Binaural Beat en Wetenschap

Voor zover ik heb kunnen nagaan zijn er geen Nederlandstalige publicaties betreffende het verschijnsel Binaural Beat.
Aan de andere kant van de ocean zijn er vele studies en experimenten uitgevoerd met name in de Verenigde Staten.
Het zou een aanwinst zijn om informatie te mogen ontvangen die naar een of meerdere nederlandstalige studies verwijzen.

Hier volgen enkele engelstalige studies en/of referenties er naar.
De wetenschappelijke data die volgen zijn te vinden in verscheidene publicaties en zijn beschikbaar in het publieke domein.

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Binaural Auditory Beats Affect Vigilance Performance and Mood
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When two tones of slightly different frequency are presented separately to the left and right ears the listener perceives a single tone that varies in amplitude at a frequency equal to the frequency difference between the two tones, a perceptual phenomenon known as the binaural auditory beat. Anecdotal reports suggest that binaural auditory beats within the electroencephalograph frequency range can entrain EEG activity and may affect states of consciousness, although few scientific studies have been published. This study compared the effects of binaural auditory beats in the EEG beta and EEG theta/delta frequency ranges on mood and on performance of a vigilance task to investigate their effects on subjective and objective measures of arousal. Participants (*n* = 29) performed a 30-min visual vigilance task on three different days while listening to pink noise containing simple tones or binaural beats either in the beta range (16 and 24 Hz) or the theta/delta range (1.5 and 4 Hz). However, participants were kept blind to the presence of binaural beats to control expectation effects. Presentation of beta-frequency binaural beats yielded more correct target detections and fewer false alarms than presentation of theta/delta frequency binaural beats. In addition, the beta-frequency beats were associated with less negative mood. Results suggest that the presentation of binaural auditory beats can affect psychomotor performance and mood. This technology may have applications for the control of attention and arousal and the enhancement of human performance.

Keywords: binaural auditory beats, vigilance performance, mood, frequency-following response.

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Accessing Anomalous States of Consciousness with a Binaural Beat Technology

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Abstract – Exposure to binaural beats in an environment of restricted stimulation coupled with a guidance process can safely provide access to and experiences in many propitious states of consciousness. This method requires a unique combination of well-understood psycho-physiological inductive techniques with the addition of a refined binaural-beat technology. Binaural beats provide potential consciousness-altering *information* to the brain's reticular activating system. The reticular activating system in turn interprets and reacts to this *information* by stimulating the thalamus and cortex thereby altering arousal states, attentional focus, and the level of awareness, i.e., the elements of consciousness itself. This effective binaural-beat process offers a wide variety of beneficial applications and vehicle for the exploration of expanded states of consciousness.

Keywords: consciousness – altered states

Binaural-Beat Induced Theta EEG Activity and Hypnotic Susceptibility

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May 1997

ABSTRACT

Six participants varying in degree of hypnotisability (two lows, two mediums and two highs) were exposed to three sessions of a binaural-beat sound stimulation protocol designed to enhance theta brainwave activity. The Stanford Hypnotic Susceptibility Scale, Form C (SHSS: C) was used for pre and post-stimulus measures of hypnotic susceptibility. Time-series analysis was used to evaluate anterior theta activity in response to binaural-beat sound stimulation over baseline and stimulus sessions. A protocol designed to increase anterior theta activity resulted in a significant increase in theta measures (% activity) between pre-stimulus baseline and stimulus observations for five of six participants. Hypnotic susceptibility levels remained stable in the high-susceptible group, and increased moderately in the low and medium susceptible groups.

INTRODUCTION

Differential individual response to hypnosis, has, captured the attention of hypnosis

practitioners and researchers since the time of Mesmer, in the late 18th century. Despite the long recognized importance of individual variation in hypnotisability, efforts to modify or increase individual hypnotic susceptibility have proven to be problematic and controversial.

Part of the difficulty in addressing the nature of hypnotisability has been the lack of consensus regarding the basic phenomena of hypnosis. The central issue has been whether observed hypnotic responses are due to an altered state of consciousness or merely the product of psychosocial factors.

Considering hypnosis as either an altered state or as a purely psychosocial phenomenon served to provide two opposing factions into which most theories of hypnosis could be grouped. Contemporary hypnosis researchers tend to hold less extreme positions, realizing the benefit of a perspective, which is comprised of the strengths of both the special-process (i.e., altered state of consciousness) and the social-psychological theoretical domains.

Theoretical Perspectives of Hypnosis

The 1960's witnessed the advent of standardized hypnotic susceptibility measurements. Reliable standardized instruments have been developed for use with groups and individuals. Early work with the electroencephalogram (EEG) designed to identify hypnotic susceptibility also began around this time. More recent EEG/hypnosis research has focused on electro cortical correlates of both the state of, and differential individual response to, hypnosis. The concept of a reliable electro cortical correlate of hypnotic susceptibility draws attention to the recent applications of neurofeedback therapy, which has employed a number of protocols designed for individual brainwave modification. Recent advances in the application of binaural-beat technology and the associated EEG frequency following response, which can be either relaxing or stimulating, have demonstrated efficacy of brainwave modification in areas such as enriched learning, improved sleep, and relaxation (Atwater, 1997). In consideration of recent EEG / hypnosis research along with the recently demonstrated efficacy of EEG neurofeedback training research and the binaural-beat technology applications, it would seem that the lingering question of hypnotisability modification can now be addressed by utilizing brainwave modification within a systematic protocol.

As mentioned earlier, it has often been the case in the past to view the field of hypnosis as being dominated, theoretically, by two opposing camps; the special-process and the social-psychological. In general, the special-process view holds that hypnosis induces a unique state of consciousness; whereas, the social-psychological view maintains that hypnosis is not a distinct physiological state.

Popular authors of the post-Mesmeric period (i.e., mid 19th century), such as James Braid, proposed psycho physiological and sometimes neurophysiological explanations for the hypnotic phenomenon (Sabourin, 1982). In fact, Braid adopted the term 'neuro-hypnology' to describe the phenomenon and is credited as the originator of the term 'hypnosis' (Bates, 1994, p.24). The work of other English physicians, such as John Elliotson and James Esdaile, on surgical anesthesia and clinical pain relief in the mid-19th century (Soskis, 1986), are indicative of the psycho physiological zeitgeist of hypnosis in that time. This physiologically oriented

perspective is reflected in Hilgard's neodissociation model (Hilgard, 1986), which suggests that hypnosis involves the activation of hierarchically arranged subsystems of cognitive control. This dissociation of consciousness is clearly manifested in the realm of hypnotically induced analgesia. Hilgard's conception of a 'hidden observer' (Hilgard, 1973) as a dissociated part of consciousness, a part that is always aware of non-experienced pain and can be communicative with the therapist, is exemplified in his description of a hypnotically analgesic individual whose hand and arm were immersed in circulating ice water as follows:

All the while that she was insisting verbally that she felt no pain in hypnotic analgesia, the dissociated part of herself was reporting through automatic writing that she felt the pain just as in the normal non-hypnotic state (p. 398).

In Hilgard's model, the hidden observer is the communication of the above-described subsystem not available to consciousness during hypnosis. It is reasonable to assume, considering hypnosis research with pain control, that such a dissociative effect of cognitive functioning (i.e., cortical inhibition) would have, as a substrate, some neuropsychophysiological correlate.

Often the social-psychological or social-learning position sees hypnotic behaviors as other complex social behaviors, the result of such factors as ability, attitude, belief, expectancy, attribution, and interpretation of the situation (Kirsch & Lynn, 1995). The influence of such variables as learning history and environmental influences are described by Barber (1969). In this influential discourse, Barber presents a framework in which hypnotic responding is related to antecedent stimuli, such as expectations, motivation, definition of the situation, and the experimenter-subject relationship. Diamond (1989) proposed a variation of the social-psychological view, which emphasized the cognitive functions, associated with the experience of hypnosis, as described in the following:

It may be most fruitful to think of hypnotisability as a set of cognitive skills rather than a stable trait. Thus, it is conceivable that the so-called 'insusceptible' or refractory S [subject] is "simply less adept at creating, implementing, or utilizing the requisite cognitive skills in hypnotic test situations". Similarly, what makes for a highly responsive or 'virtuoso' S may well be precisely the ability or skill to generate those cognitive processes within the context of a unique relationship with a hypnotist (p. 382).

According to the social-psychological paradigm, an individual's response to hypnosis is related to a disposition toward hypnosis, expectations, and the use of more effective cognitive strategies, not because the individual possesses a certain level of hypnotic ability. An important implication of the social psychological or social-learning theory is that an individual's level of hypnotisability can be modified and thus enhanced with systematic strategies to accommodate for individual deficiencies. These two positions can no longer be perceived as a dichotomy, but more accurately as overlapping areas in a Venn diagram. It is not difficult for one to recognize the role of both individual characteristics (i.e., differential neurological activity) and contextual variables (i.e., psychosocial constructs) in measuring and determining the hypnotic response. In other words, the hypnotic response can be viewed as a product of a trance-like state of altered consciousness, which is itself moderated by

psychosocial factors such as social influence, personal abilities, and possibly the effects of modification strategies. Such a perspective allows for a more complete investigation of the nature of hypnotic susceptibility by taking into account the relevant issues within each position.

Importance of Individual Differences

In the middle 1960's, the focus on hypnotic research was dominated by a trait, or individual difference, approach. The use of standardized hypnotic susceptibility measurements became common. Most practitioners today tend to view hypnotic susceptibility as a relatively stable characteristic that varies across individuals. This view, and the realization of individual variability in the ability to experience hypnosis, is not new ideas, as Mesmer long ago emphasized the individual's receptivity to hypnotic process (Laurence & Perry, 1988). Braid, an English physician during the 19th century, described the remarkable differences of different individuals in the degree of susceptibility to the hypnotic experience (Waite, 1960). The importance of within-individual variability in hypnotic susceptibility is also found in Braid's comments that individuals are affected differently, and that even the same individual could react differently at different times to hypnosis (Waite, 1960). Differential responses to hypnosis were recognized by Freud in his attempts to determine which patients would be the most responsive to hypnotic training. Freud, like others at this time, was unable to identify reliable correlates of hypnotisability. Freud's frustration is reflected in his observation that, "We can never tell in advance whether it *VAII* be possible to hypnotize a patient or not, and the only way m have of discovering is by the attempt itself" (Freud, 1966, p. 106). This view is reflected in the methodology of current standardized scales of hypnotisability, which use direct measures of hypnotic responses to determine level of hypnotisability.

