

A Quantum Biofeedback and Neurotechnology Cybertherapy System for the Support of Transpersonal Psychotherapy

Raul Valverde

ABSTRACT

Transpersonal psychology is the study of human nature and rests on the assumption that human beings possess potentials that exceed the limits of their ego and integrate the spiritual experience within a broader understanding of the human psyche and consciousness. Altered states of consciousness have been used to aid psychotherapy by transpersonalists for decades. A cyberpsychotherapy system is proposed to support transpersonal psychotherapy. The system can be used to induce a non-ordinary state of consciousness that can be used by transpersonal psychologists as a healing tool to treat patients with psychological problems such as psychosis. With the help of internet technology, these treatment sessions can occur over great distances. The cyberpsychotherapy system uses a quantum signal generator for the induction of altered states of consciousness, based on the so-called *Koren Helmet* of Persinger's (1983). The cyberpsychotherapy has integrated EEG which serves as a biofeedback device in order to assess if the patient has reached the desired level of consciousness. Additionally, this EEG measurement can be used to inform the adjustment of the signal generator frequency to improve the psychotherapy experience of the patient, if necessary. A sample of 10 patients was used to test the cybertherapy system based on neurotechnology and quantum biofeedback. Data was collected and analysed to confirm the system's efficacy. Although the results show that the patients were not able to reach the desired level of consciousness for the psychotherapy, there was statistically significant evidence that the proposed system can alter an individual's level of consciousness, which may help inform future designs intended to induce a state of consciousness most conducive to psychotherapy.

Key Words: altered states of consciousness, neurotechnology, biofeedback, quantum medicine, transpersonal therapy

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Introduction

Cybertherapy is an internet based computer-mediated system used to facilitate psychotherapy

Corresponding author: Raul Valverde

Address: Concordia University, John Molson Building, Canada.

Phone: + (514) 848-2424 ext. 2968

e-mail: raul.valverde@concordia.ca

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(Botella *et al.*, 2009). This includes new applications of technology within psychology and healthcare which utilize augmented and virtual reality components in order to facilitate effective psychotherapy (Botella *et al.*, 2009). Although there are many cybertherapy systems in the literature (Takacs, 2005), none of them address transpersonal psychotherapy or are based on quantum biofeedback technology. Transpersonal psychotherapy that is based on transpersonal research and theory, considers the psyche to be



multidimensional and composed of several "levels of consciousness," each having different characteristics that are governed by different laws. Transpersonal psychology is the study of human nature and development, based on the assumption that human beings possess potentials that exceed the limits of normal ego development. A main goal of transpersonal theory is to integrate the spiritual experience within a broader understanding of the human psyche and consciousness (Grof, 1988).

The trend of explaining consciousness by applying quantum theories has gained popularity in recent years and, although clearly disdained by many neuroscientists, more and more, researchers have been directing their attention to quantum explanations (Valverde, 2016). Brian D. Josephson (1962) of the University of Cambridge, winner of the 1973 Nobel Prize in Physics for his studies on the quantum effects in superconductors (Josephson effect), proposes a unified field theory of quantum nature that would explain not only consciousness and its attributes, but also the phenomenology observed to date in terms of psychological and mystical experiences. The human being experiences different altered states of consciousness, that is, consciousness can be altered in different ways. Stanley Krippner (2000) defines altered states of consciousness as mental states that can be subjectively recognized by an individual, or by an objective observer, that are different in mental functions, the normal state of the individual, and alertness and waking states.

Altered states of consciousness have been used as an adjunct to psychotherapy by transpersonal therapists. One of these techniques, known as Holotropic breathwork, is produced by utilizing a hyperventilation technique, instructing the individual to breath deeply and rapidly for several minutes. Grof (1988), with this technique, induces a homeostatic crisis which leads to an altered state of consciousness, allowing meaningful subconscious content and self-insights from that new state. Stanislav Grof (1988) uses the experiential healing power of this new state of consciousness to help treat his patients. Although holotropic breathwork induces these altered states of consciousness, quantum biofeedback and neurotechnology offer an alternative way to induce altered state of consciousness for transpersonal therapy that can be easily implemented with the use of quantum computer technology and used in combination with the

internet to facilitate online transpersonal therapy (Valverde, 2015a).

