gas and the conduit to control the gaseous flux;

means, connected to the generator means and responsive to said voltage pulses, for operating the valve means to provide an oscillation of the gaseous flux with a frequency less than 15 Hz.

8. The apparatus according to claim 7, further comprising vessel means for smoothing fluctuations of the gaseous flux caused by fluctuations in the pressure of the source of gas.

9. A method for manipulating the nervous system of a subject, the subject having an ear, comprising the steps of:

generating voltage pulses; and

inducing, in a manner responsive to the voltage pulses, at the ear subliminal atmospheric acoustic pulses with a pulse frequency less than 15 Hz.

10. The method according to claim 9, for exciting in the subject a sensory resonance that occurs at a resonance frequency less than 15 Hz, further comprising the step of tuning the pulse frequency to the resonance frequency.

11. The method according to claim 9, wherein said inducing comprises the steps of:

generating in the atmosphere a gas jet, the latter having a momentum flux; and

modulating the momentum flux in pulse-wise fashion in a manner responsive to the voltage pulses.

12. The method according to claim 11, further comprising the step of directing the gas jet at a material surface.

13. The method according to claim 9, wherein said inducing comprises the steps of:

generating a gas flow through a conduit orifice that is open to the atmosphere; and

modulating the gas flow to produce flow pulsations, in a manner responsive to the voltage pulses.

14. A method for remotely manipulating the nervous system of a subject in the course of law enforcement in a standoff situation, the subject having an ear, comprising the steps of:

generating voltage pulses;

generating, in a manner responsive to the voltage pulses, atmospheric acoustic signals at a plurality of locations remote from the subject for inducing at the ear subliminal atmospheric acoustic pulses with a pulse frequency less than 15 Hz, the signals having phase differences with respect to each other arranged to cause constructive acoustic wave interference at the subject.

15. A method for exciting in a subject a sensory resonance having a resonance frequency less than 15 Hz, the subject having an ear, comprising the steps of:

generating voltage pulses;

inducing, in a manner responsive to the voltage pulses, at the ear subliminal atmospheric acoustic pulses with a pulse frequency less than 15 Hz;

tuning the pulse frequency to the resonance frequency; and also

inducing audible audio-frequency atmospheric acoustic signals at the ear.

16. A method for controlling in a subject neurological disorders that involve pathological oscillatory activity of neural circuits, the subject having an ear, comprising the steps of:

generating voltage pulses;

inducing, in a manner responsive to the voltage pulses, at the ear subliminal atmospheric acoustic pulses with a pulse frequency less than 15 Hz; and

arranging said pulse frequency to detune the pathological oscillatory activity.

17. A method for controlling in a subject epileptic seizures, the subject having an ear, comprising the steps of:

generating voltage pulses;

inducing in a manner responsive to the voltage pulses, at the ear subliminal atmospheric acoustic pulses with a pulse frequency less than 15 Hz; and

initiating said inducing when a seizure precursor is felt by the subject.

Description

BACKGROUND OF THE INVENTION

The central nervous system can be manipulated via sensory pathways. Of interest here is a resonance method wherein periodic sensory stimulation evokes a physiological response that peaks at certain stimulus frequencies. This occurs for instance when rocking a baby, which typically provides relaxation at frequencies near 1/2 Hz. The peaking of the physiological response versus frequency suggests that one is dealing here with a resonance mechanism, wherein the periodic sensory signals evoke an excitation of oscillatory modes in certain neural circuits. The sensory pathway involved in the rocking example is the vestibular nerve. However, a similar relaxing response at much the same frequencies can be obtained by gently stroking a child's hair, or by administering weak heat pulses to the skin, as discussed in U.S. Pat. No. 5,800,481, Sep. 1, 1998. These three types of stimulation involve different sensory modalities, but the similarity in responses and effective frequencies suggests that the resonant neural circuitry is the same. Apparently, the resonance can be excited either via vestibular pathways or via cutaneous sensory pathways that carry tactile or temperature information.

Near 2.5 Hz another sensory resonance has been found that can be excited by weak heat pulses induced in the skin, as discussed in U.S. Pat. No. 5,800,481, Sep. 1, 1998. This sensory resonance brings on a slowing of certain cortical functions, as indicated by a pronounced increase in the time needed to silently count backward from 100 to 70 with the eyes closed. The effect is sharply dependent on frequency, as shown by a response peak a mere 0.13 Hz wide. The thermally excited 2.5 Hz resonance was found to also cause sleepiness, and after long exposure, dizziness and disorientation.

Other, more obscure types of stimulation in the form of weak magnetic fields or weak external electric fields can also cause the excitation of sensory resonances, as

SUMMARY OF THE INVENTION

Experiments have shown that atmospheric acoustic stimulation of deeply subliminal intensity can excite in a human subject the sensory resonances near 1/2 Hz and 2.5 Hz. The 1/2 Hz resonance is characterized by ptosis of the eyelids, relaxation, drowsiness, a tonic smile, tenseness, or sexual excitement, depending on the precise acoustic frequency near 1/2 Hz that is used. The observable effects of the 2.5 Hz resonance include a slowing of certain cortical functions, sleepiness, and, after long exposure, dizziness and disorientation. The finding that these sensory resonances can be excited by atmospheric acoustic signals of deeply subliminal intensity opens the way to an apparatus and method for acoustic manipulation of a subject's nervous system, wherein weak acoustic pulses are induced in the atmosphere at the subject's ears, and the pulse frequency is tuned to the resonance frequency of the selected sensory resonance. The method can be used by the general public for control of insomnia and anxiety, and for facilitation of relaxation and sexual arousal. Clinical use of the method includes the control and perhaps a treatment of anxiety disorders, tremors, and seizures. A suitable embodiment for these applications is a small portable battery-powered subaudio acoustic radiator which can be tuned to the resonance frequency of the selected sensory resonance.

There is an embodiment suitable for law enforcement operations in which a subject's nervous system is manipulated from a considerable distance, as in a standoff situation. Subliminal subaudio acoustic pulses at the subject's location may then be induced by acoustic waves radiating from a venting acoustic monopole, or by a pulsed air jet, especially when aimed at the subject or at another material surface, where the jet velocity fluctuations are wholly or partly converted into static pressure fluctuations.

The described physiological effects occur only if the intensity of the acoustic stimulation falls in a certain range, called the effective intensity window. This window has been measured in exploratory fashion for the 2.5 Hz resonance.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a preferred embodiment wherein a modulated air jet is used for inducing subliminal acoustic pulses in the atmosphere at the subject's ears, for the purpose of manipulating the subject's nervous system.

FIG. 2 shows an embodiment in which a pulsed air jet is produced by modulating the flow from a fan by a cylindrical sheet valve that is driven by a voice coil.

FIG. 3 shows schematically an acoustic monopole operated by a solenoid valve.

FIG. 4 shows the circuit of a simple generator for producing voltage pulses that drive a piezoelectric speaker.

FIG. 5 depicts a portable battery-powered device that contains the circuit and the piezoelectric speaker of FIG. 4.

FIG. 6 shows schematically a generator for chaotic pulses.

FIG. 7 depicts a circuit for generating a complex wave.

FIG. 8 illustrates an application in a law enforcement standoff situation.

FIG. 9 contains experimental data that show excitation of the sensory resonance near 2.5 Hz, and the effective intensity window.

FIG. 10 depicts experimental data showing that the sensory excitation occurs via the ear canal.

FIG. 11 shows the buildup of the physiological response to the acoustic stimulation.

FIG. 12 shows schematically an acoustic monopole operated by a rotating valve.

DETAILED DESCRIPTION OF THE INVENTION

It has been found in our laboratory that deeply subliminal atmospheric acoustic pulses with frequency near 1/2 Hz can evoke in a human subject a nervous system response that includes ptosis of the eyelids, relaxation, drowsiness, the feeling of pressure at a centered spot on the brow, seeing moving patterns of dark purple and greenish yellow with the eyes closed, a soft warm feeling in the stomach, a tonic smile, a "knot" in the stomach, sudden loose stool, and sexual excitement, depending on the precise acoustic frequency used. These responses show that this sensory resonance involves the autonomic nervous system.

The sharp peaking of the physiological effects with frequency is suggestive of a resonance mechanism, wherein the acoustic stimulation, although subliminal, causes excitation of a resonance in certain neural circuits. Since the frequencies and responses are similar to those for the 1/2 Hz sensory resonance discussed in the Background Section, it appears that the resonance excited by the described acoustic stimulation is indeed the 1/2 Hz sensory resonance. It has been found that the 2.5 Hz sensory resonance can be excited acoustically as well. This sensory resonance causes the slowing of certain cortical processes, sleepiness, and eventually dizziness and disorientation.

One can avoid the described physiological responses by wearing snugly fitting ear plugs. This shows that the excitation occurs via the external ear canal, so that the stimulation proceeds either through the auditory nerve or the vestibular nerve. Frequencies near 1/2 Hz or 2.5 Hz are far too low for stimulating the cochlear

apparatus, but they are within the response range of hair cells in the vestibular end organ. Also, there exists a low-frequency acoustic path to the vestibular end organ by virtue of the ductus reuniens which provides a fluid connection between the cochlea and the vestibular organ. The narrow duct severely attenuates acoustic signals and acts as a low pass filter with a very low cutoff frequency. Subaudio acoustic signals, i.e., acoustic signals with frequencies up to 15 Hz, may perhaps penetrate to the vestibular organ with sufficient strength for stimulating the exquisitely sensitive vestibular hair cells.