Differential treatment outcome, associated with individual differences in the way individuals respond to hypnosis, has been observed by practitioners for centuries. Hypnotic susceptibility may also be a relevant factor in the practice of health psychology/behavioral medicine. Bowers (1979) suggested that hypnotic ability is important in the healing or improvement of various somatic disorders. He has also provided evidence that therapeutic outcomes with psychosomatic disorders are correlated with hypnotic susceptibility; even Men hypnotic procedures were not employed (Bowers, 1982). Significant relationships have been found between hypnotisability and the reduction of chronic pain, chronic facial pain, headaches, and skin disorders (e.g., warts, chronic urticaria, and atopic eczema) with hypnotic techniques (Brown, 1992). Support for the interaction of negative emotions and hypnotic ability as a mediator of symptoms and disease has also been provided by recent research (Wickramasekera, 1979, 1994; Wickramasekera, Pope & Kolm, 1996). A recent article by Ruzyla-Smith, Barabasz, Barabasz & Warner (1995), measuring the effects of hypnosis on the immune response, found significant increases in B-cells and helper T-cells only for the highly hypnotizable participants in the study. This report not only suggests that hypnosis can modify the activity of components of the immune system, but also highlights the importance of individual variability in response to hypnosis.

In terms of modifications of hypnotisability, initial hypnotic susceptibility level may be a factor in the resulting degree of modification. In a paper discussing the issue of hypnotisability modification, Perry (1977) presented a number of studies employing a

range of less susceptible individuals for modification training. Overall, the attempts to modify hypnotisability were unsuccessful in these studies. Perry suggested that successful modification tends to be more common in medium susceptible individuals. It may be that the medium susceptible individual, having already demonstrated a certain degree of hypnotic ability, possesses the underlying cognitive framework essential to the hypnotic experience. This line of reasoning could explain the differential responses of low susceptible and medium susceptible individuals to hypnotisability modification training. The high susceptible individual could also provide to be less responsive to modification strategies compared to the medium susceptible individual, as a potential exists for a ceiling effect with the high susceptible individual.

Standardized Measures of Hypnotic Susceptibility

The long observed differences in individual response to hypnosis eventually led to the development of the first viable measures of hypnotisability, the Standford Hypnotic Susceptibility Scale, Forms A and B (SHSS: A and SHSS: B) by Weitzenhoffer and Hilgard (1959). The introduction of the Standford Hypnotic Susceptibility Scale, Form C (SHSS: C) by Weitzenhoffer and Hilgard (1962) represented an improved version of the two earlier forms; it was comprised of a greater proportion of more difficult cognitive items. The SHSS: C is still the prevalent measure of hypnotic susceptibility in current use and is often the criterion by which other measures of hypnotisability are evaluated (Perry, Nadon & Button, 1992). This instrument is essentially an ascending scale, which begins with relatively easy hypnotic induction procedures and progressively moves to more difficult trance challenges.

A recent study by Kurtz & Strube (1996), comparing a number of hypnotic measures, described the SHSS: C as the gold standard of susceptibility tests. This study also addressed the idea of using multiple measures of hypnotic susceptibility in order to improve predictive power over using a single administered test. Kurtz & Strube (1996) concluded that the use of multiple measures of susceptibility was not warranted, and that the 'rational' choice for a single measure of hypnotic susceptibility would be the SHSS: C.

Research with the EEG and Hypnotic Susceptibility

Brainwaves are the far-field electrical wave patterns set up by neuro-chemical activity in the living brain. The electroencephalograph (EEG) is an instrument, which can measure this activity and determine its strength (higher or lower amplitude) and speed (high or low frequency). Scientists have characterized brainwaves into four broad categories: (a) beta, brainwaves above 13 cycles per second (or hertz), indicative of active consciousness; (b) alpha, a slower brainwave ranging from 8 to 12 hertz, characteristic of a relaxed conscious state of awareness; (c) theta, the next slower waves ranging from 4 to 8 hertz, often associated with dreamlike imagery and deep relaxation; (d) delta, the slowest waves from 0 to 4 hertz which can predominate during dreamless sleep.

The majority of early research which hypnosis shared a common goal: the development of a methodology to determine if, and when, an individual is hypnotized. The majority of early EEG research which hypnosis focused on the state of hypnosis, often attempting to distinguish the state of hypnosis from the state of

sleep (Sabourin, 1982). Weitzenhoffer's 1953 review of studies utilizing the EEG with hypnosis concluded that hypnosis is perhaps more akin to light sleep than either deep sleep or the waking state.

A shift occurred in the late 1960's as researchers began investigating possible electro cortical correlates of hypnotic susceptibility using the EEG. The predominant focus in hypnosis research from this time forward was on individual differences rather than the hypnotic state per se. Much of the early research focused on alpha wave indices of hypnotic susceptibility. A review by Dumas (1977) found that no alpha-hypnotisability correlation existed in the general population. Additionally, a recent critical review by Perlini & Spanos (1991) offered little support for an alpha-hypnotisability relationship. Other early studies found greater resting theta wave activity with highly susceptible individuals (Galbraith, London, Leibovitz, Cooper & Hart, 1970; Tebecis, Provins, Farnbach & Pentony, 1975; Akpinar, Ulett and Itil, 1971). Overall, the comparison of early EEG research proves difficult given the aggregate of technologies and methodologies employed over a span of time characterized by extreme variance in technology development.

Recent studies have re-examined the relationship between EEG measures and hypnotic susceptibility based on rigorous subject screening and control, along with enhanced recording and analytic techniques. Sabourin, Cutcomb, Crawford and Pribram (1990) found highly hypnotizable subjects to generate substantially more mean theta power than did low hypnotizable subjects in frontal, central and occipital derivations during resting non-hypnotic baseline, with largest differences observed in the frontal (F3, F4) locations. According to a review by Crawford and Gruseiler (1992), theta activity, which is strongly and positively related to hypnotic susceptibility, is the most consistent EEG correlate of hypnotic susceptibility. The results of recent study by Graffin, Ray & Lundy (1995) indicate that highly hypnotizable subjects demonstrate significantly more theta activity in frontal (F3, F4) and temporal (T3, T4) areas in comparison to low hypnotizable subjects at baseline measures. The studies by Sabourin et al (1990) and Graffin et al (1995) are alike in that each employed fast Fourier transformation (FFT) and power spectral analysis of monopolar EEG derivations, which allows for the examination of activity within each component frequency of each EEG epoch.

The position which is most supported in the contemporary literature is a consistent pattern of EEG activity which can differentiate individuals according to standardized hypnotic susceptibility scores. It is suggested that high-susceptible individuals produce more anterior theta activity as compared to low-susceptible individuals. This baseline individual difference is an important neuropsychophysiological indicator of hypnotisability and could provide to be a more stable individual difference measure than standard psychometric measures (Graffin et al, 1995).

Theta Waves and Perceptual Variations

The relationship between theta activity and selective attentional processes lends further support to a coexistent relationship with hypnotisability. The concepts of Class 1 and Class 11 inhibition have been presented by Vogel, Broverman & Klaiber (1968). Class 1 inhibition is described as being correlated with a general inactvitiy or drowsiness, whereas Class 11 inhibition is related to more efficient and selective attentional processes. The Class 11 concept of slow wave actvitiy is described by

Vogel et al (1968) as “a selective inactivation of particular responses so that a continuing excitatory state becomes directed or patterned” (p. 172). Sabourin et al (1990) suggested that the theta activity observed in highly hypnotizable subjects reflects involvement in greater absorptive attentional skills. As in the Sabourin et al. (1990) study, Graffin et al. (1995) provide suggestions regarding the selective attentional component of theta: “high hypnotizables either possess, or can manifest, a heightened state of attentional readiness and concentration of attention” (p. 128). The relationship between greater attentional readiness and frontal theta has also been suggested in psycho physiological studies (Bruneau et al., 1993; Ishihara & Yoshii, 1972; Mizuki et al., 1980). Another possible supportive line of research involves the examination of psychological absorption and hypnotisability relationships. Studies have found absorption to be consistently correlated with hypnotisability (Glisky, Tataryn, Tobia, Kihlstrom, 1991; Tellegen & Atkinson, 1974). In a review of psychological correlates of theta, Schacter (1977) described the relationship between the hypnagogic state and the presence of low voltage theta activity. Green & Green (1977) described the theta state as that of reverie and hypbnogogic imagery. They employed theta neurofeedback training to induce quietness of body, emotions, and mind, and to build a bridge between the conscious and unconscious. In describing theta EEG brainwave biofeedback, the Life Sciences Institute of Mind-Body Health (1995) associated increased theta activity with ‘states of reverie that have been known to creative people of all time’ (p.4).

Considering these findings related to theta activity, a relationship between individual levels of hypnotisability, selective inhibition, hypnogogic reverie, and theta activity is more easily understood. Relatively high theta activity may be indicative of a characteristic brainwave pattern, which reflects an underlying cognitive mechanism that relates to a type of selective inhibition and hypnogogic imagery.

Research with Neurofeedback Training

Neurofeedback training works on the brain’s activity to produce certain brainwaves the way exercise works to strengthen muscles. EEG biofeedback instruments show the kinds of brainwaves an individual is producing, making it possible for that individual to learn to manipulate the observed brainwaves.

Demonstrated individual success acquiring the ability to self-regular characteristic brainwave patterns is evident in the neurofeedback literature. Various protocols have been employed by many practitioners to enhance both relaxation (an increase in production of slow waves, such as theta, and a decreased production of fast beta waves) and mental activity (a decrease production of excessive slow wave, such as delta and lower frequency theta; with an increase in the production of ‘fast’ beta waves). An impressive number of recent studies have demonstrated the efficacy of brainwave neurofeedback training. The work by Peniston and others with individuals and alcohol abuse issues (Peniston & Kulkosky, 1989, 1990, 1991; Saxby and Peniston, 1995) has provided remarkable results. Peniston has shown 13-month follow-up relapse rates of 20% (compared to 80% using conventional medical training), significant reductions in Beck Depression Inventory scores, and decreased levels of beta-endorphin in subjects treated with Alpha-Theta brainwave training. The area of attention deficit hyperactivity disorder (ADHD) has received strong attention from neurofeedback researchers (Barabasz & Barabasz, 1995; Lubar,

1991; Rossiter & Vaque, 1995). Lubar's work has provided strong support for the effectiveness of a protocol designed for Beta-training (16 – 20 Hz) and Theta inhibition (4 – 8 Hz), with 80% of 250 treated children showing grade point average improvements of 1.5 levels (range 0 – 3.5) (Lubar, 1991). Objective assessments of the efficacy of neurofeedback training for ADHD have shown significant improvements on the Test of Variables of Attention (T.O.V.A) scales and Wechsler Intelligence Scale for Children-Revised (WISC-R) IQ scores with subjects who demonstrated significant decreases in theta activity across sessions (Lubar, Swaamod, Swartwood, & O'Donnell, 1995). Additional studies with post-traumatic stress disorder (PTSD) with Vietnam veterans (Peniston, 1990); Peniston & Kulkosky, 1991; Peniston, Marrinan & Deming, 1993) have provided unprecedented results with a condition often very resistant to training with other interventions.

The work by Ochs (1994) with the use of light and sound feedback of EEG frequencies, EEG dis-entrainment feedback (EDF), is also promising in terms of modification of EEG patterns. However, unlike traditional EEG biofeedback, with Dr. Ochs' device there is no need for the individual to be consciously involved in the process. The visual and auditory stimuli respond to and match the individual's brainwaves and these stimuli are in turn generated by the overall frequency of the individual's brainwaves. The aptitude of this system is the capacity for the clinician to alter the feedback frequencies upward or downward, in effect, providing flexibility into a 'set' or 'characteristic' brainwave pattern.