Quantum biofeedback uses sensors to monitor physiological relaxation indicators, like skin temperature and muscle tension. It expands classical biofeedback by using galvanic skin response (GSR) together with modern computer technology to detect the response of the built-mind-spirit body (sometimes called the super-conscious), to a large array of stress indicators. Quantum Biofeedback is a sophisticated biofeedback technique based on advanced quantum scientific principles that promote a deeper understanding of health and healing. This approach views the body as a complex electrical circuit combined with the application of the principles of electrical engineering, which are able to analyze and balance the electric body.

Quantum Biofeedback interacts with all cellular matrices of the body, which allows communication between conscious and unconscious levels (Valverde 2015a). This is accomplished by establishing electrical communication using 12 electrodes which are attached to the head, wrists, and ankles of the patient. A loop and cyber handshake between the Quantum Biofeedback System and the patient using a calibration procedure is then created. By connecting in this way, all 200 billion cells in the human body are included in the exchange of information. On this basis, it is now possible to identify and prioritize the tensions and toxins that are a major concern and bring them into balance (Valverde, 2015a).

Classic biofeedback is based on electroencephalographic(EEG) measurements taken from the frontal cortex. This EEG information is presented to the user who then tries to consciously change their internal reactions to modify their brainwave state. Quantum Biofeedback links the user's reactions to all body cell matrices, not only the conscious aspects, but also with the unconscious. This provides greater gain in the understanding of health, as our conscious perception of the world is limited by design to 17% of the stimulation we receive (Valverde 2015a).

An application of quantum physics (neurotechnology) in the altered states of consciousness was carried out by Persinger (1983). Persinger was able to induce visions of God and other religious and mystical experiences in the laboratory by using a computer and with



what he called the Koran Helmet that also has the nickname of the Koren helmet. The Koren Helmet was originally called the Koran Helmet, named after its inventor Stanley Koren and Michael Persinger. He found that the temporal lobes of the brain are the source of the most spiritual experiences and other alternate state of consciousness.

This Koren helmet is a device to induce altered states of consciousness using weak magnetic signals to direct brain activity that can induce spiritual experiences that helps with transpersonal exploration and transformation of many people that is able to heal because of these transpersonal experiences (Persinger, 2000). It is suggested that altered states of consciousness such as sensed presence and out-of-body experience, whether they are produced by magnetic, electrical, or other stimulations or circumstances, can be most effectively explained as the changes of the relative contents and/or intensities of the test subjects' neural quantum entanglement with their surroundings including possibly spiritual environments or information (Hu and Wu, 2012).

With the aid of quantum biofeedback and neurotechnology, people can discover hidden deep events and conflicts in their subconscious that can lead to healing experiences. The proposed research has the objective of creating a cyberpsychotherapy system that uses quantum biofeedback and neurotechnology to facilitate transpersonal psychotherapy by inducing altered state of consciousness over the internet.

This work has the goal of contributing to the existing literature regarding the application of quantum biofeedback and neurotechnology to psychology by suggesting a cybertherapy system for the facilitation of transpersonal psychotherapy.

Transpersonal Psychology

Transpersonal psychology integrates the spiritual experience within a broader understanding of the human psyche. It is with the study of states of consciousness and the full potential of man, that transpersonal psychology assumes that humans can achieve harmony and transcendence through spiritual development. Transpersonal is something that exceeds the range of an individual's own experience or personal history. Transpersonal psychotherapist, Anthony Sutich

(founder and first editor of the *Journal of Transpersonal Psychology*), provided one of the first formal definitions of transpersonal psychology in 1969 at the inaugural edition of the *Journal of Transpersonal Psychology*:

The emerging Transpersonal Psychology refers specifically to the empirical, scientific study, and the responsible application of relevant results, becoming meta-needs individual and species-wide, the final values, conscience unitive, peak experiences, values, ecstasy, mystical, amazing experience, being, self, essence, joy, wonder, ultimate meaning, transcendence of self, the spirit, unity, cosmic consciousness, synergy of individual and species level, maximum interpersonal encounter, sacralization of everyday life, transcendental phenomena, self-cosmic humor and joy maximum sensory awareness, responsiveness and expression; and concepts, experiences and activities (Sutich, 1969).

Stanislav Grof, co-founder of transpersonal psychology with Abraham Maslow, defines transpersonal psychology as "The psychology that respects the entire spectrum of human experience, including holotropic states, and all domains of the psyche - Biographical, perinatal and transpersonal" (Grof, 2000).