For the 1/2 Hz and 2.5 Hz resonances, the described physiological responses are observed only if the acoustic intensity lies in a certain interval, called the effective intensity window. The acoustic intensity levels in this window are far below the human auditory threshold, so that exposed subjects do not sense the acoustic pulses in any other way than through the mentioned physiological effects. The upper limit of the effective intensity window is believed to be due to nuisance-guarding neural circuitry that blocks repeditive nuisance signals from higher processing.

The acoustic signals used for the excitation of sensory resonances have the nature of pulses. The pulses may be square, trapezoid, or triangle, or rounded versions of these shapes. However, depending on the pulse frequency, strong harmonics with frequencies in the audible range could stimulate the cochlear apparatus. This may be avoided by using sine waves or appropriately rounded other waves with low harmonic content.

The acoustic pulses occur in the atmosphere air; even when administered with earphones, the pulses at the subject's ear constitute pressure and flow pulses in the local atmospheric air.

The resonance frequencies of the 1/2 Hz and 2.5 Hz sensory resonances lie respectively near 1/2 and 2.5 Hz. The different physiological effects mentioned occur at slightly different frequencies. Thus, one can tune for drowsiness or sexual excitement, as desired. The precise resonance frequency is also expected to depend slightly on the subject and the state of the nervous and endocrine systems, but it can be measured readily by tuning the acoustic pulse frequency for maximum physiological effect. Besides the resonances near 1/2 and 2.5 Hz, other sensory resonances may perhaps be found, and those with resonance frequencies below 15 Hz are expected to be excitable acoustically via the vestibular nerve, since the vestibular hair cells are sensitive in this frequency range.

The finding that deeply subliminal subaudio acoustic stimulation can influence the central nervous system suggests a method and apparatus for manipulating the nervous system of a subject by inducing subliminal atmospheric acoustic pulses of subaudio frequency at the subject's ears. In doing so, one may in addition exploit the sensory resonance mechanism, but there are important applications where this is not done. For example, the subliminal acoustic manipulation of the nervous system may be used clinically for the control of tremors and seizures, by detuning the pathological oscillatory activity of neural circuits that occurs in these disorders. This may be done by choosing an acoustic frequency that is slightly different from the frequency of the pathological oscillation. The evoked neural signals then cause phase shifts which may diminish or quench the oscillation. Exploitation of the resonance mechanism by tuning the acoustic signals to the resonance frequency of a selected sensory resonance affords other forms of manipulation, such as control of insomnia and anxiety, or facilitation of sexual arousal.

For both types of manipulation, the required subliminal subaudio acoustic pulses may be induced at one or both of the subject's ears by earphones with a proper low-frequency response, acoustic waves generated by an acoustic source and propagated through the atmosphere, or by a pulsed jet of gas (which may be air), preferably directed at a material surface open to the atmosphere, such as a wall or the subject's skin or clothing. In the area of impact, especially where the surface is oriented substantially perpendicular to the jet, atmospheric pressure pulses are then generated by virtue of the ram effect, wherein flow velocity fluctuations are wholly or partly converted into static pressure fluctuations. If the material surface on which the jet impinges includes the subject's ears, then these pressure pulses cause direct stimulation of the subject, but the pulses also propagate through the atmosphere to the subject's ears by virtue of acoustic wave propagation along accessible paths.

The induction of atmospheric acoustic pulses by a pulsed air jet proceeding in the atmosphere and directed

at a subject is shown in FIG. 1, where a blower 1, labeled "FAN", produces an air jet 2 that is directed at a subject 3. The fan is powered by a power supply 4, labelled "SUPPLY". At the fan, the supply voltage is modulated in pulsed fashion by a relay 5 controlled by the generator 6, labelled "GENERATOR", through voltage pulses 7 supplied to electromagnet windings 8. A user can adjust the frequency of the pulses with the tuning control 9. The pulsing of the voltage supplied to the fan causes the momentum flux 10 of the air jet to be modulated in a pulsed manner. Upon impinging on a material surface such as the skin of the subject 3, the pulsed jet induces acoustic pressure pulses at the ears 11 of the subject. The atmospheric acoustic effect of the jet is complicated by the fact that the region of the fan inlet undergoes a fluctuation of static pressure as the result of the modulation of jet momentum flux. There thus are two distinct acoustic monopoles, one at the fan inlet and the other in the area of impact of the jet on the material surface. The monopoles radiate with a phase difference that is determined by the jet velocity, the modulation frequency, and the distance between fan and impact area. The resulting sound pressure at the subject's ears can be analyzed with retarded potentials as discussed for instance by Morse and Feshbach (1953). Even a jet which does not impinge on a material surface radiates by virtue of the acoustic monopole at the fan inlet.

When skin of the subject is exposed to gas flow of the jet, or to the flow of atmospheric air entrained by the jet, the flow will fluctuate in pulsed fashion, so that a periodic heat flux occurs by convective transport and evaporation of sweat. The resulting periodic fluctuation of the skin temperature can excite a sensory resonance, as discussed in U.S. Pat. No. 5,800,481, Sep. 1, 1998. Hence, the apparatus of FIG. 1 can cause excitation of a sensory resonance via two separate sensory pathways, viz., the vestibular nerve and the afferents from cutaneous temperature receptors. The strength of the thermal stimulation depends on the skin area and type of skin exposed to the fluctuating flow. The face is particularly sensitive, especially the lips. The two-channel excitation of sensory resonances needs further investigation. In any particular situation, the vestibular channel can be blocked by using earplugs.

An air jet with pulsed momentum flux can also be obtained as illustrated in FIG. 2. Shown is a fan 1, labelled "FAN", which discharges into manifold 12. The air flow in the manifold can be partially obstructed by a sheet valve 13 in the form of a perforated cylindrical sheet. The sheet valve carries a voice coil 14 which is situated in the field of a permanent magnet 15, in the manner of conventional electromagnetic loudspeakers. When no current flows through the voice coil, the sheet valve is held in equilibrium position by springs 16. In this position, the perforation 17 in the sheet is lined up with the flow passage allowing essentially unimpeded flow through the manifold and out the exit 18, such as to form a jet 19 in the atmosphere. Sending a current pulse through the voice coil 14 causes the sheet valve to be displayed in the axial direction, thereby partially obstructing the air flow through the manifold. Owing to the low inertia of the sheet valve, the arrangement allows efficient pulse modulation of the jet momentum flux.

A somewhat different modulation system can be obtained with a rotating cylindrical sheet valve that has one or more holes along its periphery, and which is adjacent to a stationary cylindrical shroud that has corresponding holes, so that rotation of the valve causes modulation of the air flow through the holes. The valve is rotated by a stepper motor driven by voltage pulses. The latter are obtained from a generator that is controlled by a tuner.

One can also use direct acoustic wave propagation for inducing the required atmospheric acoustic pulses. It is then advantageous to employ as the source of the waves an acoustic monopole, since for these the acoustic pressure does not fall off as fast with increasing distance as for dipoles. Moreover, at the very low frequencies involved, acoustic pressure shorting across a conventional loudspeaker baffle is very severe. A sealed loudspeaker mounted in an airtight box eliminates this pressure shorting, and radiates acoustic waves with a relatively large monopole component.

An acoustic monopole may also be produced by having a source of pressurized gas vent through an orifice into the atmosphere in a pulsed fashion. The gas may be air. Alternatively, one may have a source of low-pressure air inhale atmospheric air through an orifice in pulsed fashion. These actions are easily achieved by an oscillating or rotating valve. For purposes of discussion it is convenient to introduce the concept of gaseous flux through the orifice, defined as the integral of the normal flow velocity component over an imagined surface that tightly caps the orifice, the normal component being perpendicular to the local surface element, and reckoned positive if the flow is directed into the ambient atmosphere. The gaseous

flux has the dimension of m.sup.3 /s. For the case with a source of pressurized gas, the gaseous flux is positive and due to gas venting to the atmosphere. For the case with a source of vacuum, the gaseous flux is negative and due to atmospheric air entering the orifice. The strength of the acoustic monopole is expressed as the amplitude of the gaseous flux fluctuation, amplitude being defined as half the peak-to-peak variation. The concept of gaseous flux allows a unified discussion of venting acoustic monopoles that use a source of pressurized gas or a source of vacuum, or both.

The source of pressurized air could be a cylinder with pressurized gas, such as a CO.sub.2 cartridge. For personal use, such a cartridge may last a long time because only very small acoustic monopole strengths are needed for the induction of the required weak acoustic signals. For long term and long range operation, the exhaust port of an air pump may serve as a source of pressurized air, and the intake port could be used as a source of vacuum.