The flexibility of individual neurofeedback training is evident in the various approaches designed to intensify certain types of EEG activity either by itself, or to intensify certain types of EEG activity and decrease other types of EEG activity occurring at the same time. Overall, the relatively high number of recent neurofeedback training studies with consistent positive results stronglyt demonstrates the changes in cognitive and behavioral variables resulting from the alteration of individual brainwave patterns.

Research with Binaural-Beat Sound Stimulation

Binaural-beat stimulation is an important element of a patented auditory guidance system developed by Robert A. Monroe. In fact, Robert Monroe has been granted several patents for applications of psychophysical entrainment via sound pattern in (Atwater, 1997). In the patented process referred to as Hemi-Sync®, individuals are exposed to factors including breathing exercises, guided relaxation, visualizations, and binaural beats. Extensive research within the Monroe Institute of Applied Sciences, which has documented physiological changes associated with Hemi-Sync use, along with consistent reports of thousands of Hemi-Sync users, appears to support the theory that the Hemi-Sync process encourages directed neuropsychophsiological variations (Atwater, 1997).

The underlying premise of the Hemi-Sync process is not unlike that adopted by many EEG neurofeedback therapists, that an individuals' predominant state of consciousness can be reflected as a homeostatic pattern of brain activity (i.e., an individual differential bandwidth activity within the EEG spectrum) and can often be resistant to variation. Atwater (1997) reported that practitioners of the Hemi-Sync process have observed a state of hypnagogia or experiences of a kind of mind-awake/body asleep state associated with entrainment of the brain to lower

frequencies (delta and theta) and with slightly higher-frequency entrainment associated with hyper suggestive states of consciousness (high theta and low alpha). In line with current EEG research relating to ADHD (see Lubar, 1991), Hemi-Sync researchers have noted deep relaxation with entrainment of the brain to lower frequencies and increased mental activity and alertness with higher frequency entrainment. The Monroe Institute has been refining binaural-beat technology for over thirty years and has developed a variety of applications including enriched learning, improved sleep, relaxation, wellness, and expanded mind-consciousness states (Atwater, 1997).

Binaural beat stimulation can be further understood by considering how we detect sound sources in daily life. Each ear can detect incoming frequencies or sounds as the wave curves around the skills by detraction. The brain perceives this differential input as being 'out of phase', and this waveform phase difference allows for accurate location of sounds. Stated simply, less noise is heard by one ear, and more by the other. The capacity of the brain to detect a waveform phase difference also enables it to perceive binaural beats (Atwater, 1997). The presentation of waveform phase differences (different frequencies), which normally is associated with directional information, can produce a different phenomenon when heard with stereo headphones or speakers. The result of presenting phase differences in this manner is a perceptual integration of the signals; the sensation of a third 'beat' frequency (Atwater, 1997). This perception of the binaural-beat is at a frequency that is the difference between the two auditory inputs.

Binaural beats can easily be heard at the low frequencies (<30 Hz) that are characteristic of the EEG spectrum (Austere, 1973). This perception of the binaural-beat is associated with an EEG frequency following response (FFR). This phenomenon is described by Atwater (1997) as EEG activity, which corresponds to the fundamental frequency of the stimulus, such as binaural-beat stimulation.

The sensation of auditory binaural beating occurs when two coherent sounds of nearly similar frequencies are presented one to each ear with stereo headphones or speakers. Origination in the brainstem's superior olivary nucleus, the site of contra lateral integration of auditory input (Oster, 1973), the audio sensation of binaural beating is neurologically conveyed to the reticular formation (Swann, Bosanko, Cohen, Midgley & Seed, 1982) and the cortex where it can be observed as a frequency-following response with EEG equipment. The word reticular means 'net-like' and the neural reticular formation itself is a large, net-like diffuse area of the brainstem (Anch, et al. 1988). The RAS regulates cortical EEG (Swann et al. 1988) and controls arousal, attention and awareness – the elements of consciousness itself (Tice & Steinberg, 1989; Empson, 1986). How we interpret, respond, and react to information (internal stimuli, feelings, attitudes and beliefs as well as external sensory stimuli) is managed by the brain's reticular formation stimulating the thalamus and cortex, and controlling attentiveness and level of arousal (Empson, 1986). Binaural beats can influence ongoing brainwave states by providing information to the brain's reticular activating system (RAS). If internal stimuli, feelings, attitudes, beliefs, and external sensory stimuli are not in conflict with this information, the RAS will alter brainwave states to match the binaural-beat provocation.

A recent study of Foster (1991) was conducted in an effort to determine the effects of

alpha-frequency binaural-beat stimulation combined with alpha neurofeedback on alpha frequency brainwave production. Foster found that the combination of binaural-beat stimulation and alpha neurofeedback produced significantly higher alpha production than that of neurofeedback alone, but that the group which received only binaural-beat stimulation, produced significantly higher alpha production than either group. In a review of three studies directed towards the effects of Hemi-Sync tapes on electrocoritcal activity, Sadigh (1994) reported increased brainwave activity in the desired direction after virtually minutes of exposure to the Hemi-Sync signals.

Research to date, therefore, has suggested that the use of the binary-beat sound applications can contribute to the establishment of prescribed variation in individual psycho physiological homeostatic patterns of cognitive variables and characteristic brainwave patterns affords not only a methodology for change, but also an objective unit for measure of change.

Purpose of the Present Study

The present study was an effect to develop, and to test the efficacy of, techniques designed to increase anterior theta activity and susceptibility to hypnosis as measured by currently employed standardized instruments. Contemporary hypnosis/EEG research studies have found individual electro cortical differents (anterior theta activity) to be reliable predictors of hypnotic susceptibility. Clinicians and researchers within the field of neurofeedback training have also demonstrated the efficacy of prescribed changes in individual EEG patterns and behavioral variables, with a number of medical and psychological disorders. Practitioners and researchers utilizing the binaural-beat technology developed by the Monroe Institute have produced impressive changes in individual EEG patterns. Given the strong support of brainwave modification, and the efficacy of the binary-beat sound patterns to modify brainwave patterns, it is logical and advantageous to make use of a binaural-beat sound based protocol. Since theta activity is positively related to individual level of hypnotic susceptibility, it follows that the employment of a protocol designed to increase frontal theta activity could also meditate an increase in hypnotic susceptibility. It was proposed that a binaural beat protocol designed to increase in theta measure (% activity), and a related increase in hypnotic susceptibility, as measured by standardized instruments. In consideration of the previous association between hypnotic susceptibility increases in theta activity relative to hypnotisability group. The examination of potential differential changes in theta activity relative to initial level of hypnotisability could provide further data supporting the association of theta activity and hypnotic susceptibility.

Research Hypotheses

Hypothesis 1 – increased in hypnotic susceptibility, after exposure to binaural-beat sound stimulation protocol, will be observed for all participants from pre to post-measures. The Significant Change Index (SCI) was used to evaluation change between pre and post SHSS:C scores. Graphing was used to provide visual interpretation and of individual level of hypnotisability.

Hypothesis 2 – Theta activity will increase in all individuals as a result of the binaural beat sound stimulation protocol. The C Statistic was performed on the time series of theta measures across baseline and stimulus sessions for each individual.

Hypothesis 3 – Increases in theta activity after exposure to binaural-beat sound stimulation protocol. Will be of greatest significance in individuals in the medium-hypnotisable group. The C Statistic was performed on the time series of Theta measures across baseline and stimulus sessions for each individual.

Hypothesis 4 – Increases in theta activity after exposure to binaural-beat sound stimulation protocol will be of least significance in individuals in the low hypnotisable groups. The C Statistic was performed on the time series of theta measures across baseline and stimulus sessions for each individual.

METHOD

Participants

Six participants were selected from a pool of Northern Arizona University (NAU) undergraduates who were administered the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C, Weitzenhoffer & Hilgard, 1962). The six participants were grouped according to varying degrees of hypnotisability (two lows, two mediums, and two highs) for participation in the stimulus sessions. The variations in hypnotic susceptibility within each group were minimal, assuring the participants were relatively homogeneous in terms of initial hypnotic susceptibility measures. To reduce the risk of attrition during this study, participants were paid $40.00 each for participation in the study.

INSTRUMENT

Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C)

Each participant's score on the SHSS:C served as a baseline measure of hypnotic susceptibility. Also, after completion of the three stimulus sessions, raw scores were obtained on the SHSS:C for each participant a second time. The raw scores obtained in this post treatment evaluation provided an index of each participant's hypnotic susceptibility level after exposure to the binaural-beat stimulus protocol. The following general hypnotizability level designation and raw-score ranges are used with the SHSS:C (a) low hypnotizable (0-4), (b) medium hypnotizable (5-7), (c) high hypnotizable (8-10), and (d) very-high hypnotizable (11-12).

The Kuder-Richardson total scale reliability index, which provides a measure of the degree of consistency of participants' responses, was reported by E. R. Hilgard (1965) as .85, with retest reliability coefficients ranging from .60 to .77 over the range of twelve items on the SHSS: C.

APPARATUS

EEG-Recording

The NRS-2D (Lexicor Medical Technology, Inc) is a miniaturized two channel Electroencephalograph (EEG) system. The device is approximately one inch tall, three inches wide, and six inches long and is connected directly to a 486 computer via the parallel port. It has a built in impedance meter and operates with both BIOLEX (BLX) neurotheaphy software and NeuroLex (NLX) EEG acquisition software. The BLX and NLX systems comprise an array of tools including an

audio/visual display system, graphing and reporting features, fast Fourier transformation and spectral analysis of complex wave forms, as well as conventional EEG recordings. An artifact inhibit feature stops all recording when the artifact (e.g., eye movement or other muscle signals) exceeds the selected artifact inhibit amplitude threshold. The computerized system was used to measure participants' theta activity for each 2-second epoch. In the EEG data analysis, fast Fourier transformation was performed, and a power spectrum calculated, for each epoch.

Binaural-Beat Sound Tapes

The Monroe Institute specifically for this study produced the audiocassette tapes used in this study. Both a control tape and experimental tape were used in this study. The binaural beats provided in the experimental tape are unique in that they were designed to be complex brainwave-like patterns rather than simple sine waves. The right-left differences in stereo audio signals on these tapes were assembled in a sequence to produce a dynamic wave pattern (brainwave-like) as compared to a static, uniform sine wave pattern. Specifically, the experimental tape used in this experiment was produced with a binaural-beat pattern that represents a theta brainwave pattern of high hypnotic susceptibility. The Monroe Institute provided objective data verifying the binaural-beat components imbedded in the experimental tape, both in wave form and frequency spectra formats.

The experimental tape was produced with pink sound and theta binaural beats imbedded in carrier tones. The control tape was produced with pink sound and tones without binaural beats.