Transpersonal psychology covers a multitude of experiences and behaviors produced by spontaneous or altered states of consciousness. Transpersonal phenomena include meditative experiences, dreaming, experiences induced by psychedelics, peak experiences, cosmic consciousness, enlightenment, mysticism, out-of-body experiences, channeling trance, near-death experiences, memories of reincarnation, extrasensory awareness, archetypal phenomena, accelerated learning, exceptional state of health and well-being, mind-body healing, and spontaneous healing from many types of illnesses that are chronic.

Altered States of Consciousness and Transpersonal Psychology

Ludwig (1966) defines an "altered state of consciousness" as any mental state(s) induced by various types of physiological, psychological or pharmacological agents, which can be recognized subjectively by an individual (or by an objective observer), as representing a sufficient deviation in the subjective experience, or psychological



functioning, during ordinary states of conscious awareness. This deviation can be sufficiently represented by a greater awareness than usual with internal sensations or mental processes, changes in the formal characteristics of thought, and the deterioration of the test of reality to varying degrees.

According to Ludwig (1966), the cognitive approach to altered states of consciousness has a distinct set of characteristic which include alterations in thinking, loss of control, change in emotional expression, change of body image, perceptual distortions, change in the meaning or importance, a sense of the ineffable, and feelings of rejuvenation.

By applying the disruptive force requirement for the basic state of consciousness (either through some physiological action, such as drugs or the alteration of attention via practices like meditation), the organization of cognitive subsystems is destabilized until a new force pattern (such as mental set, setting, expectations, drug effects) is applied to shape the subsystems in a whole new system, resulting in the production of a new discrete state of consciousness.

The cognitive awareness approach has helped transpersonal psychologists differentiate several levels of waking states of consciousness. According to this approach, consciousness is not one homogenous state, but varies and changes much like the colors of the rainbow. Transpersonal psychologists tend to see the experiences of mystical union, enlightenment, nirvana, and related experiences as natural and beneficial non-ordinary states of consciousness that may be subject to the effects of state-dependent learning. The idea that the experience of the sacred can be interpreted as altered states of consciousness can be construed from two observations: (1) psychedelic drugs have been used through the centuries and cultures to induce religious experiences, and (2) reports from some drug experiences are phenomenologically (descriptively or experiential) indistinguishable from accounts of natural mystical experiences (Smith, 1964).

Transpersonal psychologist, Charles T. Tart, has examined altered states of consciousness from a cognitive perspective in terms of changes in the configuration and operation of the underlying mental processes (Tart, 1971; 1976; 1983; 1992). According to

Tart, states of consciousness involve cognitive functioning that include the following subsystems: exteroceptors (receives sensory information), interoceptors (receives kinesthetic input), input processing (working memory), the subconscious processes, sense of identity, evaluation and decision making, emotions, space / time sense, long term memory, the motor output (behavior) plus latent functions. These 10 subsystems (with even more latent functions possible), define any discrete state of consciousness. The particular configuration of the subsystems in a given time is shaped and limited by the deployment of attention, the body's energies, characteristics of the structures themselves, and the particular social and cultural environments in which they operate.

Grof (1988) suggested that the term "altered states of consciousness" cover transpersonal experiences; however, there are certain types of altered states of consciousness that do not meet the criteria for being transpersonal (involving an expansion or extension of consciousness beyond the limits of the usual and limitations time and space). For example, a living and complex childhood memory occurs in an altered state of consciousness (e.g., hypnosis or psychedelic sessions), but do not meet the criteria for being transpersonal.

The cultural context of the 1960s and 1970s provided fertile ground for the emergence of transpersonal studies as an independent field of study in psychology. The infusion of Eastern ideas, including the contemplative traditions of Zen, Advaita, Vedanta and Taoism, along with the institutionalization of the humanist revolution in academic psychology, and the growing interest in consciousness and altered states of consciousness that are triggered by the widespread use of psychedelics, paved the way for the birth of transpersonal psychology movement in California in the late 1960s (Ferrer, 2002).