A simple venting acoustic monopole is shown in FIG. 12, where the source 63 of pressurized gas, which may be air, is connected to a conduit 69 which has an orifice 65 that is open to the atmosphere. A rotating valve 66 labelled "VALVE" controls the gaseous flux through the orifice. The valve is rotated by a stepper motor 67 labelled "MOTOR", driven by voltage pulses from the generator 68 labelled "GENERATOR". The motor speed is determined by the frequency of the voltage pulses. This frequency can be selected by the tuner 70, which therefore controls the frequency of the acoustic pulses emited by the orifice 65. For the simple orifice shown, boundary layer separation may occur in the outflow, so that the air pulses emerge in the form of jets. This causes dipole and higher multipole components in the radiated acoustic field. If desired, such radiation components can be avoided or diminished by placing a spherically or dome shaped fine mesh screen over the orifice 65. Instead of holding pressurized gas, the source 63 may hold a vacuum. In either case, the pulsing of the gaseous flux causes radiation of monopole-type acoustic waves. The source 63 may be replenished by a pump.

Push-pull operation can be achieved in the manner shown in FIG. 3. An air pump 20, labelled "PUMP", with flow ports 64, pressurizes the pressure vessel 21 while drawing a vacuum in the vacuum vessel 22. A valve 23 is operated by the solenoid 24 such as to alternately admit high and low pressure air to the conduit 26. The latter vents to the atmosphere through a screen 55 placed across an orifice 27 that is open to the atmosphere. The valve is controlled by an oscillator consisting of the solenoid 24, which is connected to the pulse generator 6, labelled "GENERATOR". The frequency of the electric current pulses through the solenoid is determined by the setting of the tuning control 9. This frequency is to be tuned to the resonance frequency of the sensory resonance that is to be excited. The tuning may be done manually by a user. The conduit 26 is structured as a diffuser in order to avoid boundary layer separation during the exhaust phase; the screen across the orifice 27 inhibits formation of a jet, thereby providing more nearly for a monopole type acoustic wave. During the intake phase the orifice acts as a sink; streamlines 28 of the resulting flow are illustrated. The vessels 21 and 22 smooth the flow fluctuations through the orifice that are due to the flow fluctuations through the pump; they are drawn at a relatively small scale for compactness sake. Instead of the oscillating valve 23, a rotating valve may be used, driven by a stepper motor powered by voltage pulses from a generator.

Conventional loudspeakers may be used as well as the source of acoustic radiation. An example is shown in FIG. 4, where the piezoelectric transducer 37 is driven by a simple battery-powered pulse generator built around two RC timers 30 and 31. Timer 30 (Intersil ICM7555, for instance) is hooked up for astable operation; it produces a square wave voltage with a frequency determined by capacitor 33 and the potentiometer 32, which serves as a tuner that may be operated by a user. The square wave voltage at output 34 drives the LED 35, and appears at one of the output terminals 36, after voltage division by potentiometer 71. The other output is connected to the negative supply. The output terminals 36 are connected to the piezoelectric speaker. Automatic shutoff of the voltage that powers the timer 30 at point 38 is provided by a second timer 31, hooked up for monostable operation. Shutoff occurs after a time interval determined by resistor 39 and capacitor 40. Timer 31 is powered by a 9 Volt battery 41, via a switch 42. Optional rounding of the square wave is done by an RC circuit consisting of a resistor 43 and capacitor 44. An optional airtight enclosure 29 may be used for the speaker 37, in order to enhance the monopole component of the radiated acoustic signal. Instead of a piezoelectric speaker one may use an electromagnetic loudspeaker with a voice coil. Because of the low impedance of the voice coil, a resistor

must then be included in the output circuitry in order to keep the output currents to low values such as to allow battery powering of the device. Small voice coil currents are sufficient for the low acoustic powers required.

Low pulse frequencies can be monitored with the LED 35 of FIG. 3. The LED blinks on and off with the square wave, and it doubles as a power indicator. The pulse frequency can be determined by reading a clock and counting the LED light pulses. For higher frequencies a monitoring LED can still be used, if it is driven by a signal obtained by frequency division of the generator signal.

The automatic shutoff described above is an example for automatic control of the generated voltage; more sophisticated forms of control involve automatic frequency sequences. A computer that runs a simple timing program can be used for the generation of all sorts of square waves that can be made available at a computer port. An economic and compact version of such arrangement is provided by the Basic Stamp manufactured by Parallax Inc, Rocklin, Calif., which has an onboard EEPROM that can be programmed for the automatic control of the generated pulses, such as to provide desired on/off times, frequency schedules, or chaotic waves. The square waves can be rounded by RC circuits, and further smoothed by integration and filtering.

A compact packaging of the device such as shown of FIG. 4 is depicted in FIG. 5 where all circuit parts and the speaker, piezoelectric or voice-coil type, are contained in a small casing 62. Shown are the speaker 37, labelled "SPEAKER", driven by the generator 6, labeled "GENERATOR", with tuning control 9, LED 35, battery 41, and power switch 42. The LED doubles as a mark for the tuning control dial. With the circuit of FIG. 4, the device draws so little current that it can be used for several months as a sleeping aid, with a single 9 Volt battery.

For the purpose of thwarting habituation to the stimulation, irregular features may be introduced in the pulse train, such as small short-term variations of frequency of a chaotic or stochastic nature. Such chaotic or stochastic acoustic pulses can cause excitation of a sensory resonance, provided that the average pulse frequency is close to the appropriate sensory resonance frequency. A chaotic square wave can be generated simply by cross coupling of two timers. FIG. 6 shows such a hookup, where timers 72 and 73, each labeled "TIMER", have their output pins 74 and 75 connected crosswise to each other's control voltage pins 76 and 77, via resistors 78 and 79. The control voltage pins 76 and 75 have capacitors 80 and 81 to ground. If the timers are hooked up for astable operation with slightly different frequencies, and appropriate values are chosen for the coupling resistors and capacitors, the output of either timer is a chaotic square wave with an oval attractor. Example circuit parameters are: R.sub.78 =440K.OMEGA., R.sub.79 =700K.OMEGA., C.sub.80 =4.7 .mu.F, C.sub.81 =4.7 .mu.F, with (RC).sub.72 =0.83 s and (RC).sub.73 =1.1 s. For these parameters, the output 74 of timer 72 is a chaotic square wave with a power spectrum that has large peaks at 0.46 Hz and 0.59 Hz. The resulting chaotic wave is suitable for the excitation of the 1/2 Hz resonance.

A complex wave may be used for the joint excitation of two different sensory resonances. A simple generator of a complex wave, suitable for the joint excitation of the 1/2 Hz autonomic resonance and the 2.5 Hz cortical resonance, is shown in FIG. 7. Timers 82 and 83 are arranged to produce square waves of frequencies f.sub.1 and f.sub.2 respectively, where f.sub.1 is near 2.5 Hz, and f.sub.2 is near 1/2 Hz. The outputs 84 and 85 of the timers are connected to the inputs of an AND gate 86. The output 87 of the AND gate features a square wave of frequency f.sub.1, amplitude modulated by a square wave of frequency f.sub.2, as indicated by the pulse train 88.

The very low frequency waves needed for the acoustic stimulation of the vestibular nerve may also be provided by a sound system in which weak subaudio pulses are added to audible audio program material. This may be done in the customary manner way of adding the currents from these signals at the inverting input of an operational amplifier. The amplitude of the pulses is chosen such that the strength of the resulting acoustic pulses lies in the effective intensity window. Experiments in our laboratory have shown that the presence of audible signals, such as music or speech, does not interfere with the excitation of sensory resonances.

The invention can also be implemented as a sound tape or CD ROM which contains audible audio program

material together with subliminal subaudio signals. The recording can be done by mixing the audio and subaudio signals in the usual manner. In choosing the subaudio signal level, one must compensate for the poor frequency response of the recorder and the electronics, at the ultra low subaudio frequencies used.

The pathological oscillatory neural activity involved in epileptic seizures and Parkinson's disease is influenced by the chemical milieu of the neural circuitry involved. Since the excitation of a sensory resonance may cause a shift in chemical milieu, the pathological oscillatory activity may be influenced by the resonance. Therefore, the acoustic excitation discussed may be useful for control and perhaps treatment of tremors and seizures. Frequent use of such control may afford a treatment of the disorders by virtue of facilitation and classical conditioning.

In this as well as in the detuning method discussed before, an epileptic patient can switch on the acoustic stimulation upon sensing a seizure precursor.

Since the autonomic nervous system is influenced by the 1/2 sensory resonance, the acoustic excitation of the resonance may be used for the control and perhaps the treatment of anxiety disorders.

The invention can be embodied as a nonlethal weapon that remotely induces disorientation and other discomfort in targeted subjects. Large acoustic power can be obtained easily with acoustic monopoles of the type depicted in FIG. 3 or FIG. 12. If considerable distance needs to be maintained to the subject, as in a law enforcement standoff situation illustrated in FIG. 8, several monopoles can be used, and it then may become important to have phase differences between the acoustic signals of the individual monopoles arranged in such a manner as to maximize the amplitude of the resultant acoustic signal at the location 52 of the subject. Shown are four squad cars 53, each equiped with an acoustic monopole capable of generating atmospheric pulses of a frequency appropriate for the excitation of sensory resonances. The relative phases of the emitted pulses are arranged such as to compensate for differences of acoustic path lengths 54, such that the pulses arrive at the subject location 52 with substantially the same phase, resulting in constructive interference of the local acoustic waves. Such arrangement can be achieved easily by using radio signals between the monopole units, with the target distances either dialed in manually or measured automatically with a range finder. The subaudio acoustic signals can easily penetrate into a house through an open window, a chimney, or a crack under a closed door.