PROCEDURES

General

For all participants, informed consent forms were provided. All participants were debriefed at the completion of the study. All participants, at each stage of the study, were treated according to the ethical guidelines of the American Psychological Association.

Participant EEG Setup

During all sessions earlobes and the forehead electrode sites were cleaned with Ten-20 Abrasive EEG Prep Gel to decrease skin resistance prior to attaching EEG electrodes. Ten-20 EEG conductive paste was used as a conduction medium to fill the cups of silver-chloride electrodes. One monopolar EEG derivation was used, located according to the 10-20 system (Jasper, 1958) at FZ; the references were linked ears (R1, R2).

Participant Binaural-Beat Audio Setup

During all sessions participants wore headphones, providing audio input of pink sound and tones (baseline) or pink sound and theta binaural beats imbedded in carrier tones (stimulus).

Multiple Baseline EEG Recordings

The length of pre-stimulus session baseline for participants within each category of

hypnotisability varied as follows: the duration of baseline recordings for Participant #1 was 5 minutes and Participant #2 was 10 minutes. For each category of hypnotisability, the two participants were exposed to a baseline session of either 5 or 10 minutes, and three 20-minute stimulus sessions. This procedure allowed participants to be exposed to the same stimulus sessions under 'time-lagged' conditions. This approach is the foundation of the Multiple Baseline single-subject experimental design, which allows for examination of changes in stimulus sessions relative to the varied baseline periods.

Theta Measures

EEG measures of percent theta activity at frontal (FZ) placement were recorded during all sessions. Data were recorded at each 2-second epoch during EEG recording. These date support trend analysis over time of baseline and stimulus sessions.

Hypnotisability Measures

Pre-stimulus data for level of hypnotisability (SHSS:C scores) were collected for each participant during the selection process. Post-stimulus sessions data for level of hypnotisability (SHSS: C scores) were collected following each participant's last stimulus session.

Baseline Session

During this session participants were given information regarding (a) general understanding of theta binaural-beat sound stimulation and (b) the purpose/protocol of stimulus sessions. Prior to recording of EEG data, the experimenter instructed participants to close their eyes and to take two to three minutes to allow themselves to become relaxed. The experimenter instructed the participant to visualize herself as relaxed and comfortable and still, to experience a feeling of inner quietness. This procedure was used to allow the participant's brainwave activity to stabilize prior to baseline records.

Binaural-Beat Stimulus sessions

The duration of each session was 20 minutes. Prior to recording of EEG data, the participants were allowed 2 – 3 minutes for stabilization of brainwave activity as previously described in the baseline session procedures. Prior to exiting the room, the experimenter started the cassette tape, the EEG recording function, and turned off the overhead light, leaving a single table lamp as a source of illumination in the room. The stimulus session was preset to terminate at 20 minutes. Each participant completed three sessions over a period of one week.

Interviews

Following each stimulation session, each participant was asked about her experience. This free-flow interview was used to assess the participants' subjective experience of listening to the binaural-beat sound stimulation, and to test for adverse effects or reactions on the part of each participant.

Schedule of Sessions

The four sessions (one baseline and three stimulus) were completed for each

participant in two meetings within a five day period. During the initial meeting, the participants completed the first two stimulus sessions in addition to the baseline session. The sessions were scheduled in this manner to reduce participant response cost and to decrease participant attrition. Participants were allowed to take breaks of approximately 10 minutes between each session. The second meeting took place on the second day following the initial meeting. During this second meeting the participants completed the third stimulus session.

Data Analysis

Data was analyzed in order to evaluate changes in theta activity across sessions and changes in hypnotisability levels from pre-stimulus to post-stimulus scale administrations (SHSS:C).

The EEG data of each two-second epoch during the baseline sessions were averaged to yield 10 data points for the five-minute baseline recording and 20 data points for the 10-minute baseline recording. The EEG data for each stimulus session was averaged to yield 25 data points for each 20-minute recording.

In an effort to determine if the pretest to posttest change hypnotisability scores on the SHSS: C exceeded that which would be expected on the basis of measurement error, the Significant Change Index (SCI) as suggested by Christensen & Mendoza (1986) was used. Descriptive techniques (graphical representations) were used to indicate the change in hypnotisability from pre to post-measures.

The C statistic was used to analyze the series of theta activity data across baseline and stimulus sessions. This approach was used to determine if a statistically significant different existed between baseline and stimulus sessions observations of theta activity.

When comparing baseline and stimulus session's observations, the C statistic provides information about changes in the level and direction between the two time series. In the determination of statistical signification of an obtained C value, a Z value is obtained from the ratio of the C value to its standard error of the mean. Graphical representations of the time series of theta activity measures were used to allow confirmation of the statistical findings by visual inspection of the data.

RESULTS

Participant Characteristics

The six participants in this study were female, ranging in age from 19 to 32. In order to facilitate association of each participant with relevant data, the following labels will be used in reference to the participants by hypnotisability group (LOW, MED, HIGH) and by duration of baseline (1 = 5-minute baseline, 2 = 10-minutes baseline). The three participants (one from each hypnotisability group) with 10 minute baselines are referred to as LOW2, MED2, and HIGH2. The majority of participants reported having no previous experience with relaxation-oriented experiences such as hypnosis, meditation, or formal relaxation training.

Test of Hypotheses

Hypothesis 1 – Increases in hypnotic susceptibility, after exposure to binaural-beat sound stimulation protocol; will be observed for all participants from pre to post-measures. Both participants in the low-susceptibility group (LOW1, LOW2) increased by a raw score of 1 from pre to post-measures. Both of the participants in the medium-susceptibility group (MED1, MED2) increased to the raw score of 8. MED1 increased from a raw score of 6 to a raw score of 8, MED2 increased from a raw score of 7 to a raw score of 8. No changes in raw score values were observed with the participants in the high-susceptibility group (HIGH1, HIGH2) between pre and post-measures. A calculation of the Signification Change Index (SCI) [used to assess pretest to posttest SHSS:C scores considering the standard error of the difference (SD) between the two test scores: SCI value > 1.65 denotes significance at $p<.05$] for each participant the following values: LOW1 – SCI = 1.96, SD = .51, $p<.05$; LOW2 – SCI = 1.96, SD = .51, $p<.05$, MED1 – SCI = 3.92, SD = .51, $p<.05$, MED2 – SCI = 1.96, SD = .51, $p<.05$. According to these calculations, a change of .84 or greater in raw-score value was required to establish a significantly different change in hypnotic susceptibility. Therefore, these data suggest that this hypothesis was supported in participants LOW1, LOW2, MED1, and MED2.

Hypothesis 2 – Theta activity will increase in all individuals as a result of the binaural-beat sound protocol. Evaluation of intersession theta activity relative to baseline theta activity first required an analysis of baseline data to assure stability for subsequent comparison. In the examination of baseline trends of theta activity, the C statistic was calculated for each participant. LOW1 demonstrated no significant trend during the 5-minute baseline session ($C = .18$, $n = 10$, $p>.05$). LOW2 demonstrated a significant downward trend during the 10-minute baseline session ($C = .75$, $n = 20$, $p<.05$). MED1 demonstrated no significant trend during the 5-minute baseline session ($C - .20$, $n = 10$, $p>.05$). MED2 demonstrated no significant trend during the 10-minute baseline session ($C = .32$, $n =$ $p>.05$). HIGH1 demonstrated no significant trend during the 5-minute baseline session ($C = -.28$, $n = 10$, $p>.05$). HIGH2 demonstrated no significant trend during the 10-minute baseline session ($C = -.07$, $n = 20$, $p>.05$).

In five of six participants, the baseline time series of theta activity data did not show a constant direction or trend, and indicated no departure from random variation. One participant (LOW1) demonstrated a significant downward trend. Therefore, the baseline data for all six participants provided adequate support for subsequent comparisons.

In the examination of trends in theta activity across baseline and the three binaural-beat stimulation sessions, the C statistic was calculated for each participant. LOW1 demonstrated a significant upward trend ($C = .36$, $n = 85$, $p<.01$). LOW2 demonstrated a significant upward trend ($C = .35$, $n = 95$, $p<.01$). MED1 demonstrated a significant downward trend ($C = .74$, $n = 85$, $p<.01$). MED2 demonstrated a significant upward trend ($C = .88$, $n = 95$, $p<.01$). HIGH1 demonstrated a significant upward trend ($C = .70$, $n = 85$, $p<.01$). HIGH2 demonstrated a significant upward trend ($C = .77$, $n = 95$, $p<.01$).

Thus, in five of six participants significant upward intersession trends in theta activity were observed. This significant intersession activity in relation to non-significant baseline activity provides support for this hypothesis in five of six participants.

Hypothesis 3 – Increases in theta activity will be of greatest significance in the participants in the medium-hypnotizable group. An examination of the derived C statistic values for each hypnotic susceptibility group provided data regarding the relative significance of theta activity increases between groups. Mean C values for each susceptibility group (LOW, MED, HIGH) were calculated. The mean value for the medium-hypnotizable group does not include MED1, as this participant demonstrated a decrease in theta activity across stimulus sessions. Therefore, comparing the mean C value for the low and the high susceptible groups with the single C value for the medium susceptibility group which increase, the following values were obtained:

LOW (M = .36)
MED (M = .88)
HIGH (M = .74)

This analysis indicated a supportive trend in the data, but without inclusion of participant MED1, it does not provide support for this hypothesis.

Hypothesis 4 – Increases in theta activity will be of least significance in the participants in the low-hypnotisable group.
An examination of the derived C statistic values for each hypnotic susceptibility group provided data regarding the relative significance of theta activity increases between groups. Mean C values for each group of susceptibility (LOW, MED, HIGH) were calculated. The mean value for the medium-hypnotizable group does not include MED1, as this participant demonstrated a decrease in theta activity across stimulus sessions. The mean C values for each group of susceptibility are as follows:

LOW (M = .36)
MED (M = .88)
HIGH (M = .74)

Therefore, these data suggest support for this hypothesis.

DISCUSSION

Hypothesis 1

Increases in hypnotic susceptibility, after exposure to binaural-beat sound stimulation protocol, will be observed for all participants from pre to post measures.
As mentioned earlier, the participants who demonstrated a significant increase in hypnotic susceptibility were Participants LOW1, LOW2, MED1 and MED2. The participants in the high-hypnotizable group did not change in the measure of hypnotic susceptibility. Graphical analysis allowed for a simplified examination of the changes in hypnotisability levels from the pre to post binaural-beat stimulation administrations. In as much as no decreases in demonstrated raw-score values were observer across the six participants, these data suggest support of previous data indicating the relatively stable nature of hypnotic ability over time (Perry, Nadon & Button, 1992). As previously mentioned, a potential ceiling effect may be present in the SHSS: C. The items on the SHSS: C are presented in a progressively greater difficulty. Data reported by Perry, Nadon & Button (1992) showed that 68% of the normative sample

passed the first four items, and only 16% passed the last four items. The items begin relatively easy and become progressively more difficult and therefore are rank-ordered and do not meet interval level requirements. Thus, to accurately interpret of the findings of this study, the progressive organization of the SHSS:C items must be taken into consideration. The obtained changes in the medium-susceptible group may be more meaningful than observed changes in the low-susceptible group, as a change of one raw-score point would be a more difficult task in the medium-susceptible group than would a change of one raw-score point in the low-susceptible group. This indicates that the application of the Significant Change Index may not reveal the true significance of changes in hypnotic susceptibility with the SHSS:C. The organization of the SHSS:C is also an important factor in the ceiling-effect phenomena observed in the two participants in the high-susceptible group.