Since the 1970s, transpersonal psychology, as the humanist movement that preceded it, has been divided into three different groups; the first group represented by the ideas of Grof (1988) that believes that transcendence can only occur in the presence of an altered state of consciousness. This group produces conceptual models of non-ordinary states of consciousness. The second group, led by Wilber (1975), include those trying to assign internal states of



consciousness and identify with the monistic and perennial philosophy of Aldous Huxley. Wilber believes that all expressions of the highest state of consciousness in each tradition are the same as the psychopathic conditions occurring at the bottom, the normal waking reality in the middle and meditative states of higher consciousness in the top. The third and by far the largest segment of the transpersonal movement has no identifiable bearer, it sees the self as getting up and go to work in the morning, the higher consciousness is sweeping the floor, washing dishes, and raking leaves. The lighting is doing everything we are supposed to be doing at this minute. There is a preconceived thing; is not an altered state of consciousness, it is simply the deep philosophy, which is to be found most clearly in the mundane.

Altered states of consciousness answer the question "who we really are?" The answer to this question is that we are a part of God and that humans are spiritual beings having human experiences that somehow reveal the status of our full identity of our cosmic direction.

Brain Waves

Our brain works primarily with bioelectrical energy. Although the power of electricity that handles our neurons is low (measured in millivolts), this power processes, manages, distributes and utilizes vast amounts of information and generates an almost infinite number of responses. So by using micro electricity, we can quantitatively establish that the brain is a machine operating at low frequencies. Our brain, in addition to processing information that comes by the senses, is capable of emitting extra-sensory information received via similar "electromagnetic waves", but with lower intensity similar to the frequencies of a radio transmitter-receiver. Our brain can act as a radio station, similar to numerous species of birds that in their migrations are guided by a genuine receiver of terrestrial magnetism located in the pituitary gland. With this receiver, they know where they have to fly and in what direction. It's like having a real compass incorporated into the brain. The mind could be defined as the "sense" of the brain (like sight is the sense of the eye).

A German psychiatrist, Hans Berger (1843-1941), demonstrated that an "amplifier" device,

which was later termed an electroencephalograph, could capture electrical potential (voltage fluctuations) in the human brain. Before him, the English physician Richard Caton (1842-1926) showed similar potential in dogs. The first types of brain frequencies that were discovered were of the "alpha" and "theta" ranges. Later, these findings were complemented by research of other ranges of frequency captured by the electroencephalograph. Each type of wave results in a different neuropsychological state. That is, our mind, our body, and our physical and physiological activity are completely different in each of these states or frequencies. The type of neurochemicals and hormones released into the blood stream varies depending on frequency and the presence and quantity of such substances have an impact on the mood we have and interact to produce the physiological-mental-physical-end of our mental state. A level of consciousness is conscious thought that is always thinking, even in moments of apparent inactivity, but trivial ideas continually pass by consciousness. Most of the thoughts are accompanied by reactions in behavior, and small involuntary movements. When you're not actively thinking then you're probably dreaming. According to Signer and Streiner (1966), a person has, throughout the day, about 200 daydreams. Therefore, consciousness is the sum of all the different perceptions. The most general distinctions of consciousness are wakefulness and sleep; however, both cerebral and psychological states change according to conscious and subconscious content, unique to each individual. These changes are directly related to the electrical activity of the brain. This activity can be measured by the number of oscillations per second (Hz) that are linked to different states of consciousness in the brain: our brain only perceives a limited range of frequencies, defining our existence in this three-dimensional medium. 20 to 20,000 vibrations per second are perceptible by our ears, the range of the electromagnetic spectrum perceivable by our eyes extends from red to violet (although the visible spectrum is only a sliver of the larger continuum), all possible smells and tastes (which are also vibrations) and the endless textures that we can distinguish with our skin. But the brain is not only receiver but also is sends vibrations. It has been proven thanks to the EEG, that the brain emits waves of varying intensity and frequency

depending on the mental state of the person being observed. These waves are classified into:

Table 1. Types of Brainwaves (Valverde, 2015a).