Some of our experiments on acoustic excitation of sensory resonances which provide a basis for the present invention will be discussed presently. Of all the responses to the excitation of the 1/2 Hz resonance, ptosis of the eyelids stands out for distinctness, ease of detection, and sensitivity. When voluntary control of the eyelids is relinquished, the eyelid position is determined by the relative activities of the sympathetic and parasympathetic nervous systems. There are two ways in which ptosis can be used as an indicator that the autonomic system is being affected. In the first, the subject simply relaxes the control over the eyelids, and makes no effort to correct for any drooping. The more sensitive second method requires the subject to first close the eyes about half way. While holding this eyelid position, the eye are rolled upward, while giving up voluntary control of the eyelids. With the eyeballs turned up, ptosis will decrease the amount of light admitted to the eyes, and with full ptosis the light is completely cut off. The second method is very sensitive because the pressure excerted on the eyeballs by partially closed eyelids increases parasympathetic activity. As a result, the eyelid position becomes somewhat labile, exhibiting a slight flutter. The labile state is sensitive to small shifts in the activities of the sympathetic and parasympathetic systems. The method works best when the subject is lying flat on the back and is facing a moderately lit blank wall of light color.

The frequency at which ptosis is at a maximum is called the ptosis frequency. This frequency depends somewhat on the state of the nervous and endocrine systems, and it initially undergoes a downward drift, rapid at first and slowing over time. The ptosis frequency can be followed in its downward drift by manual frequency tracking aimed at keeping ptosis at a maximum. At a fixed frequency, the early ptosis can be maintained in approximately steady state by turning the acoustic stimulation off as soon as the ptosis starts to decrease, after which the ptosis goes through an increase followed by a decline. The acoustic stimulation is turned back on as soon as the decline is perceived, and the cycle is repeated.

At fixed frequencies near 1/2 Hz, the ptosis cycles slowly up and down with a period ranging upward from about 3 minutes, depending on the precise acoustic frequency used. The temporal behavior of the ptosis frequency is found to depend on the acoustic pulse intensity; the drift and cycle amplitude are smaller near the low end of the effective intensity window. This suggests that the drift and the cycling of the ptosis frequency is due to chemical modulation, wherein the chemical milieu of the neural circuits involved affects the resonance frequency of these circuits, while the milieu itself is influenced by the resonance in delayed fashion. Pertinent concentrations are affected by production, diffusion, and reuptake of the substances involved. Because of the rather long characteristic time of the ptosis frequency shift, as shown for instance by the cycle period lasting 3 minutes or longer, it is suspected that diffusion plays a rate-controlling role in the process.

The resonance frequencies for the different components of the 1/2 Hz sensory resonance have been measured, using acoustic sine waves with a sound pressure of 2.times.10.sup.-9 N/m.sup.2 at the subject's left ear. Ptosis reached a steady state at a frequency of 0.545 Hz. Sexual excitement occurred at two frequencies, 0.530 Hz and 0.597 Hz, respectively below and above the steady-state ptosis frequency. For frequencies of 0.480 Hz and 0.527 Hz the subject fell asleep, whereas tenseness was experienced in the range from 0.600 to 0.617 Hz.

The resonance near 2.5 Hz may be detected as a pronounced increase in the time needed to silently count backward from 100 to 70, with the eyes closed. The counting is done with the "silent voice" which involves motor activation of the larynx appropriate to the numbers to be uttered, but without passage of air or movement of mouth muscles. The motor activation causes a feedback in the form of a visceral stress sensation in the larynx. Counting with the silent voice is different from merely thinking of the numbers, which does not produce a stress sensation, and is not a sensitive detector of the resonant state. The larynx stress feedback constitutes a visceral input into the brain and may thus influence the amplitude of the resonance. This unwanted influence is kept to a minimum by using the count sparingly in experiment runs. Since counting is a cortical process, the 2.5 Hz resonance is called a cortical sensory resonance, in distinction with the autonomic resonance that occurs near 1/2 Hz. In addition to affecting the silent counting, the 2.5 Hz resonance is expected to influence other cortical processes as well. It has also been found to have a sleep inducing effect. Very long exposures cause dizziness and disorientation. The frequency of 2.5 Hz raises concerns about kindling of epileptic seizures; therefore, the general public should not use the 2.5 Hz resonance unless this concern has been laid to rest through further experiments.

The sensitivity and numerical nature of the silent count makes it a very suitable detector of the 2.5 Hz sensory resonance. It therefore has been used for experiments of frequency response and effective intensity window. In these experiments, rounded square wave acoustic pulses were produced with a frequency that was slowly diminished by computer, and the subject's 100-70 counting time was recorded for certain frequencies. The acoustic transducer was a small loudspeaker mounted in a sealed cabinet such as to provide acoustic monopole radiation. At fixed frequency, the acoustic monopole strenght in m.sup.3 /s varies linearly with the voice coil current, with a constant of proportionality that can be calculated from measured speaker dome excursions for given currents. The sound pressure level at the entrance of the subject's nearest external ear canal can be expressed in terms of the acoustic monopole strength and the distance from the loudspeaker. For each experiment run, the sound pressure level at the entrance of the subject's external ear canal can thus be calculated from the measured amplitude of the voice coil current and the pulse frequency. Since for the subaudio frequencies the distance from the acoustic radiator to the subject's ear is much smaller than the wavelength of the sound, the near-field approximation was used in this calculation. The sound pressure level was expressed in dB relative to the reference sound pressure of 2.times.10.sup.-5 N/m.sup.2. This reference pressure is traditionally used in the context of human hearing, and it represents about the normal minimum human hearing threshold at 1.8 KHz.

FIG. 9 shows the result of experiment runs at sound pressure levels of -67, -61, -55, and -49 dB. Plotted are the subject's 100-70 counting time versus pulse frequency in a narrow range near 2.5 Hz. Resonance is evident from the sharp peak 57 in the graph for the sound pressure level of -61 dB. The graphs also reveal the effective intensity window for the stimulation, as can be seen by comparing the magnitude of the peaks for the different sound pressure levels. For increasing intensity, the magnitude of the peak first increases but then decreases, and no significant peak shows up in the graph for the largest sound pressure of -49 dB;

this can be seen better from the insert 58, which shows the graphs for -67 and -49 dB in a magnified scale. It follows that the effective intensity window extends approximately from -73 to -49 dB, in terms of the sound pressure level at the entrance of the subject's external ear canal.

The physiological response to the 2.5 Hz acoustic stimulation can be avoided by wearing earplugs. FIG. 10 is a plot of the 100-70 counting time versus acoustic pulse frequency, with and without earplugs. The sound pressure level at the entrance of the subject's external ear canal was -6 dB for both runs. Without earplugs the counting time has the peak 59, but no significant peak is seen in graph 60 for the run in which the subject used earplugs. Two conclusions can be reached from these results. First, in the experiments the 2.5 Hz resonance is essentially excited acoustically rather than through the magnetic field induced by the voice coil currents in the loudspeaker. Second, it follows that the exciting sound essentially propagates via the external ear canal, instead of through the skin and bones in the area of the ears, or via cutaneous mechanoreceptors in the skin at large.

To answer the question whether the acoustic excitation of the 2.5 Hz sensory resonance occurs perhaps through the cochlear nerve, one needs to consider the human auditory threshold curve such as shown, for instance, by Thomson (1967). The curve has a minimum near 1.8 KHz where the threshold sound pressure level is 0 dB, by definition. At 10 Hz the threshold is 105 dB. Hence, the pronounced acoustic excitation of the sensory resonance shown in FIG. 9 for a sound pressure level of -61 dB is 166 dB below the auditory threshold at 10 Hz. The excitation occurs near 2.5 Hz, and at that frequency, the auditory threshold is even higher than at 10 Hz. Although the curve in Thomson's book does not go below 10 Hz, linear extrapolation suggests the estimate of 135 dB for the threshold at 2.5 Hz, bringing the sound pressure level that is effective for acoustic excitation of the sensory resonance to 196 dB below the estimated threshold at the frequency near 2.5 Hz used. This result all but rules out excitation via the cochlear nerve.

Chemical modulation may be the cause for the small frequency difference for peaks 57 and 59 in FIGS. 9 and 10, for the sound pressure level of -61 dB; these peaks occur respectively at 2.516 and 2.553 Hz.

The physiological response to the excitation of the sensory resonances at a fixed stimulus frequency is not immediate but builds over time. An example is shown in FIG. 11, where the graph 61 depicts the measured 100-70 time plotted versus elapsed time, upon application of acoustic pulses of 2.558 Hz frequency and a sound pressure level of -61 dB. The graph shows that the response is initially delayed over about 5 minutes; thereafter it increases, and at about 22 minutes the slope is seen to decrease somewhat. Other experiments have shown a counting time that eventually settles on a plateau, or even starts on a decline. Chemical modulation and habituation could account for these features. The response curve depends strongly on initial conditions.