Low-Hypnotisable Group

The two participants in the low-hypnotizable group demonstrated modest increases in SHSS: C raw score values. Both participants LOW1 and LOW2 increased one raw-score value from two to three. As previously suggested, the lack of initial hypnotic ability in less hypnotizable individuals often leads to unsuccessful attempts at modification of hypnotisability with this population. Although both participants in this group demonstrated only a single point increase in raw-score values on the SHSS: C, a positive increase suggests that modification of hypnotisability % with less susceptible individuals using binaural-beat stimulation can lead to positive results.

Medium-Hypnotisable Group

Considering the previously mentioned hierarchy of difficulty with the SHSS: C, it may be said that the two participants in the medium-hypnotizable group demonstrated the greatest increase in SHSS: C raw score values. Both participants MED1 and MED2 changes in general hypnotisability level from medium to high, with raw-scores of 6 to 8 and 7 to 8, respectively. These data also suggest support for Perry's (1977) findings, in which successful modification of hypnotisability was most common in medium hypnotizable subjects.

These individuals appear to possess a certain essential cognitive framework or a predisposition, which provides for a variety of hypnotic experiences, as demonstrated on the SHSS: C.

In relation to the effects of binaural-beat sound stimulation on hypnotic susceptibility, these data reveal mixed conclusions. An interesting point is that Participant MED1 demonstrated the largest increase in hypnotic susceptibility and also a significant decrease in theta activity in response to the binaural-beat sound stimulation. In contract, Participant MED2 demonstrated the most significant increase in theta activity in response to the binaural-beat sound stimulation. Therefore, these data indicate that theta activity is not the only contributing factor in hypnotic susceptibility, suggest that modification of hypnotisability with medium susceptible individuals using binaural-beat stimulation can be effective, and highlight the importance of individual variation. These data can provide a meaningful direction for researchers and practitioners of hypnosis interested in increasing hypnotic susceptibility.

High-Hypnotisable Group

The two participants in the high-hypnotizable group demonstrated no change in SHSS: C raw-score values. The possibility exists for a ceiling-effect with individuals

scoring at the upper end of the SHSS: C scale. Both participants HIGH1 and HIGH2 had the same pre and post raw-scores, 9 and 10, respectively. The items or skills an individual must demonstrate to increase in raw score above 9 are cognitive items of greater difficult including, negative and positive hallucination tasks. This potential ceiling-effect is also evident in Hilgard's (1965) report on relative item difficulty within the SHSS: C, in which only nine percent of participants in the normative base passed the positive and negative hallucination tasks. These data suggest that those who are high in hypnotisability, in terms of the SHSS: C, may be less responsive to binaural-beat stimulation relative to individuals who demonstrate less hypnotic ability. Perhaps there is a ceiling effect on an individual's ability to produce theta as well.

Hypothesis 2

Theta activity will increase in all individuals as a result of the binaural-beat sound protocol.
This hypothesis was supported in data from five of six participants, each showing an upward intersession trend in theta activity across stimulus periods. The subject in the medium hypnotizable group with the 5-minute baseline (MED1) demonstrated a downward intersession trend in theta activity across stimulus periods. The theta activity of Participant MED1 changed significantly in session-3. No significant change or trend in theta activity was observed for this participant prior to session-3. These data indicate that some confounding factor(s) may have been in effect during the session-3 stimulation/recording period of participant MED1.
In a post-hoc analysis of intersession theta activity, the C statistic was calculated for the five participants who demonstrated a significant increase in theta activity over the three binaural-beat stimulation periods. This analysis was employed to determine which of the three binaural-beat stimulation sessions produced the most significant increase in theta activity relative to the baseline measures. For all five participants, the data from the third stimulation session (session-3) produced C values of the highest significance relative to baseline. These third session C values follow. LOW1 ($C = .49$, $n = 35$, $p<.01$), LOW2 ($C = .67$, $n = 45$, $p<.01$), MED2 ($C = .89$, $n = 45$, $p<.01$), HIGH1 ($C = .62$, $n = 35$, $p<.01$), HIGH2 ($C = .83$, $n = 45$, $p<.01$). These data suggest that continued exposure to binaural-beat stimulation could have an incremental positive effect on theta activity, and that in this study the most significant incremental effect was observed in the third stimulus session.
In a post-hoc analysis of intersession theta activity, the C statistic was calculated for all six participants using the combination of data from session-1 and session-2 relative to data from the baseline session. This comparison was done to further evaluate the initial effects of the binaural-beat sound stimulation. The following C values were revealed: LOW1 ($C = .36$, $n = 60$, $p<.01$), LOW2 ($C = .30$, $n = 70$, $p<.01$), MED1 ($C = .11$, $n = 60$, $p>.05$), MED2 ($C = .74$, $n = 70$, $p<.01$), HIGH1 ($C = .18$, $n = 60$, $p>.05$), HIGH2 ($C = .36$, $n = 70$, $p<.01$). These data suggest that the binaural-beat stimulation effected an initial change (increase) in four of the six participants (LOW1, LOW2, MED2 and HIGH2).
The two participants who did not demonstrate a significant increase in theta activity during the two initial sessions were MED1 and HIGH1. As mentioned earlier, Participant MED1 demonstrated a significant downward intersession trend across all three sessions, most obvious in session-3. The explanation of this anomalous response is uncertain, but as described in the introductory section on binaural-beat sound stimulation, a number of factors influence the EEG frequency-following response. Factors of primary interest in relation to theta activity are internal feelings, attitudes, beliefs and overall mood-state.

As theta is related to an overall relaxed state, any negative affect related to these factors could adversely affect theta production. Participant HIGH1 also demonstrated the most significant response in session-3. Participant HIGH1 reported previous experienced with head injury and EEG measurements. This experience involved an automobile accident in which the participant was knocked unconscious some ten years previous. Reported results of EEG at that time indicated an 'abnormal' pattern during the sleep state. The relationship of possible brainwave abnormalities to measured theta activity in response to binaural-beat stimulation is now known. However, there is the possibility that the theta response of participant HIGH1 was affected by this head injury.

An additional post-hoc analysis was utilized to provide a precise evaluation of the immediate effect of the binaural-beat sound stimulation within the framework of the Multiple Baseline design. In this analysis, within each susceptibility group, the 10-minute baseline recording periods of Participant LOW2, MED2 and HIGH2 were compared to the 5-minute baseline recording periods appended with 5-minutes of the first stimulus session of Participants LOW1, MED1 and HIGH1. As previously stated, the participants within each susceptibility group assigned 10-minute and 5-minute baseline recording periods all demonstrated no significant upward trends in theta activity during baseline recordings. An examination of the initial five-minute stimulation period following the baseline period for the participants assigned the 5-minute baseline % within each susceptibility group revealed the following C values; LOW1 ($C = .72$, $n = 16$, $p<.05$), MED1 ($C = .27$, $n = 16$, $p>.05$), HIGH1 ($C = .25$, $n = 16$, $p>.05$). The corresponding Z values for each C value stated above follow. LOW1 ($Z = 2.99$); MED1 ($Z = 1.12$); HIGH1 ($Z = 1.02$). Participant LOW1 demonstrated a significant upward trend during the initial 5-minute stimulus period, and participants MED1 and HIGH1 did not demonstrate a significant trend during the initial 5-minute stimulus period. As mentioned earlier, participants MED1 and HIGH1 did not demonstrate a significant increase in theta activity during the two initial sessions. In contrast, Participant LOW1 demonstrated a significant increase in theta activity during all three stimulus sessions. These data highlight the power of individual differences in relation to theta brainwave activity. The observation that the initial recording of stimulus data seemed predictive of a differential theta activity response over time may be particularly important is this analysis. It may be that the significance of an initial theta activity response to binaural-beat sound stimulation is positively related to the significance of the theta activity response over time.

Hypothesis 3 – Increases in theta activity will be of greatest significant in the participants in the medium-hypnotisable group.

The obtained unequal number of participants in each group, due to the exclusion of participant MED1 (this participant demonstrated a decrease in theta activity across stimulus sessions), presents difficulties in providing support for this hypothesis. Participant MED2 demonstrated the highest significant overall increase in theta activity across the baseline and stimulus sessions primarily manifested in session-2 and session-3. Further support for this hypothesis is also indicated in the previously mentioned post-hoc analysis of (a) session-1 and session-2 combined relative to baseline, and (b) session-3 comparison to baseline. In both analyses, Participant MED2 demonstrated the highest significant overall increase in theta activity.

Hypothesis 4 – Increases in theta activity will be of least significance in the participants in the low-hypnotisable group.

The observed unequal number of participants in each group, due to the exclusion of Participant MED1 (this participant demonstrated a decrease in theta activity across

stimulus sessions), also presents difficulties in providing support for this hypothesis. Even with this consideration, the observation that both Participants LOW1 and LOW2 demonstrated the lease significant overall increase in theta activity across the baseline and stimulus sessions suggests support for this hypothesis.

Conclusions

The findings of this study provide support for the efficacy of the binaural-beat sound stimulation process, pioneered by the Monroe Institute, in effecting an increase in theta brainwave activity. As mentioned earlier, the baseline and stimulus tapes differed only in the presence or absence of the binaural-beat stimulation (ie, both contained pink sound and tones). Each participant demonstrated no significant upward trend in baseline recordings of theta activity. Thus, the observed trends in theta activity following introduction of the binaural-beat sounds allows one to state, with a good deal of certainty, that it is the effect of the binaural-beat sounds and not merely the passage of time, the measurement operation, or some other independent event that effected the observed increases in theta activity. During the post-session interviews, no descriptions of unpleasant experiences were reported. Individual reports of each stimulation session varied from profoundly insightful to pleasant and relaxing.

The single-subject experimental design used in this study allowed for examination of the effects of binaural beast stimulation on individual theta activity over time. With single-subject methodology there is no need to compromise the effects of stimulation on different subjects by averaging across groups as is done with group designs.

The data in this study relative to hypnotisability suggest support for the stability of hypnotic susceptibility over time and suggest support for previous data showing differential response to modification of hypnotisability relative to initial susceptibility level. This support is evident in the fact that no participant decreased in hypnotic susceptibility over time and in the differential participant responses across general hypnotic susceptibility levels. Surprisingly, the most significant increase in hypnotic susceptibility was observed in the participant with the most significant decrease in theta activity in response to the binaural-beat sound stimulation. Even though the significance of the decrease in theta activity for this participant was explained entirely by third session recordings, it is difficult to draw conclusions regarding the relationship of theta activity to hypnotic susceptibility when reviewing the findings of this study. Overall, this study indicates that theta activity is related to, but cannot uniquely explain, the variation in hypnotic susceptibility.