TYPES OF BRAIN WAVES	STATES OF CONSCIOUSNESS
BETA WAVES: 14 Hz to 30 Hz	This type of waves is recorded when the person is awake in a state of normal activity. Correspond to states of conscious attention, anxiety, surprise, fear, stress.
GAMMA WAVES: 25 and 100 Hz	They express pathological conditions of maximum tension, excitement and the individual enters a state of STRESS in which the coordination of ideas and normal physical activity are seriously altered.
ALPHA WAVES: 8 Hz to 13 Hz	Relaxation and rest, calm, reflective state. Reduction of bodily sensations. The subconscious begins to emerge: Abstraction, suggestibility. Assimilation of the study. Ease of visualization of mental images.
THETA WAVES: 3.5 Hz to 7 Hz	During sleep or in deep meditation, autogenous training, hypnosis, yoga (whenever the formations of the subconscious act). The state stimulates creative inspiration. Considered a state for maximum capacity of learning. Fantasy, imagination. Hypnagogic images.
DELTA WAVES: 1 Hz to 3 Hz	It arises mainly in the states of deep sleep and unconsciousness. Very rarely can be experienced being awake unless with a very hard training (Yoga, Meditation, Zen, Hypnosis, Self-hypnosis) or with a synchronizer of hemispheres. It corresponds to deep sleep, hypnotic trance, REM sleep. It corresponds to sleep without dream, trance, deep hypnosis. Delta waves are very important in the healing process and strengthening the immune system.

The alpha state is when, if we would connect to an electroencephalogram, our brains would work between 7.5 to 14 cycles per second. When “operating” in this state, we traverse along the border of the conscious and the unconscious. It is a gate between both states of consciousness and this makes “alpha state” special, because it allows us, on the one hand, still have conscious awareness of our mind and body, that is, we realize what we think and happening around us. On the other hand, since the “lift” of consciousness in the “lower floors” of the mind, gives us access to information and own subconscious states, can utilize the wealth of mental “power” residing in the subconscious. This state is a “being comfortable,” in inner peace

and happiness, in deep relaxation, greatly increases the power of suggestion and auto-suggestion. That is, hypnosis is much more effective in alpha and suggestion will be more easily accepted with fewer “filters” from our conscious rationality.

Magnus and Van der Holst (1987) speak of frequencies ranging from 3.5 to 7.5 cycles per second. They are associated with the states of creative ideation and imagery. During its cortical proliferation, an individual can discover events deeply hidden in the recesses of their subconscious, as well as conflicts – those of personality, in particular. Is the wave of imagination and dynamic contact with other possible “dimensions psi” that offers us the opportunity to research our personality and deep in our psychology?

Research Methodology

The state of consciousness of someone can be loosely determined by measuring physiological changes. Certain physiological changes are typically associated with altered state of consciousness so measuring these physiological changes may provide evidence to more accurately determine the state of consciousness someone is in. Cade and Coxhead (1979) were able to map altered state of consciousness with alpha brain waves between 10 to 8 cycles.

This research uses EEG that was specifically designed to show the ephemeral patterns of the electrical signals from the two hemispheres of the cortex as they are happening (Cade & Coxhead, 1979). The EEG technology used for this research is the Emotiv 3D Brain Activity Map EEG software (Emotiv, 2016) that works with the Emotiv EPOC neuroheadsets. The neuroheadset captures the users’ brainwave (EEG) signals. After being converted to digital form, the brainwaves are processed, and the results are wirelessly transmitted to the USB receiver. The Emotiv 3D Brain Activity Map interprets these signals to displays mental activity in real time. The software displays brain activity in four significant brainwave frequency bands (delta, theta, alpha, beta) and uses the headset EPOC to read data. The software displays a colored gradient map showing the distribution of the indicated frequency band activity where red indicates the highest level of activity, falling away to orange, yellow, green, blue then black.



Figure 1, shows theta frequency bands with the highest level of activity indicating that the individual in this case was experiencing deep meditative states, daydreaming, and automatic tasks. Emotiv 3D Brain Activity Map EEG software has data collection and replay functionalities that can be use to analyze the collected data.

An application of quantum physics (neurotechnology) in the altered states of consciousness was carried out by Persinger (1983). Persinger (1983) was able to induce visions of God and other religious and mystical experiences in the laboratory by using a computer and with what he called the Koren helmet that has also the nickname of the Koren helmet. He found that the temporal lobes of the brain are the source of the most spiritual experiences and other alternate state of consciousness.