The method is expected to be effective also on certain animals, and applications to animal control are therefore envisioned. The nervous system of mammals is similar to that of humans, so that the sensory resonances are expected to exist, albeit with different frequencies. Accordingly, in the present invention subjects are mammals.

The described method and apparatus can be used beneficially by the general public and in clinical work. Unfortunately however, there is the possibility of mischievous use as well. For instance, with small modifications the method of FIG. 1 can be employed to imperceptibly modulate the air flow in air conditioning or heating systems that serve a home, office building, or embassy, for covert manipulation of the nervous systems of occupants.

The invention is not limited by the embodiments shown in the drawings and described in the specification, which are given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

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US 6,135,944 *- Method of Inducing Harmonious States of Being*

United States Patent ***6,135,944***
Bowman , et al. **October 24, 2000**

Method of inducing harmonious states of being

Abstract

A method of inducing harmonious states of being using vibrational stimuli, preferably sound, comprised of a multitude of frequencies expressing a specific pattern of relationship. Two base signals are modulated by a set of ratios to generate a plurality of harmonics. The harmonics are combined to form a "fractal" arrangement.

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Field of Search: 600/27,28,26

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Primary Examiner: Hindenburg; Max
Assistant Examiner: Szmal; Brian

Parent Case Text

CROSS-REFERENCE TO RELATED APPLICATION

This application under 37 CFR .sctn.119 claims priority from U.S. Provisional Patent application Ser. No. 60/065,851 filed Nov. 14, 1997

Claims

What is claimed is:

1. A method of generating a combined signal, comprising:

(a) selecting a first and a second base frequency, the first base frequency being different than the second base frequency;

(b) providing a multiplication array having at least two elements;

(c) multiplying the first and second base frequencies by each element of the multiplication array, thereby producing a plurality of respective first and second harmonic frequencies; and

(d) combining the plurality of first harmonic frequencies to produce a first original composite signal and combining the plurality of second harmonic frequencies to produce a second original composite signal.

2. The method defined in claim 1, further comprising:

(e) subjecting a human being to the first and second original composite signals.

3. The method defined in claim 2, wherein the first and second original composite signals are audio signals.

4. The method defined in claim 1, further comprising:

(e) selecting one of the plurality of first harmonic frequencies as a substitute first base frequency and selecting one of the plurality of second harmonic frequencies as a substitute second base frequency;

(f) repeating (c) and (d) using the substitute first and substitute second base frequencies, respectively, in place of the first and second base frequencies, thereby producing, respectively, a first and a second additional composite signal.

5. The method defined in claim 4, wherein the first and second original composite signals are not generated while the first and second additional composite signals are generated.

6. The method defined in claim 4, wherein the first and second additional composite signals are generated at least part of the time that the first and second original composite signals are generated.

7. The method defined in claim 6, further comprising:

(g) subjecting a human being to the first and second original composite signals and the first and second additional composite signals.

8. The method defined in claim 7, wherein the first and second original composite signals and the first and second additional composite signals are audio signals.

9. The method defined in claim 8, wherein the difference between the first base frequency and the second base frequency is 7.85 Hz.

10. A recording, comprising a playback medium storing at least first and second tracks of data representing, respectively, first and second composite signals, wherein:

(a) the first and second composite signals comprise, respectively, a combination of a first and a second plurality of harmonic frequenceies;

(b) each of the first and second plurality of harmonic frequencies is a product of a respective first and second base frequency and a ratio of positive integers; and

(c) the first base frequency is unequal to the second base frequency.

11. The recording defined in claim 10, wherein the first and second composite signals are audio signals.

12. The recording defined in claim 11, wherein the first base frequency differs from the second base frequency by 7.85 Hz.

13. A harmonic fractal matrix of frequencies, comprising a first and a second column of elements, wherein:

(a) both columns contain an equal number of elements;

(b) each element represents a frequency;

(c) each element of the first column is a product of a first base frequency and an element of a multiplication array;

(d) each element of the second column is a product of a second base frequency and an element of the multiplication array; and

(e) the first base frequency is unequal to the second base frequency.

14. The harmonic fractal matrix defined in claim 13, wherein each element of the multiplication array is a ratio of two positive integers.

15. The harmonic fractal matrix defined in claim 14, wherein the first base frequency differs from the second base frequency by 7.85 Hz.

Description

FIELD OF THE INVENTION

This invention relates to applying stimuli to a human being to induce an altered state of consciousness.

BACKGROUND OF THE INVENTION

Throughout the ages music has demonstrated the ability for sound to influence an individual's state of being. Musicians have intuitively produced compositions that elicit a wide range of emotional response. The science of psychoacoustics explores the processes underlying this phenomena. The psychoacoustic theory of the present invention incorporates a scientific method of influencing an individual's state of being through sound.

Several methods for using sound to induce altered states of being have previously been explored. Most of these efforts have dealt with techniques that incorporate measured physiological data, primarily Electroencephalograph (EEG) signals, into a stimulus to be introduced to the body. Encoding EEG frequency information into an audio stimulus to induce specific brain wave frequencies is a technique commonly found. Typically, these techniques employ a single frequency or a plurality of frequencies that are varied over time to linearly guide the brain waves to a desired frequency of vibration. Several known techniques for inducing altered states using vibrational stimuli based upon EEG brain wave information are shown, for example, in the following U.S. patents:

4,834,701	5,135,468	
		5,356,368
4,883,067	5,213,562	
5,036,858	5,289,438	

SUMMARY OF THE INVENTION

The present invention provides a method of inducing harmonious states of being through the application of vibrational stimuli, preferably sound. The stimuli are comprised of a pattern of waveforms that express what we call a "fractal" arrangement in their frequency relationships. FIG. 1 exemplifies such a fractal arrangement of harmonic frequencies. This arrangement is organized in matrix form and thus is referred to as a "harmonic fractal matrix". The ratio of 3 Hz to 5 Hz is in the same proportion as 30 Hz to 50 Hz and 300 Hz to 500 Hz. Each of these frequency pairs are said to be "fractally equivalent" to every other as they express the same proportion through varying levels of magnitude.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described in greater detail hereinafter by reference to the accompanying drawings, wherein:

FIG. 1 illustrates a fractal frequency arrangement expressing the structured pattern of harmonic relationship of the harmonic fractal matrix according to the invention;

FIG. 2 graphically illustrates the process of multiplying carrier frequency 1 70 and carrier signal frequency 1' 80 by modulation array 90 and combining the resulting signals into the structured pattern of harmonic relationship expressed as the harmonic fractal matrix 100 of the invention;

FIGS. 3A-3B show a detailed example of the modulation array and harmonic fractal matrix of FIG. 2 according to the invention;

FIG. 4 illustrates the process by which a plurality of harmonic fractal matrices are created according to the invention; and

FIG. 5 illustrates an example of a multi-tiered pyramid arrangement outlining a template for combining and sequencing multiple harmonic fractal matrices according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The application of vibrational stimuli comprised of harmonic relationships arranged to form specific patterns has been extensively investigated by the present inventors. As a result of that investigation, it was determined that stimuli comprised of harmonic frequencies arranged to express fractal relationships brought about profound changes in conscious perception, as well as psychological and physiological states of being. The method, according to a preferred embodiment of the present invention, derives from this discovery the fractal arrangement of frequency harmonics referred to as the "harmonic fractal matrix". FIG. 2 graphically illustrates the process by which the harmonic fractal matrix is generated. A base frequency 1 70 and a base frequency 1' 80 are operated upon by a multiplication array 90. The resulting harmonic frequencies produce the harmonic fractal matrix 100 as shown.

The detailed example below outlines each of the formulaic steps to create the harmonic fractal matrix using audio signals.

First, two audio base signals having frequencies f.sub.C1, and f.sub.C1', are chosen such that the frequencies are separated by a non-zero value. An example of two such frequencies is given below.

Base Signal 1	Base Signal 1'
f.sub.Cl = 144 Hz	f.sub.C1 ' = 151.85 Hz

The separation frequency, .DELTA..function..sub.C1, of 7.85 Hz used in this example is derived from the following equation.

.DELTA..function..sub.C =3.phi..sup.2 =7.85

Where .phi. is the mathematical "golden mean" (1.618), a ratio commonly found in nature and in esthetically pleasing Western works of art. Choosing a separation frequency based upon the golden mean has been found to produce beneficial results.

Second, a set of ratios of whole numbers is selected to comprise the elements of a multiplication array. These ratios are of the form expressed in the following equation. ##EQU1## where: R=ratio;

i and j=positive integer values;

n=harmonic number counter (1,2,3, . . . N); and

N=total number of harmonics.

FIG. 3A shows an example of a quintessential (N=5) multiplication array comprised of ratios.
Third, the frequency of each base signal is multiplied by the multiplication array to produce a plurality of harmonic signals. FIG. 3B shows the result of applying the multiplication array of FIG. 3A to the base signal frequencies. As shown, the ratio that stands between the harmonic frequencies remains constant as the absolute frequency values are changed. This produces harmonics that relate to each other in a "fractally equivalent" nature. Thus the simultaneous application of base frequency 1 harmonics and base frequency 1' harmonics produces N simultaneous levels of fractally equivalent frequency relationships establishing the harmonic fractal matrix of FIG. 3B.