Limitations

Although the single-subject experimental design used in this study provided a direct examination of individual responses over time, the design of this study is not without inherent limitation. For example, as the participants in this study are not representative of the general population, it would be difficult to generalize the findings of this study, even to a similar group of females. It is worth noting, however, that the issue of external validity, which often essentially relates to possible inconsistencies in the data due to small sample sizes, is tempered somewhat in this study by the adequate number of recorded data points within each subject.

The demographic data were collected post-hoc, and thus prevented the homogeneous selection of subjects based on such variables as previous experience with EEG recordings or head-injury. Also, data collected in intersession interviews

was not recorded for further analysis. This is unfortunate, as information regarding the subjective experience of binaural-beat stimulation is meaningful not only in and of itself but could have provided data relating to the differential participant theta activity in response to binaural-beat sound stimulation observed in this study.

Future Research

In future related research with the use of binaural-beat stimulation, the time of exposure could be increased. An increase in exposure time could provide important data relating to modification of theta brainwave activity and hypnotic susceptibility. This could be easily accomplished by using a home-practice protocol, not unlike home-practice relaxation training commonly used in behavioral medicine settings with disorders such as migraine headaches. This type procedure would allow for extended stimulation periods in a true applied setting. Another possible line of research could involve the use of binaural-beat stimulation within background music during hypnotic procedures in an effort to increase participant response to hypnotic susceptibility evaluation measures. The use of 'background support' via binaural-beat sound stimulation could also prove a valuable asset to clinical practitioners as well. Data from this study may also provide a foundation for subsequent group comparison designs directed toward the generalization of stimulation effects across larger groups of individuals.

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1. User Comments

In one study, thirty patients had sessions in Theta (5 Hz) and experienced relaxation states of 80 – 100% after five minutes as well as improved pain relief. Eight patients had blood tests before and after the sessions and showed improved beta-endorphin levels of 10 – 50%.
Using a first-generation prototype light/sound device, one doctor noted, “These devices produce a distinct relaxation state. Programming the device between 3 and 7 Hz, it takes about 10 to 15 minutes for the patients to enter – effortlessly – a state of hypnosis. They terminate the sessions relaxed and with a feeling of well-being”. Also, “the device has a calming effect on the nervous or anxious patients. In a majority of cases, the patients feel relaxed, and clam during a period of three to four days after the session. It happens that the subjects have a reminiscence of childhood experiences, particularly when in Theta. They related their experiences which we incorporated into our psychotherapeutic program”.
“The harmonics works like a tranquilizer and the effect lasts for several days. Using the harmonics in Theta frequency, clients are very receptive to suggestions on behavioral aspects such as reducing tobacco, alcohol and food consumption’s”.
Many patients “were more creative during the sessions”.
“By inducing hemispheric coherence the frequencies can contribute to improved intellectual functioning of the brain. Like children spending most of their time in Theta, the machine allows a reduction in learning time. With adults a return into Theta allows them to discover childhood experiences. The machine is like a ‘lost and found office’ for the subconscious”.
DJ Anderson used photo-stimulating goggles with variable frequency using red LEDs in order to stimulate the optic nerve, through closed eyes, right and left with frequencies between 0.5 and 50 Hz. The study included seven patients who suffered a total of more than 50 migraines during the observation period. Forty-nine of these migraines were relieved (either by reducing the average duration or by increasing the frequency interval in between migraine crisis) and 36 other migraines could be

stopped while using the goggles. DJ Anderson, B.Sc, MB, “The treatment of Migraine with Variable Frequency Photo-Stimulation”, in HEADACHE, March 1989, pp 154-155:

The more these sounds are used, the easier it becomes to produce and maintain Alpha/Theta rhythms. As these states of higher awareness become infused into normal brain activity, the result can lead to what some have called a fifth state of consciousness, or an ‘awakened mind’. In this state of illumination and bliss one sees the world as distinctly as before but with a new mind that perceives the universe with new meaning. It’s this experience of illumination that is the seed for all breakthrough scientific theories, literary ideas, revolutionary inventions, and artistic masterpieces. The technology used here induces these states by forcing your brain to focus your mental energies inward … tapping your own vast reserve of creative genius and eventually unfolding ‘an enlightened state of awareness’.

An unusual side benefit of listening to these sounds is a surprising need for less sleep. Some users are able to reduce their sleep requirement by as much as 3 – 4 hours each night, rising each morning feeling refreshed as if they had slept a full 8 hours. The reason? It’s believed the theta-sounds replace the need for extensive dreaming which is the main purpose of sleep. Another interesting side effect, many users report a dramatic increase in sex drive. No one knows exactly why, but it may be linked to changes in brain chemistry. But, perhaps the most unusual side effect is the reported increase in psychic functioning, including episodes of precognition, out-of-body experiences, and spontaneous channeling events.

When you finish each session your entire body becomes charged with a new energy and vitality. Fears and anxieties are gone. You are renewed, more alert, and mentally you feel on top of the world.

What causes the euphoria and peak experiences? The neuroscientists say the ‘high’ you experience is caused by a release of endorphins in the brain. A hundred times more powerful than morphine it makes you feel like you’re soaring with eagles.

Zen mediators have been found to alter Alpha/Theta frequency according to their depth of meditation, reports Japan’s leading neurophysiologist, Dr Tomio Hirai. He has correlated brain-wave patterns with certain stages of meditation and according to Dr. Hirai, “Meditation is not merely a state between mental stability and sleep, but a condition in which the mind operates at the optimum. In this condition the person is relaxed but ready to accept and respond positively to any stimulus that may reach him”.

Research now confirmed that brainwave rhythms correspond to certain states of consciousness, and this suggests that individuals capable of altering their brainwave patterns can have significant control over other mental and physiological functioning. As Elmer and Alyce Green of the famous Menninger Institute first reported in the mid-70s’, “…simply causing your brain to generate theta activity for a few minutes each day seems to have enormous benefits, including boosting the immune system, enhancing creativity, and triggering integrative experiences leading to feelings of psychological well-being”.

Biofeedback researchers have found that people, who enter the ‘theta state’, expand their states of consciousness, acquire super-receptivity to new information, and demonstrate a greater ability to ‘rescript’ material on a subconscious level. Even more astonishing are the findings of a study conducted on a group of chronic alcoholics at a University in Colorado. After 13 weeks the group that learned to generate theta and alpha brainwaves, shoed a far greater recovery rate, and a complete transformation of personality.

e Viewing?

Remote viewing is the ability of a person to project their conscious observation to a distant location in the physical universe and to see or sense what is there.
There are a number of methods available to achieve remote viewing; Ganzfeld, CRV (using map coordinates) and psychometry.

How does the Remote Viewing Harmonic Work?

It was clear from the work done in the 70s and 80s by various governments and the CIA that the main state was likely to be an alpha wave state.
Many accounts of CRV showed the participants talking to coordinators; almost certainly indicating that they probably moved between alpha and low beta. They will certainly have had both frequencies working together in many instances.
Unfortunately, most accounts of remote viewing are only partially accurate. Sometimes the accounts were completely incorrect.
We believed that it was at certain combinations of alpha frequency and beta frequency that the highest incidence of correct remote viewing took place.
We attended many remote-viewing courses and found that most attendees were in a mildly relaxed but alert state – again supporting the theory that the active principles were a combination of alpha and beta.
We initially worked with carrier waves at 500 – 600 Hz but eventually found that carrier waves between 150 Hz and 250 Hz worked best for entrainment.
After extensive case testing we found that an alpha frequency of 10 Hz consistently produced outstanding results for viewing distant or sealed objects. Some aspect of the target was identifiable in over 60% of our tests. The correct data tended to come through within 1 minute of achieving this frequency.
We then tried sweeping through the beta frequencies whilst the 10 Hz frequency remained constant. This would effectively set up the absolute correct conditions at least once through the sweep. The data was constantly monitored and the results correlated.
The first complementary beta frequency was found to be at 14.5 Hz and the second at 18.0 Hz. There were clear peaks of accurate data retrieval at these 2 frequencies.
We compared the use of each frequency in conjunction with the 10 Hz base and the use of all three frequencies together.
There was a significant improvement in data retrieval when all 3 frequencies were combined.
The remote viewing harmonic sweeps from 20 Hz to 10 Hz over a period of 10 minutes. This ensures that your brain will lock into the frequency at some point. Once 10 Hz is reached the 14.5 Hz and 18.0 Hz harmonics are added at a lower amplitude. Remote viewing facility would be at its peak in the last 5 minutes of the program.

The frequency development of Bodymelt and Threshold

Whilst evaluating the sweep down through low beta and higher alpha we noticed a consistent response at 12.0 Hz plus or minus 0.2 Hz.
The whole body, no matter how tense or anxious, completely relaxed at this frequency. It remained relaxed whilst at this frequency.
The effect was very like the muscular relaxation you feel when in a hot sauna. It was

a powerful demonstration of how the brain can affect the body. It also demonstrated how, with the correct tools, we could also control the body from an external source. We experimented with other harmonic frequencies in conjunction with the 12 Hz frequency and made other discoveries (later in the E Book) but found that the relaxation power was driven almost entirely by the 12 Hz frequency.
The Bodymelt harmonic sweeps from 20 Hz down to 12 Hz over a period of 8 minutes. The rest of the program stays at 12 Hz for the deepest relaxation possible without distraction.
One of the most remarkable effects was found as we scanned through the theta range following relaxation at 12 Hz. At 7.0 Hz plus or minus 0.3 Hz we experienced an obvious movement of consciousness.
The effect was quite startling at first as it was sudden, and was like a 'pulling of consciousness from the body to the brain or mind'. It seemed like all awareness was focused at the front of the head just behind the eyes. We experienced a consistent loss of awareness of the physical body.
After a varying length of time in this state, a 'travelling' sensation was experienced, often with visual and auditory imagery. This was clearly the rudiment of an OOBE or astral projecting experience.
We experimented with further harmonics but did not find anything that enhanced this effect.
The Threshold harmonic sweeps from 20 Hz down to 12 Hz over a period of 8 minutes to create the deep relaxation mentioned earlier. The theta frequency at 7 Hz is increased in amplitude over the next 12 minutes. The 'consciousness pulling' effect tended to happen after about 15 minutes; but timing was variable.