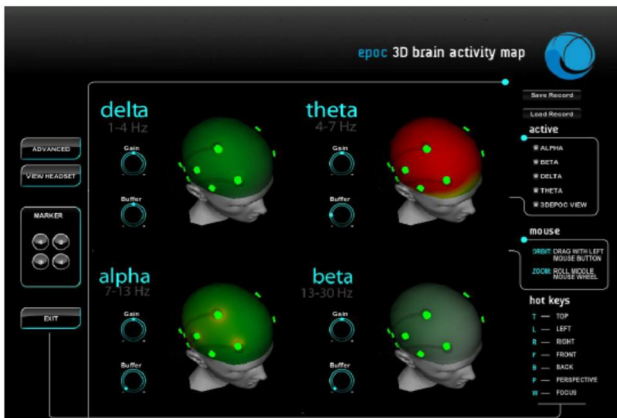


Figure 1. 3D viewer.

This Koren helmet is a device to induce altered states of consciousness using weak magnetic signals to direct brain activity that can induce spiritual experiences that helps with transpersonal exploration and transformation of many people that is able to heal because of these transpersonal experiences (Persinger, 2000). It is suggested that altered states of consciousness such as sensed presence and out-of-body experience whether they are produced by magnetic, electric, or other stimulations or circumstances can be most effectively explained as the changes of the relative contents and/or intensities of the test subjects' neural quantum entanglement with their surroundings including possibly spiritual environments or information (Hu and Wu, 2012).

Intense experiences are based in the temporal lobes (Persinger, 1983), The sessions used in the research are intended for eliciting altered states of consciousness, and use the coils over the temporal lobes, which are understood to be the source of the mystical experiences (Persinger, 1983).

This research uses a product called Shakti (Shakti, 2016) that is based on the Koran helmet of Koran and Persinger (1983). Shakti Software produces audio analogs to EEG signals. These are applied to the brain using modified commonly available magnetic coils. The magnetic signals are applied to the head at very low strength. The signals are short bursts, followed by intervals of silence. Each signal speaks a language that only one brain structure understands and responds. The brain has two hippocampi and two amygdalas, one on each side. Shakti is applied using the structure's own signal, but only over the side of the head where it supports something positive. When these structures respond, they put the person in a positive altered state of consciousness (Shakti, 2016).

The Shakti sessions that were used for this research are 'interhemispheric' (switching from both hemispheres to one) sessions, incorporating the same principles used in the study of Sculthorpe & Persinger (2003). In this last study, it was shown that the most effective sessions turned out to be two-phase sessions. This study applies a modulated 40 Hz signal to both temporal lobes, followed by the amygdala signal to only the left temporal lobe as indicated in figures 2 and 3. This is the session design that comes closest to the sessions used in the "Koren Helmet" experiments (Shakti, 2016).

Electromagnetic frequency emissions (EMF) emissions are varieties of radiation, and/or electrons. The Shakti helmet uses magnetic fields, which are neither radiation nor electrons. Electromagnetic radiation is composed of photons; magnetic fields are not. Magnetic fields are not composed of the elementary particles than can interact with some organic compounds, nor are they composed of electrons, ions, or anything else that is encompassed by the word 'emission'. These are simple magnetic fields created by two poles. Fields from an electromagnet are made of the same matter as the earth's magnetic field. These are 'made' of 'lines of force', and are not 'EM emissions'. These



do not pose a health risk of any kind (Greenland *et al.*, 2000).

The Shakti helmet uses magnetic coils connected to a computer sound card. The output of a sound card is modulated DC. The polarity - one wire is positive and the other wire is negative - is always the same, no matter how the amplitude varies. A speaker or headphones uses a magnetic coil to move a diaphragm to make sound. Generally, the goal is to move the coil two ways to make sound. However, because of the springiness of the coil you only need one polarity. For example, a given voltage might push the coil. When the voltage drops lower, the voice coil will rebound and move the other way. EM fields reach deep inside the brain. Magnetic fields cannot be blocked by the skull (Hatch and Stelter, 2001). The proposed helmet's magnetic signals reach deep inside the brain because there is nothing in or around the brain capable obstructing them (Persinger, 1997).