Another desired characteristic of this process is to apply the multiplication array as a dividing principle to the amplitudes of the base signals. The amplitudes of the harmonic signals are thus inversely related to their frequencies. In other words, the amplitude of a harmonic signal is decreased in the same proportion as its frequency is increased and vice versa.

Finally, the signals of the harmonic fractal matrix are combined for application to the human body. Base frequency 1 harmonics are combined to produce composite signal C1 while base frequency 1' harmonics are combined to create composite signal C1' as shown in the equations below. ##EQU2##

The composite signals, C1 and C1', may be applied monaurally and/or binaurally to the ears to create varying effects. The aforementioned steps are preferably repeated a multitude of times to produce a plurality of harmonic fractal matrices. Each matrix is created using the same ratios applied to new and different base signal frequencies chosen from the original set of harmonic frequencies. FIG. 4 shows an example of creating two additional fractal matrices in which the original base frequencies are replaced by level 3 and level 5 harmonic frequencies.

The composite signals of the harmonic fractal matrices may be applied simultaneously or preferably in stages to provide a gradual introduction of the stimulus to the body. FIG. 5 shows an example of a gradual introduction wherein the composite signals have been sequenced and mixed into two separate tracks. Here, the composite signals of a single matrix are initially applied, followed by the introduction of composite signals of additional matrices combined and sequentially arranged in time according to a multi-tiered pyramid arrangement. Tier 1 has C1 applied to track 1 while C1' is simultaneously applied to track 2. Tier 2 incorporates a mix of C1 and C2 to track 1 with a mix of C1' and C2' applied to track 2. Tier 3 includes a mix of C1, C2, and C3 to track 1 with a mix of C1', C2', and C3' applied to track 2. The duration of each tier is typically in the range of two to ten minutes, though shorter or longer durations may be used.

The multi-tiered pyramid arrangement is preferably introduced to the body by means of stereo audio signals applied to the ears. In one application, track 1 and track 2 are separately applied to the left and right channels, respectively. In another application, track 1 and track 2 are applied in a mix to both left and right channels in direct or inverse proportion to one of the whole number ratios.

The original base signals may be of a continuous or discontinuous nature. In a first embodiment continuous signals alone are used. In a second embodiment pulsated signals alone are utilized. In a third embodiment both continuous and pulsated signals are simultaneously utilized wherein the frequencies of the pulsated signals are either the same as, or are a whole number multiple of, the frequencies of the continuous signals. In this third embodiment, the continuous and discontinuous aspects are simultaneously applied to create an audible experience of a smooth melodic backdrop accompanied by the sounding of periodic pulses.

The method of the present invention has applications in a number of different areas. The induction of a natural state of harmony is marked by a reduction in muscle tension, reduced stress and anxiety, and an overall sense of well being. Variations in the base frequencies and ratios selected provide other desirable states including relief of mental tension and fatigue; induction of meditative states; heightened focus and concentration; enhanced dream activity and recall; and sleep induction. Other areas of application include aiding individuals with Attention Deficit Disorder (ADD) to remain calm and focused. The present invention further provides a method to positively influence the human body through non-intrusive, non-chemical, and inexpensive means, such as audio stimuli recorded on a cassette, which can be utilized at the discretion of the user.

The principles and preferred embodiments of the present invention have been described in the foregoing specification. The invention should not, however, be construed as limited to the particular forms described, or the particular examples given, as those are to be considered exemplary in nature and regarded as illustrative rather than restrictive. Variations and changes may be made by those skilled in the art without departing from the scope and pioneering spirit of the invention. Consequently, the invention should be considered as limited only by the scope of the appended claims.

Studies in Intelligence

CIA Study: Bible Lesson on Spying

***by* John M. Cardwell, 1978**

This CIA study, "A Bible Lesson on Spying," appeared in the Winter 1978 issue of the agency's classified spy journal, *Studies in Intelligence*. The study reviews the ethical and strategic lessons of spy missions ordered by Moses and Joshua to scope out the "Promised Land."

A BIBLE LESSON ON SPYING

For the past few years the Central Intelligence Agency has come under considerable scrutiny. Major issues have been raised regarding oversight and control, the intent being to insure accountability and legality. With the advent of the Carter administration, the issue of morality has also become a major concern. Today the CIA and the nation are confronted by a perplexing situation: how can we engage in secret operations with oversight of these operations lying essentially in the public domain (Congress) and conduct inherently insidious spying activities that also must also conform to traditional non-spying standards of ethical conduct nd morality.

In an effort to seek some solutions to these problems, it is natural that we should explore historical precedents to determine what lessons and insights the past might offer. One rich source of information that should not be overlooked in the Holy Bible. The purpose therefore of this discussion is to explore the issue of spying as it occurs in the Bible and examine the lessons it might offer. Perhaps new perspectives can be found that will offer guidance regarding how "...one Nation, under God..." should go about the business of spying.

The subject of spying appears in numerous places throughout the Old and New Testament.(1) Spies were used by the Israelites against their adversaries, and on occasion various factions within the tribes of Israel used spies against each other. In the New Testament, spies were used by the political forces opposed to the emerging Christian movement and by members of the early Christian church to protect itself. There are many additional incidents in which individuals clearly engaged in espionage activities but are not normally referenced using those terms. For example, Judas could be described as having been a secret agent for the Sanhedrin because of his role in the betrayal of Jesus.

Spying as an activity is not treated as an issue in either the Old or the New Testaments and is discussed or mentioned only as an event worth reporting. As a consequence, the lessons to be learned from examining the scriptures must be inferred in the context of narrative experiences. Guidance to be derived from the study of biblical spying events is therefore subjective and dependent upon the approach and depth from which inferences are drawn. In this discussion, however, the objective has been to emphasize the facts and keep interpretations to a minimum.

The earliest mention of spying in the Old Testament occurs in the story of Joseph.(2) After Joseph had been sold by his brothers into bondage and had later maneuvered himself into a position of influence in the Egyptian government, his brothers came to Egypt to buy food during a famine. They were brought before Joseph but did not recognize him. Joseph, however, did recognize them, and in an effort to hide his recognition, accused him of coming to Egypt not to buy food but to spy. Evidently spying was an established fact of life, well familiar to Joseph.

There are only two spying incidents in the Bible in which methods and sources are discussed in any detail, and both occur in the Old Testament. The first incident occurred under the direction of Moses shortly after he led the Israelites out of Egypt.(3) They had camped in the wilderness of Paran near the boundary of the Promised Land, and Moses used spies to determine what the Promised Land was like. The second occurred

approximately 40 years later under the direction of Joshua.(4) At that time, the Israelites had completed their sojourn in the desert and were again about to enter the Promised Land. There is a remarkable contrast not only in terms of methods and sources used by these two outstanding biblical leaders, but also in the different administrative procedures governing these two operations and the kinds of people involved. From an analysis of these two operations, biblical experience and perspectives with respect to spying are revealed.(5)

The children of Israel were divided into 12 tribes, or family groups, each tribe having its own leaders and hierarchy. The society was predominately patriarchal in nature with the leader of each tribe acting as a kind of benevolent dictator or governor over his group. In him was vested the responsibility for providing administrative, legal, military, social, economic, and religious guidance and leadership. Moses was the overall leader and spokesman of the tribes but he exercised final authority only upon the consensus of the people and the leaders of the 12 tribes. Forty years later Joshua occupied roughly the same position as Moses. Both men, therefore, were not absolute rulers of the tribes of Israel. The people could, and occasionally did, reject their leadership.

Moses conducted the earliest spying operations recorded in the Bible. As previously mentioned, the purpose of this operation was to "spy out" Canaan.(6) He chose 12 prominent individuals, one from each of the 12 tribes, to be his spies and instructed them to go to the Promised Land and learn what the land was like. To provide proof that indeed it was a "land flowing with milk and honey," he instructed his spies to return with samples of fruit. These spies spent 40 days in the Promised Land, returned as instructed with information regarding the cities and the population, and delivered samples of fruit. Upon their return, they reported their findings publicly to Moses and the 12 tribes. They brought back a uniform opinion regarding the cities, number of people, lay of the land, and the fact that the countryside was indeed "flowing with milk and honey." Ten of the spies, however, reported that the people were so physically large and well organized that is an invasion was attempted, the Israelites would be destroyed. They advocated stoning the two spies who said that an invasion should be attempted.

Moses was distraught at the loss of confidence by the Israelites, especially after they had been safely delivered out of Egypt and had successfully crossed the Red Sea. Their attitude brought them dangerously close to losing their status as God's chosen people, but Moses argued successfully on their behalf. They were nevertheless severely punished for their failure. They were told that they would be required to remain in the wilderness one year for every day the spies spent in the Promised Land, that is, 40 years for the 40 days spent spying. They were furthermore told that everyone over the age of 20 would be denied entry into the Promised Land, and that the only exceptions would be the two spies who maintained their faith. Even Moses was told he would not enter the Promised Land, and he did not.(Deuteronomy 1:37) Thus the first spying operation discussed in the Bible ended in failure and had disastrous consequences for the population.