The frequency development of Telepath

The body of scientific evidence suggested that Telepathy worked when theta activity was present. It seemed reasonable to hypothesize that when two people have matched theta waves they have the potential to be telepathic (much like the use of carrier waves for telecommunication systems).
We experimented with general synchronized theta sweeps using two experimenters. We found that success was achieved at a number of theta frequencies, the synchronization being the key factor.
We considered that long distance telepathy and extrasensory communication may be enhanced by incorporating the Earth's natural resonance. This is called the Schumann Resonance.
The fundamental frequency of the Schumann resonance is roughly the fundamental frequency of a spherical shell whose inside boundary is the surface of the Earth and whose outside boundary is the ionosphere, acting as a spherical shell electromagnetic wave former.
The fundamental frequency ought to be roughly the time it takes electromagnetic radiation to go all the way around the spherical shell. Since the speed of light is about 300,000 km/sec and one cycle is the circumference of the Earth, which is about 40,000 km/cycle. Basic physics calculates this as a frequency of 7.5 Hz.
The Schumann Resonances are actually observed by experiment to occur at several harmonic frequencies between 6 and 50 cycles per second; specifically 7.8, 14 (see earlier as an RV enhancing frequency), 20, 26, 33, 39 and 45 Hz with a daily variation of about +/- 0.5 Hz. The 7.8 Hz observed fundamental resonance is close to the rough theoretical estimate of 7.5 Hz. So long as the properties of Earth's electromagnetic cavity remains about the same, these frequencies remain the same.

The addition of the Schumann resonance did show an improvement in telepathic communication.
The telepath harmonic sweeps from 20 Hz down to 12 Hz over a period of 18 minutes to create the deep relaxation mentioned earlier. The theta frequency at 7.8 Hz (Schumann frequency) is increase in amplitude over the next 12 minutes. The communication of information between 2 synchronized experimenters was accurate and consistent.

How the frequencies enhance Speed Learning

There are a number of references to enhanced learning abilities due to the use of binaural frequencies – you will see these references in Chapter 8. Many of these are in the theta range.
We feel that alpha frequencies are more potent in this particular area.
We also used the references from the work of Ostrander and Schroeder in the tremendous book Super learning to experiment with pulsed sound used in conjunction with the binaural effect.
It is worth noting that rhythmic pulsing of sound can cause entrainment of other parts of the body.
We used pulsed sound at 60 Hz as recommended in Super nature. This used in conjunction with a 12 Hz harmonic frequency created a perfect environment for speed learning and super learning.
You would need to read your study material or, better still, play it in the background of your meditation session.

The frequencies used for Precognition

It is thought that a number of frequencies cause the generation of precognitive dreams. We found that this was best enhanced at around 6.0 Hz plus or minus 0.4 Hz.
It is worthy of note that at these frequencies we had consistent reports of 'awareness of presence' in the meditative state. It was often described as a caring presence.
The use of this program should be in conjunction with a suitable dream capturing approach. We found that precognition was random and not easily detectable until the event occurred.
It is also worthy of note that many experiments have confirmed that feelings of 'déjà vu' were indeed sequences seen in dreams at some time in the past.
The incidence of déjà vu greatly increases after using the Precognition program.
The harmonic sweeps from 20 Hz down to 12 Hz over a period of 8 minutes to create the deep relaxation mentioned earlier. The theta frequency at 5.8 Hz is increased in amplitude over the next 12 minutes. Initially you may feel disturbed by the 'presence'. You will get used to this after a while.

The exact frequencies used on the Sleep Reduction program

It is well documented in scientific journals that regular use of theta frequencies will reduce your need for sleep.
As we found theta frequencies to be so potent in inducing other effects we tried to find a theta frequency that was both relaxing and non distracting.
We found that a frequency of 5.6 Hz caused the largest amount of sleep recovery.
The Sleep Reducer sweeps from 18 Hz down to 5.6 Hz over a period of 10 minutes to ensure complete entrainment. The theta frequency at 5.6 Hz remains constant for

the next 20 minutes to maximize recovery.

The listings and description of the Chakra Frequencies and Kundalini

ıi?

For centuries stretching back into the dim corridors of time, Asian religions have spoken of a mystical force called the kundalini. Knowledge of how to awaken the kundalini, what it does and what to do after its awakening was a closely guarded secret among spiritual masters of the east.
The kundalini is a powerful energy that eastern religions say lies coiled at the base of the spine in humans. The kundalini gradually rises and then slowly subsides within the spine, only to rise again later on. Each time it rises, it rises further up the spine and will continue rising and subsiding until it eventually reaches the brain. The whole process may take months to complete.
There are a number of effects of the rising of this energy. All of these effects are available to those who have awakened the kundalini. Although you may have to ask for some of these qualities. It is for these effects that disciples have committed their lives to raising the kundalini energy over the ages.

1. Bliss: The rising of the kundalini is extremely blissful.
2. Visions and Images: There are many various visions that appear in the mind once the kundalini has been awakened. Many disciples of the kundalini have written of visions of the charkas and various other forms. Some visions are precognitive; some are not.
3. Awareness of the Divine
4. All you ever wanted: Almost everyone chases after material objects here and there in the world. Cars, houses, sex, etc. are quite often sought in a vain attempt to fill some inner void within the soul. One of the most remarkable feelings I ever experienced during my experiences with the kundalini was simply the realization that this was all I ever wanted. Whenever I wanted anything else, I was looking for a substitute for the feelings I was experiencing. There was a complete sense of fullness that satisfies any void within your soul.
5. Purity, Integration and the Expansion of the Mind: I don't care how religious or pure you are before you awaken the kundalini. Afterwards, the kundalini begins to really make you clean inside. That feeling of being made clean is real purity.
6. Intuitional Knowledge: It is hard to say how someone knows things by intuition; however, one of the strongest experiences I had during the awakening of my kundalini was that of receiving (revealed) knowledge. It didn't really matter about what; it could be how to play a physical sport or any other interest, but when I received it, I either knew with every fiber of my being that it was revealed truth (The Lessons of Enlightenment) or I knew with my mind that I were being given a deep insight. The deep insight feelings have stayed with me through the years. It is hard to say how someone knows things by intuition; however, one of the strongest experiences I had during the awakening of my kundalini was that of receiving (revealed) knowledge. It didn't really matter about what; it could be how to play a physical sport of any other interest, but when I received it, I either knew with every fiber of

my being that it was revealed truth (The Lessons of Enlightenment) or I knew with my mind that I were being given deep insight.

7. Mystical Powers: One of the things you are taught on the spiritual path is how to use psychic powers. One of the fundamental laws of psychic powers is that you can't influence psychically that from which you feel separate. By removing the barriers of the ego and expanding the mind, you begin to lose that sense of separateness from everything.

Awakening the Kundalini

The kundalini is easily awakened using brainwave harmonic sessions. The principle involved is quite simple. All you have to do is to use a session to put yourself into a very deep trance like state and then stimulate the mind.
This works because the trance like state removes the ego's barriers and the stimulation awakens the kundalini. This is equivalent to saying that the trance state unlocks the door, and the stimulation opens it. The session will awaken automatically the kundalini.
The following frequencies are used within the **Raise the Kundalini** series.

Muladhara	*(Base Chakra)*	16.5 Hz
Swadhistana	*(Genital Chakra)*	18.5 Hz
Manipura	*(Solar Plexus Chakra)*	29.2 Hz
Anahata	*(Heart Chakra)*	22.0 Hz
Visuddhi	*(Throat Chakra)*	23.2 Hz
Ajna	*(Head Chakra)*	24.5 Hz
Sahasrara	*(Crown Chakra)*	21.8 Hz

Experimental Frequencies

0.1 – 1 Organ/muscle resonance
0.1 – 3 Delta range; deep sleep, lucid dreaming, increased immune functions, hypnosis
0.16 – 10 Neuralgia
0.20 – 0.26 Dental pain
0.20 – 10 Post-traumatics
0.28 – 2.15 Alcohol addiction
0.28 – 10 Arthritis
0.30 – 0.15 Depression
0.30 – 10 Cervobrachial syndrome
0.37 – 2.15 Drug addiction
0.40 – 10 Confusion
0.45 – 10 Muscle pain
0.5 Very relaxing, against headache, for lower back pain; thyroid, reproductive, excretory stimulant, whole brain toner
0.5 – 1.5 Pain relief; endorphin release, better hypnosis
0.5 – 4 Deep dreamless sleep, trance, suspended animation; anti-aging – reduces amount of cortisol, a hormone associated with stress and aging, and increases the levels of DHEA (anti-aging) and melatonin (decreases aging process and rebalances body).
0.9 Euphoria

0.95 – 10 Whiplash
1 – 3 Deep, dreamless sleep, trance state, non-REM sleep
1.0 Feeling of well-being, pituitary stimulation to release growth hormone; overall view of inter-relationships; harmony and balance
1.05 Helps hair grow and get its color back; pituitary stimulation to release growth hormone (helps develop muscle, recover from injuries, rejuvenation effects)
1.45 Tri-thalamic entrainment format. According to Ronald deStrulle, creates entrainment between hypothalamus, pituitary and pineal. May benefit dyslexics and people with Alzheimer's.
1.5 Abrahams Universal Healing rate; sleep; those individuals whose ailments have manifested into the fourth stage of Chronic Fatigue, where some form of disease is apparent, experienced a release from the negative sensation of their symptoms when moved into 1.5Hz. Source: New York Times Science Section 1989.
2.15 – 10 Tendovaginatis
2.06 Associated with coccyx (small triangular bone at the end of the spinal column)
2.30 Associated with genitals
2.5 Pain relief, relaxation. Production of endogenous opiates. Use for sedative effect
2.57 Associated with bladder
2.67 Associated with intestines
3.0 Increased Reaction Time; 3.0 Hz and below used to reduce muscle tension headaches, but worked less well on migraines and sinus headaches
3.07 Associated with hara (3cm or 1.5 inch below navel, balance of pelvis)
3 – 4 Influences physical vision
3 – 6 Childhood awareness/vivid memories
3.4 Sound sleep
3.5 Feeling of unity with everything, accelerated language retention, enhancement of receptivity; (a remedy for) depression and anxiety; holistic regeneration, DNA stimulation
3.6 (A remedy for) anger and irritability
3.84 Associated with ovaries (effects vitality, life at every level)
3.9 (A remedy for) unsociable behavior, enkephalins, extrasensory perception; those who suffer from Chronic Fatigue exhaust very easily. When moved to 4 Hz these individuals showed marked improvement in the length of time between the occurrences of exhaustion after certain exercises was completed. Source: New York Times Science Section 1989 nbsp; Catecholamines, vital for memory and learning, respond at around 4 Hz. Subconscious Problem Solving/Full Memory Scanning (if one can manage to stay awake); telepathy, astral projection, 'Seduction mindset'
4.6 Attitude and behavior change
4 – 12 Skeletal muscle resonances
4.11 Associated with kidneys (effects = strength)
4.5 Guru meditation uses this to reach their deepest levels of trance
4.5 – 6.5 Wakeful dreaming, vivid images
4.6 Associated with the spleen/blood (effects = Emotional Impulse)
4.9 Introspection; induce relaxation, meditation and deeper sleep
4.0 Unusual problem solving, reduced sleep needed, theta sounds replacing

need for extensive dreaming; relaxed states, pain-relief (beta endorphin increases of 10 – 50% reported)

5.0 – 10.0 Relaxation

1.14 Associated with stomach (effects = emotional acceptance)

5.35 Associated with lungs (effects = oxygen, heat)

5.5 Moves beyond knowledge to knowing, shows vision of growth needed; #inner guidance; inner guidance, intuition, heat generation