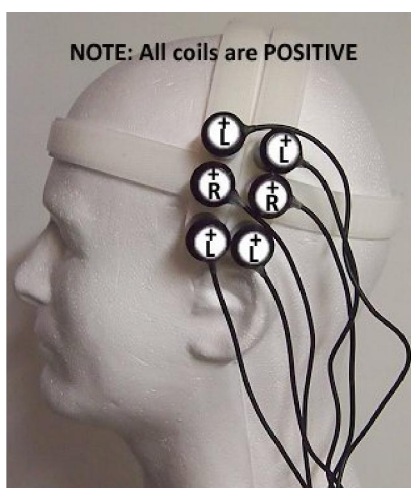
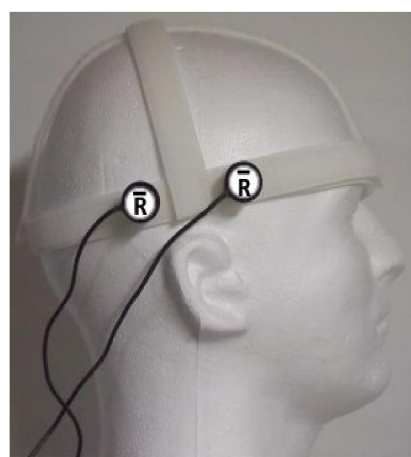


Figure 2. Left side of the session used.



NOTE: Both Coils are NEGATIVE.
Figure 3. Right side of the session.

The proposed architecture of the cybertherapy is depicted in figure 4. The therapist computer has installed 3D activity map software and Skype that provide a human computer interaction for the interface between the therapist and the system (Valverde 2011). Skype is a telecommunications software that allows verbal and text communications with the patient, the 3D activity map software allows the therapist to visualize the states of consciousness of the patient by detecting the frequency band with the highest level of activity.

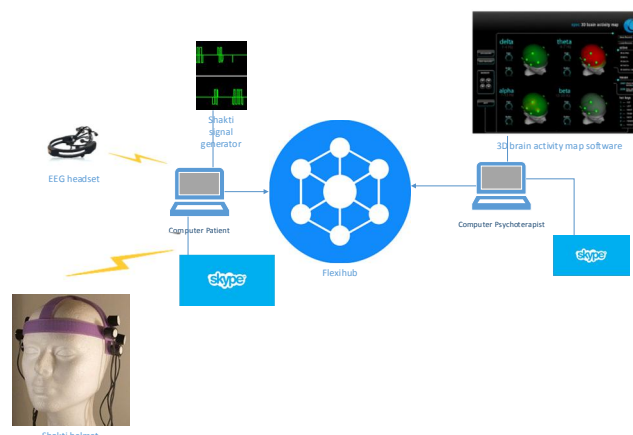


Figure 4. Proposed cybertherapy system.

The therapist is able to access the EEG signals collected by the EEG headset worn by the patient. These digital signals are transmitted over the internet by using Flexihub software (Flexihub, 2016), FlexiHub is a USB over IP software solution, it enables sharing access to USB devices over Internet. The EEG headset is connected to the USB of the patient's computer via a USB wireless adaptor.

The Shakti helmet is worn by the patient and is meant to induce altered states of consciousness by modulating 40 Hz signals to both temporal lobes from a signal generator installed in the patient's computer. A sample of 10 patients were used to test the cybertherapy system and quantum biofeedback data collected and analyzed to confirm that the patients were able to reach a desired level of consciousness for the psychotherapy.

Each patient was required to sit down and relax in a quiet room for a period of 40 minutes wearing an EEG headset without being exposed to the Shakti system, the therapist recorded the session during this 40 minute (pre-test). After, the patient was exposed to the Shakti signals by wearing the Shakti helmet, during which time the

therapist also recorded the session for 40 minutes (post-test). Information about the difference between the two tests was not given to the patients in order to avoid bias in the measurements.

Table 2. States of consciousness and frequency measurements.

Level	Consciousness level	Measured frequency	Types of waves
0	Just he is beginning to relax with difficulty quieting the mind.	25-20	alpha and beta
1	Not very clear conscience or sense of anesthesia	20-16	Guests beta alpha continuous
2	Calm and relaxed with flash back memories	16-13	Alpha continues without beta theta intermittent
3	Well defined state. Feeling of floating with increased imagination and more concentration sustained	13-10	Alfa falling Continuous theta
4	Extremely vivid awareness of breathing heartbeat, or other bodily sensations. Living consciousness. Sometimes an alternation of internal and external awareness	10-8	alpha continuous theta falling Frequency
5	Awareness with satisfaction and deep intense alertness and calmness and detachment. Feeling of altered state lacking in previous levels 0 to 4.	8-5	Theta continuous alpha close to theta
6	New way of feeling by intuitive vision synthesis of opposites in a higher unity	below 4	Delta occasionally