Forty years later the Israelites found themselves again preparing to enter the Promised Land, this time under the leadership of Joshua.(Joshua 1:1-2) Joshua was, by the way, one of the two surviving spies who had participated in the operation conducted under Moses(Deuteronomy 1: 38). As before, there was a need to send spies into the Promised Land to get intelligence to support the invasion. Joshua, however, went about things quite differently. He chose two young men whose names are not recorded and instructed them to reconnoiter the city of Jericho.(10) The spies went to Jericho and visited a harlot named Rahab. Although the presence of the spies was reported to the local authorities, Rahab hid the spies and kept them from being captured. She told the two spies that the people had been expecting an Israelite invasion for some time. She reported that -- despite the fact that the city was well fortified and the army well trained -- the people were frightened of the Israelites and had lost the courage to stand up to them. The escape of the Israelites from the Egyptians, their successful crossing of the Red Sea, the subsequent destruction of Pharaoh and his armies, and their exploits during their 40 years of wandering in the desert were well known to the people and had convinced them of the Israelites' superiority. Rahab likewise was convinced that the city would fall and made an agreement with the spies that she would help them leave the city and not reveal what she had told them if in return they would spare her and her family during the attack. The spies agreed and with Rahab's help they successfully escaped capture and eventually made their way back to their own people. The spies reported to Joshua everything that had happened, especially the information given to them by the harlot regarding the fear of the people.

Using this information, Joshua made plans for the invasion and reported his plan to the 12 tribes. The plan was approved, the invasion proceeded, and the attack, capture, and subsequent destruction of the city of Jericho was successful.(Joshua 3, 4, 5, and 6:1-21) Rahab and her family were, as agreed, spared by Joshua during the battle of Jericho (Joshua 6:22-25).

The contrast between these two incidents is significant. Moses used 12 people, all amateurs, each with both political and military responsibilities in his own tribe. Each was a prominent individual who is named in the Bible. On the other hand, Joshua apparently used two professional (throughout they were referred to only as "spies") anonymous (their names are not given) people to conduct his mission. Moses' spies brought back reports only of the physical characteristics of the land, whereas Joshua's also reported the attitude of the people. The spies Moses sent made their report openly, and the discussion that followed was conducted in public. Joshua's spies, by contrast, reported only to Joshua, who then made the necessary decisions. Moses' spies, who also would have been principals in any military action to be taken, participated in the decision-making process. Joshua's spies neither had leadership responsibilities nor did they participate in the policy-making decision process. The consequences of these two operations are significantly different. Moses' operation, conducted by amateurs more or less in the public domain, resulted in a weakening of Moses' position of authority, led to a loss of the people's confidence in themselves, and precipitated an extended period of severe national punishment. Joshua's operation, conducted in private by professionals, led to an achievement of national destiny.

An implicit point is made regarding the procedures used during these two spying operations. It is not specifically stated, but one is left with the impression that the 12 spies sent by Moses more or less went about their business as tourists, and the report they brought back is typical of the kind of thing that a tourist would report. The information reported to Moses consisted both of facts and conclusions drawn by the spies. The negative report given by the majority of the spies, for example, reflected their perception regarding the consequences of military actions, which, if taken, they would be called upon to lead. The people agreed with the negative position, not because of facts reported, but because of the negative interpretation given these facts by individuals of prominence.

Joshua's spies, on the other hand, went in secret (although they were discovered) and visited a harlot who gave them valuable information regarding the attitude of her people. The spies did not interpret this information but simply reported to Joshua what they had been told. No moral judgment was made regarding the fact that Joshua's spies visited a harlot, nor is the information provided by her judged to be of questionable validity.

The relationship between Rahab and the spies was evidently amoral. No conditions of "conversion" were imposed in the recruitment, but merely an agreement for conspiratorial silence in exchange for a harlot's office. Joshua made no recorded comment or judgment regarding his spies' recruitment of or the agreement with the harlot. He did, however, honor the agreement, despite the fact that he had not given his prior approval and took no part in making it. After the Battle of Jericho, Rahab joined the Israelites and lived with them. No mention is made of whether or not she continued to practice here old profession. All references to her, in both the Old and New Testament, refer to her only as "Rahab the harlot."

If there is a lesson to be learned, it would appear that a strong case is made for the conduct of spying activities in secret by professionals, unencumbered by other political or military responsibilities, and that these professionals should report in secret to higher authority who would make policy decisions without debate. Spies should definitely not participate in the policy-decision-making process, nor should they take their cases to the public. When that occurs, although stoning is passé, the people are likely to throw figurative rocks at the wrong people for the wrong reasons.

It can be argued that the Moses operation suffered from complications that arose because of oversight and political issues. The selection of twelve spies, one from each of the twelve tribes, was probably motivated by political considerations, and the very specific instructions given by Moses to the spies were probably necessary in order to define the specific objectives and procedures in order to obtain approval from the twelve tribes. All the Israelites knew that the operation was to occur, who was going, and what they were to accomplish on the mission. When they returned, their report was likewise made in public, the results of which have been noted earlier. It is noteworthy that the spies successfully accomplished all mission objectives. The point at which the Moses operation actually failed can be traced to the negative comments made during the public "mission briefing." Taken overall, it can be argued that the negative report of the spies and the loss of control over the situation was actually stimulated because of too much oversight and the tightly controlled administrative procedures used. In summary, this episode is a classic example of an operation that was successful, but in which the "patient" died.

The contrasts offered by the Joshua operation are startling. Joshua certainly did not have an oversight problem, nor did he worry about defining a politically acceptable mission scenario. His spies were sent in secret, were given absolutely minimal instructions, "Go, view the land, especially Jericho," and reported back only to Joshua. The operational scenario could hardly have been predicted, and if it could, it is questionable that it would have been met with approval. Joshua handled all administrative matters alone, provided flexible and responsive support to his spies by keeping their bargain, and made the necessary judgments required to successfully lead his people to victory. From a purely administrative point of view, the Joshua mission was a nightmare; nevertheless, the operation can only be judged as an unqualified success.

This report, "Parapsychology in Intelligence: A Personal Review and Conclusions," appeared in the Winter 1977 issue of *Studies in Intelligence*, the CIA's classified internal publication. In it Dr. Kenneth A. Kress, a CIA paranormal expert, provides a historical overview of the agency's investigation and use of psychic spies. The report was released to the public in 1996.]

(1) All references cited in this article can be found in the *Holy Bible,* Revised Standard Version, Thomas Nelson and Sons, New York, 1959.
(2) Genesis 42:6-17
(3) Numbers 13-14
(4) Joshua 2
(5) Intelligence operations by Moses and Joshua have previously figured in "Decision Trees" by Dr. Edwin C. Sapp, *Studies XVIII/4,* and "Scientific and Technical Intelligence" by Robert M. Clark, *Studies XIX/1,* pp. 46-47.
(6) The complete story of the espionage mission can be found in Numbers 13 and Numbers 14:1-10. The consequences are described in Numbers 14:10-34.

FORENSIC APPLICATION OF HYPNOSIS

By Inspector Marx Howell, BS (Ret.)

The first attempted use of hypnosis in the Criminal Justice system dates back to the mid 1800's and the second documented effort was in 1894.

In Cornell v. Superior Court of San Diego County (May 1959) the attorney for a defendant charged with murder, petitioned the court to require the court and sheriff to allow his client to be examined by a hypnotist in preparing his defense.

The Chowchilla, California school children kidnapping on July 15, 1976 is the "catalyst case" which brought the use of hypnosis by law enforcement into the spotlight.

While there is controversy over the use of hypnosis with witnesses and victims to crime events, it is my opinion that its use can be effective in providing useful investigative leads under certain circumstances, and when proper guidelines and techniques are followed.

Hypnotically refreshed recall standing alone, without corroboration, is insufficient for an arrest or indictment.
When using hypnosis to refresh memory, you may get correct information, incorrect information, or a combination of both. For that reason corroboration is needed to support the reliability of information obtained through hypnosis.
Receiving incorrect information from a witness/victim is not a hypnosis issue because police officers using standard interview techniques get incorrect information from witnesses who may be confused and no hypnosis is involved.
There are basically four reasons where the use of hypnosis with a witness /victim has been thrown out of court . They are: 1) the person (police officer and/or mental health individual) was incompetent in the proper procedures of the Forensic application of hypnosis, 2) the use of hypnosis in a case where it was not warranted based on the circumstances, 3) the blatant use of unacceptable questioning techniques, and 4) the prosecution didn't put on rebuttal witnesses to the defense expert.

There were approximately 800+ law enforcement officers in Texas who had received training in the forensic application of hypnosis by 1986.

On October 1, 1986, as an officer of the Texas Association for Investigative Hypnosis (TAIH), I was fortunate to have had the opportunity to propose to the membership that the association support legislation establishing minimum training standards, testing, and certification for police officers who utilize hypnotic interviewing techniques with witnesses and victims of crime events. A rough draft copy of what subsequently became Senate Bill 929 was provided to each member for review and input. After the bill was introduced, several TAIH members testified before Senate committee hearings in support of this legislation.