5.8 (Reduce) fear, absent-mindedness, dizziness

5.0 Long term memory stimulation; (reduce) unwillingness to work

6.0 – 10.0 Creative visualization – about 6 Hz for a while, then up to 10 Hz

6 – 9.6 Somatic responses, tingling, pressure, heat

6.15 Associated with heart (effects = love, warmth)

6.26 – 6.6 Hemispheric desynchronisation, confusion, anxiety, low reaction time, depression, insomnia

6.30 Mental and astral projection; accelerated learning and increased memory retention; reduces anger and irritability

6.8 Possible use for muscle spasms

6.88 Associated with collarbones (effects = vitality, overall balance, stability)

7.0 – 8.0 For healing purposes, as in laying on of hands by healer, or for self visualization in a healing situation

6.0 Mental and astral projection, bending objects, psychic surgery; increased reaction time; mass aggregate frequency (can disrupt matter as an infrasonic), alleged to resonate and rupture organs at excessive intensity

7.5 Inter-awareness of self and purpose; guided meditation; creative thought for art, invention music, etc; contact with spirit guides for direction; entry into meditation. At 7.5 Hz subjects who before suffered from confused thinking reported an ease at finding solutions to troublesome problems after a re-evaluation was conducted. Source: New York Times Science Section 1989; earth magnetic field frequency, useful theta (brain) waves frequency

7.5 – 8 For treating alcohol + drug addition – this is the range of frequencies that tells a person they are satisfied, which is 'missing' in addictive personalities

1.69 Associated with shoulders (effects = strength of the arms, expansion, teaching)

7.8 Schumann Resonance, ESP activation

7.8 – 8 Stimulates ESP, grounding, anti-jetlag, anti-mind control, improved stress tolerance; Schumann Frequency – psychic healing experiences; Schumann Resonance – pituitary stimulation to release growth hormone (helps develop muscle, recover from injuries, rejuvenation effects)

8 – 8.6 Reduced stress/anxiety

8 – 10 Learning new information

8.0 – 10.0 Alpha – rapid refreshment 15 min

8.0 – 12.0 Alpha light relaxation, 'super learning', positive thinking

8 – 13 The Alpha level is associated with a non-drowsy but relaxed, tranquil state of consciousness, primarily with pleasant inward awareness; body/mind integration; amplifies dowsing, empty-mind states, detachment, daydreams, mind/body integration

8 – 14 Qi Gong and Qi Gong machines

7.0 Past life regression; more lymphocytes (improved immune system), DNA repair (RAD-6); associated with base/muladhara chakra (colour = red) (body parts = adrenals, spinal column, kidneys) (effects = physical energy, will to

live)

8.22 Associated with mouth (effects = speech, creativity)

8.3 Pick up visual images of mental objects; clairvoyance

8.6 – 9.8 Induces sleep, tingling sensations

8.0 Awareness of causes of body imbalance and means for balance. Blind person phantom touch reading (somatosensory cortex); associated with sacral/svadhisthana chakra (color = orange) (body parts = gonads, reproductive system) (effects = relationships/sexuality)

1.19 Associated with the upper lip (effects = emotions, conflict resolution)

9.4 Major frequency used for prostate problems

9.41 Pyramid frequency (outside)

9.5 Mean dominant frequency associated with the earth's magnetic field; facial toning

9.8 – 10.6 Alertness

10 Enhanced release of serotonin and mood elevator, universally beneficial, use to try effects of other mixes. Acts as an analgesic, safest frequency, especially for hangover and jetlag. Meg Patterson used for nicotine withdrawal. Dominant alpha frequency, clarity, normalcy, anti-convulsant, circadian rhythm resync, activate kidneys, raise body temp. Good when trying to correlate information by the subconscious – sort of a waiting frequency while the subconscious does the work at lower frequencies; motor impulse coordination (motor control cortex), remote viewing; learning a foreign language centring, sleep spindles, arousal; associated with solar plexus/manipura chakra (colour = yellow) (body parts = pancreas, stomach, liver, gall bladder, nervous system) (effects = spiritual wisdom, self-healing); increased alertness (caused by an increase in norepinephrine + serotonin and a decrease in melatonin), sense of well being and decreased pain (caused by increase in beta-endorphins)

10 – 14 Dream/sleep spindles

10.2 Catecholamines

10.3 Associated with nasal passages (effects = breathing, taste)

10.4 Frequency to go to for healing of body, mind/body unity, fire walking; potent stabilizer and stimulating for the immunity, valuable in convalescence. Relaxed alertness, contemplation, body healing, mind over matter, lowering blood pressure; associated with heart/anahata chakra (color = green) (body parts = thymus, heart, blood, circulatory system) (effects = love of life, love of self and others)

10.5 Relaxed and alert

10.6 Associated with ears (effects = hearing, formal concepts)

11 – 14 Focused alertness

12.0 Centering, doorway to all other frequencies; centering, mental stability, transitional point, time seems faster [SS]; to stimulate mental clarity [ESR]; associated with throat/vishuddha chakra (color = blue) (body parts = thyroid, lungs, vocal cords) (effects = expression/self in society)

12.3 Associated with eyes (effects = visualization)

12.0 – 14.0 Learning Frequency – good for absorbing informational passively, when you plan to think about it later

12.0 – 15.0 Beta (low) – relaxed focus, improved attentive abilities; treating hyperactivity

13.0 Associated with brow/ajna chakra (color = indigo violet) (body parts =

pituitary, lower brain, left eye, ears, nose, nervous system) (effects = visualization, conceptualization)

13.8 Associated with frontal lobes (effects = the seventh sense, final decision)

13 – 30 Beta range – normal wakefulness, the taking in and evaluating of various forms of data received through the senses. It is present with worry, anger, fear, hunger and surprise. Waking state, motivation, outer awareness, survival, problem solving, arousal, dendrite growth, combats drowsiness; conscious thinking, autonomic processes and emotions

14 – 16 Associated with sleep spindles on EEG during second stage of sleep

14 – 15 Slows conditioned reflexes

14.0 Awake and alert; alert focusing, vitality, concentration on tasks. Schumann frequency – second of seven frequencies. 7.83 Hz being the first. [TS] Schumann Resonance – pituitary stimulation to release growth hormone (helps develop muscle, recover from injuries, rejuvenation effects); used in conjunction with 22 Hz for intelligence enhancement (medium = audio-visual stimulation)

14.1 'Earth Resonance'; earth harmonics – accelerated healing (probably tied to Schumann Resonance above)

14 Chronic pain; sound which bypasses the ears for sublimination (auditory cortex), associated with crown/sahasrara chakra (color = violet/white) (body parts = pineal, upper brain, right eye) (effects = integration of personality and spirituality)

15.4 Associated with Cortex (effects = intelligence)

15.0 – 18.0 Beta (mid) – increased mental ability, focus, alertness, IQ

15 – 24 Euphoria

16 – 20 Bottom limit of normal hearing

16.4 Associated with top of head (effects = spirit, liberation, transcendence)

18.0 Beta (high) – fully awake, normal state of alertness, stress and anxiety

18 – 22 Beta: outward awareness, sensory data; throws brain's sodium/potassium levels out of balance, resulting in mental fatigue

20 – 30 Imagery, peak luminosity in visual field

20 – 40 Meditation for stress relief/just at the edge of audible sound/as a musical background

19.0 Fatigue, energize. Causes distress during labor; human hearing threshold [SS]; Schumann Resonance [3rd frequency of 7]; imposing subconscious commands on another; stimulation of pineal gland; helps with tinnitus (a condition that causes ear-ringing) [JB]

20.215 Hallucination

22.0 Used in conjunction with 14 Hz for intelligence enhancement

22.27 Serotonin stimulation

25.0 Bypassing the eyes for images imprinting (visual cortex)

26.0 (4th Schumann frequency of 7); Schumann Resonance – pituitary stimulation to release growth hormone (helps develop muscle, recover from injuries, rejuvenation effects)

27.5 Increase of B Endorphins

30 Meg Patterson used for marijuana

30 – 60 Gamma Range little known but includes decision making in a fear situation, muscle tension

30 – 190 Lumbago

30 – 500 High beta: not associated currently with any state of mind. Some

effects have been observed, but currently not enough research has been done in this area, to prove, or disprove, anything;

32 Desensitizer; enhanced vigor and alertness

33 Christ consciousness, hypersensitivity, Pyramid frequency (inside); 5th Schumann frequency of 7)

35 – 150 Fractures

35 – 193 Arthralgy

35 Awakening of mid-chakras, balance of charkas

36 – 44 Learning frequencies, when [actively] studying or thinking. Helps to maintain alertness. Waking operating state

38 Release of endorphins

39.0 [6th Schumann frequency of 7]

39 Dominant when problem solving in fearful situations; Gamma – associated with information-rich task processing; 'A New Theory of Consciousness' for scientists who study the human brain, even its simplest act of perception is an event of astonishing intricacy. 40 Hz brain activity may be a kind of binding mechanism, said Dr. Rodolfo Llinas, a professor of neuroscience at New York University. Llinas believes that the 40-cycle-per-second wave serves to connect structures in the cortex where advanced information processing occurs, and the thalamus, a lower brain region where complex relay and integrative functions are carried out. Source: HEALTH/SCIENCE, New Mexican, April 7, 1995 [NEU]

45.0 (7th Schumann frequency of 7)

46.98 Useful for 'weird effects' (use with 62.64 Hz and 70.47 Hz)

40 – 60 Anxiolytic effects and stimulates release of beta-endorphins MG

43 – 193 Carcinomatosis

50 Dominant frequency of polyphasic muscle activity, mains electrical in UK

50 Slower cerebral rhythms

55 Tantric yoga; stimulates the kundalini

60 Used for speed learning and super learning

63 Astral projection

65.8 Associated with coccyx (small triangular bone at end of spinal column)

70 – 9,000 Voice spectrum

70 Mental and astral projection

72 Emotional spectrum

73.6 Associated with genitals

80 Awareness and control of right direction. Appears to be involved in stimulating 5-hydroxytryptamine production, with 160 Hz. Combine with 2.5 Hz.

82.3 Associated with bladder

83 Third eye opening for some people

85.5 Associated with intestines

90 Good feelings, security, well-being, balancing

90 – 111 Pleasure-producing beta-endorphins rise between these frequencies

95 Use for pain along with 3040 Hz

98.4 Associated with hara (3cm or 1.5 inch below navel, balance of pelvis)

100 Can help with pain (used with electrical stimulation)

105 Overall view of complete situation

108 Total knowing

110.0 Frequency associated with stomach. [Note = A] [BH1] [BH4]; associated

with ovaries (effects = vitality, life at every level)

111 Beta endorphins, cell regeneration

117.3 Frequency associated with Pancreas

120 – 500 PSI, moving of objects, changing matter, transmutation, psycho kinesis

120 Helps with fatigue

216 Carrier wave of 666 harmonic (6 to the power of 3)