Each recording session displayed the different frequency bands that represent each level of consciousness including alpha, beta, theta and delta. For the analysis, we quantified the different states of consciousness in a manner similar to Cade and Coxhead (1979) who conducted EEG tests in 70 subjects and measured the ESR (electrical resistance of the skin). These results were applied to the work of Terry Lesh (1970) allowing us to build the table below representing the objective and subjective correlates of these states. The targeted level is 5 as this represents altered state of consciousness

but it is expected that the average of the levels is under 5 as the patient needs go from 0 to 5 at different stages. However, it is expected that the post-test average is higher than the pre-test as we want to probe that the cybertherapy system is capable of raising the level of consciousness.

A mean and standard deviation for these levels were calculated for each pre-test and post-test sessions for each patient. The mean values of pre-test and post-test results were compared to check if there is an improvement in state of consciousness with the use of the cybertherapy system. The mean values were tested using the t-Student test, and the t-values were calculated by using the following formula:

$$t\text{-value} = \frac{(\text{Mean of post-test} - \text{Mean of pre-test})}{\sqrt{\frac{\text{Variance of post-test}}{\text{Sample size of post-test}} + \frac{\text{Variance of pre-test}}{\text{Sample size of pre-test}}}} \quad (1)$$

The Alpha level used was 0.05 of one tail test; with 18 degrees of freedom (sample size of pre test + sample size of post test - 2). According to the t-distribution significance table, the critical value is 1.734 for one tail test for this alpha and degrees of freedom. The Null Hypothesis is that there is no difference between the pre test and post test sample means for the states of consciousness because of the use of the Cybertherapy system.

Results

Table 3 shows the results of the study, a mean of the pre-test and post-test for each patient was calculated during the 40 minutes' sessions for each patient because of the use of the Cybertherapy system. The results show that each patient had a different reaction to the use of the system. While some patients showed very little difference from the pre-test and post-test (e.g. patient 8) or even a decrease of the level of consciousness (e.g. patient 2) some patients observed a great level of improvement with the post-test session (e.g patients 3, 6 and 9). The mean of means for all the patients for the pre-test is 2 (Calm and relaxed) while the mean of means for all the patients for the post-test is 3 (Feeling of floating with increased imagination and more concentration sustained). While it seems that the Cybetherapy system contributes to raise the level of consciousness, none of the patients were able to maintain an altered state of consciousness (level 5) during the sessions although this level was reached for a few minutes by a few patients.



The standard deviation for the pre-test was calculated as 1.34 and the standard deviation for the post test is 1.108. The t-value for the sample is 1.75. Based on this last value, the null hypothesis can be rejected; this means that there is enough statistical evidence that the Cybertherapy system is able to raise the level of consciousness. However, this is not enough to raise the level to the altered state of consciousness that is required to conduct transpersonal therapy.

Table 3. Results of the experiment.

Patient	Mean Pre-test	Mean Post-test
1	2.82	3.19
2	2.73	2.48
3	2.45	3.55
4	2.73	3.00
5	1.73	3.55
6	1.45	2.95
7	0.91	2.18
8	2.27	2.36
9	1.64	3.27
10	1.36	3.18

The results suggest that although it seems that the proposed system is on the right track, the system should be enhanced by including other

known means to reach altered states such as music therapy (Bonny, 1975), guided meditations (Lehmann *et al.*, 2001) and channeling (Valverde 2015b).

Conclusions

Inducing altered states of consciousness with neurotechnology is a relatively new concept and although there are serious studies, they are not typically incorporated into mainstream psychology or traditional medicine. This, more than anything, is due to a lack of understanding of this technology. The aim of this paper is to open the eyes of the therapists about the potential of these technologies for clinical purposes and the ability of the use internet technology to be able to conduct transpersonal therapy from a distance. Although the results do not prove that the presented technologies are effective at reliably inducing altered states, they show that there is potential for this as there is statistically significant evidence that they are able to influence one's level of consciousness.

Future research will ideally focus on the inclusion of supporting methods, such as music therapy, guided meditations, and breath work, in order to reach the desired state that can help the therapist to heal patients at a distance with the use of transpersonal psychology.

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