Senate Bill 929 was passed by the 70th Session of the Texas Legislature and signed into law by the Governor to become effective January 1, 1988. The Texas Commission on Law Enforcement Officers Standards and Education (TCLEOSE) was charged with the implementation and administration of this act. TCLEOSE is the state agency responsible for licensing commissioned police officers in Texas. Language in the statute specifically addresses and is limited to police officers who use hypnosis for investigative purposes. This law does not impose restrictions on individuals who use hypnosis, for any purpose, in the private sector. Some of the key points related to Senate Bill 929 are:

Authorizes the Commission (TCLEOSE) to promulgate rules and regulations for the administration of this bill including the following.

Establishes minimum requirements for hypnosis education and training of police officers.

Requires a police officer to attend training and pass a commissioned administered examination prior to utilizing investigative hypnosis.

Authorizes proficiency certification of officers who complete a commission approved training program and pass the state-administered test.

Imposes a potential fine of up to $1,000 for a police chief, sheriff, or other law enforcement administrator who appoints an officer under his supervision to utilize investigative hypnosis without being certified by TCLEOSE.

During the first year following the effective date of this act approximately 100 officers had been certified to conduct this type of interview. There is approximately 300 police officers who are state certified to conduct Forensic hypnosis interviews.

Hypnotically refreshed recall is admissible in Texas in both criminal and civil cases. Texas is the only state in the USA which mandates, by statute, minimum training standards, testing, and certification of police officers who use investigative hypnosis. I believe that statutory-mandated requirements similar to these would reinforce the professional and ethical practice of hypnosis by the respective disciplines, as well as enhance the overall professionalism of the hypnosis community. Police practitioners and therapists should consider adopting a uniform guide to enhance the organization and effectiveness of the hypnosis interview process. The use of hypnosis by the law enforcement community has been professionalized through the establishment of minimum training standards, testing, and certification. Certification is mandated by state statute and administered by the TCLEOSE. Procedural safeguards as set forth by the Texas Court of Criminal Appeals have reinforced the professional and ethical practice of investigative hypnosis by police. I believe that the use of a methodical approach to the hypnotic interview will further enhance the professionalism of the hypnotist.

Hopefully this information will be helpful in providing ideas for self-imposed guidelines and/or agency policy. I would encourage every hypnotherapist to become familiar with the police use of hypnosis and mention this fact in speeches and presentations.

Conclusion Appendix

Conclusion - Appendix

Now why in the world would I list so many pages of extra resources? Simple, it all has to do with Mindcontrol Research and proves that this stuff really exists. When I say go look it up, I mean it.

So I don't bother with caring if you believe at first. That's why I'm listing a ton of stuff for your perusal. Research till you find what you need to believe. Let youself learn at your own pace.

I recommend the reading list below which contains additional patents, threads and leads to check out if you're interested in finding out more about the wonderful world of hypnosis. What's most important here is ***your*** conclusion and what ***you*** think all of this may mean. Yes, it's all about you.

US2304095 Method and apparatus for inducing and sustaining sleep
US3060795 Apparatus for producing visual stimulation
US3278676 Apparatus for producing visual and auditory stimulation
US3393279 Nervous System Excitation Device
US3568347 Psycho-Acoustic Projector
US3576185 Sleep inducing method and arrangement using modulated sound and light
US3612211 Method of producing locally occurring infrasound
US3629521 Hearing Systems
US3647970 Method and system for simplifying speech wave forms-Neurophone
US3712292 Method and apparatus for producing swept FM Audio signal patterns for inducing sleep
US3773049 Apparatus for treatment of neuropsychic & somatic diseases with heat light sound & VHF electromagnetic radiation
US3782006 Means & methods to assist people in building up aversion to undesirable habits
US3884218 Method of inducing and maintaining various stages of sleep in the human being
US3951134 Apparatus and method for remotely monitoring and altering brain waves
US3967616 Multi channel system for & multi factorial method of controlling the nervous system of a living organism
US4006291 Three dimensional television system
US4141344 Sound Recording System
US4227516 Apparatus for Electro-Physiological Stimulation
US4315501 Learning Relaxation Device
US4315502 Frequency Stimulation Device
US4335710 Device for the induction of specific brain wave patterns
US4388918 Mental Harmonization Process
US4395600 Auditory subliminal message system and method
US4572449 Method for Stimulating the falling asleep and/or relaxing behavior in a person
US4616261 Method and apparatus for generating subliminal visual messages
US4686605 Method and apparatus for altering a region in the earth's atmosphere, ionosphere, and/or magnetosphere
US4692118 Video Subconscious Display Attachment
US4699153 System for accessing verbal psycho-biological conditions of a subject
US4712155 Method and apparatus for creating an artificial electron cyclotron heating region of plasma
US4717343 Method of changing a person's behavior
US4734037 Message Screen (Subliminal)
US4777529 Auditory subliminal programming system
US4821326 Non-Audible Speech Generation Method & Apparatus
US4834701 Apparatus for inducing frequency reduction in brain wave

US4858612 Electromagnetic Interaction with biological system-ground wave emergency network 800mhz
US4877027 Hearing System (Microwave)
US4883067 Method and Apparatus for Translating EEG into Music
US4889526 Noninvasive Method and Apparatus for Modulating Brain Signals
US4940058 Cryogenic Remote Sensing Physiograph
US5017143 Method and apparatus for producing subliminal images
US5036858 Method and Apparatus for changing Brain Wave Frequency
US5123899 Method and system for altering consciousness
US5134484 Superimposing Method and Apparatus Useful for Subliminal Messages
US5135468 Method and Apparatus for varying the brain state of a person by means of an audio signal
US5151080 Method and apparatus for inducing and establishing a changed state of consciousness
US5159703 Silent subliminal presentation system
US5170381 Method for mixing audio subliminal recording
US5213562 Method of inducing mental, emotional and physical states of consciousness, including specific mental activity in human beings
US5218374 Power Beaming System with printer circuit radiating elements having resonating cavities
US5221962 Subliminal device having manual adjustment of perception level of subliminal correlates
US5224864 Method of recording and reproducing subliminal signals that are 180" out of phase
US5270800 Subliminal message generator
US3278676 Method and apparatus for cyclic scanning of images
US5289438 Method and System for Altering Consciousness
US5330414 Brain Wave Inducing Apparatus
US5352181 Method and recording for producing sounds and messages to achieve alpha and Theta brainwave states and positive emotional states in humans
US5356368 Method and Apparatus for Inducing Desired States of Consciousness
US5425699 Method of modifying human behavior using signal triggered post-hypnotic suggestion
US5450859 Protection of living systems from adverse effects of electric, magnetic and electromagnetic fields
US5507291 Method and Apparatus for Remotely Determining Information as to a Person's Emotional State
US5539705 Ultra Sonic Speech Translator and Communication System (DE-AC05-840R21400-Martin Marietta Energy Systems, Inc.
US5544665 Protection of living systems from adverse effects of electric, magnetic and electromagnetic fields (see US5450859)
US5551879 Dream State Teaching Machine
US5557199 Magnetic Resonance Monitor
US5562597 Method and Apparatus for Reducing Physiological Stress
US5577041 Method of Controlling a Personal Communication System
US5586967 Method and Recording for Producing Sounds & Messages to achieve Alpha and Beta Wave States
US5644363 Apparatus for superimposing visual subliminal instructional materials on a video signal
US5675103 Non-Lethal Tetanizing Weapon
US5729694 Speech Coding, Reconstruction and Recognition using Acoustics and Electromagnetic Waves
US5777476 Ground global tomography(CGT)using modulation of ionospheric electrojets
US5784124 Supraliminal Method of Education with particular application behavior modification
US5800481 Thermal excitation of sensory resonance's
US5823932 Apparatus and method for modifying human behavior by triggering positive and aversive post-hypnotic suggestions
US5830064 Apparatus and method for distinguishing events which collectively exceed chance expectations and thereby controlling an output
US5864517 Pulsed Combustion Acoustic Wave Generator
US5889870 Acoustic Heterodyne device and method
US5919679 Method and Apparatus for altering Ionic interactions with magnetic fields
US5935054 Magnetic Excitation of Sensory Resonances
US5954629 Brain wave inducing system
US5973999 Acoustic Cannon
US5997464 Magnetic coil for pulsed electromagnetic Field
US6011991 Communication System and Method Inducing Brain Wave Analysis and/or use of Brain Wave Activity
US6017302 Subliminal Acoustic Manipulation of Nervous Systems
US6024700 System and Method for Detecting Thought and Generating Control Instruction in Response Thereto
US6052336 Apparatus and method of broadcasting audible sound using ultrasonic sound as a carrier
US6067468 Apparatus for monitoring a person's psycho-physiological condition
US6081774 Electric Fringe Filed Generator for Manipulating Nervous Systems
US6091994 Pulsative Manipulation of Nervous Systems
US6135944 Method of Inducing Harmonious States of Being
US6167304 Pulse Variability in Electric Filed Manipulation of Nervous Systems
US6203486 Earth-Magnetic Field Augmenters
US6219657 Device and Method for Creation of Emotions
US6258022 Behavior Modification-using Hypnosis
US6358201 Method and apparatus for facilitating physiological coherence and autonomic balance
US6506148 Nervous System Manipulation by EM Fields from Monitors (TV and Computer) (Heartbeat)
DE19713947a1 Unknown
JP11042282a2 Hypnosis accelerating apparatus

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[-> septal =>sex] ü¿É_ì_ê¶ü@82-97, 99-106

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EM --> heart

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