

# Beneficial Subliminal Music: Binaural Beats, Hemi-Sync and Metamusic

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*Abstract:* - The present study describes the usage of subliminal music set to incur beneficial effects on the human mind and body through the Binaural Beats and the Hemi-Sync technologies. The Binaural Beats technology was discovered in 1839 by the German physicist Heinrich Wilhelm Dove (1803–1879) and tested on the encephalograph by the American biophysicist Gerald Oster (1918-1993) in 1973 at Mount Sinai School of Medicine in New York. The Binaural Beats uses are carried out by blending them into music or other sounds. This procedure represents a recent discovery in the music therapy field as well as a new brain training technique studied and tested in many research centers and universities.

*Key-Words:* - subliminal music, Binaural Beats, Hemi-Sync, Metamusic, Frequency-Following Response, brain waves, cerebral hemisphere

## 1 Introduction

„The greatest illusion is that mankind has limitation.” Robert Monroe

The present study describes the usage of subliminal music set to incur beneficial effects on the human mind and body through the Binaural Beats technology and Hemi-Sync technology. A large number of scientific studies focusing on the phenomenon of subliminal perception in the second half of the 20<sup>th</sup> century have revealed the negative effects of subliminal messages hidden in the musical discourse. Results based on scientific data have shown that „information acquired subliminally will be integrated subconsciously and unconsciously, subliminal programming thus becoming an instrument used to influence and alter behaviors.” [1] Due to recent developments, subliminal music may presently be used to improve people’s health.

## 2 The influence of vibrations on the human body. The phenomenon of resonance

We can hear not only by means of the auditory analyzer, but also by means of the neuro-cerebral system: „it is obvious that the auditory system can act solely via connection to the nervous system. The human body is like a resounding instrument.”[2] Both musicians and music therapists, Steven Halpern and Louis M. Savary have put forward the idea that” if on one hand our body cells and our

senses may be looked at as vibration transformers, on the other hand the whole body is an instrument that releases its own vibrations and sounds. Some such as breathing rhythm and heart beats are audible, whereas others are more subtle and more profound and seem to escape us. Were we endowed with the appropriate auditory apparatus we could <<hear>> our own harmony.” [3] The human body captures the vibrations, then internally transforms them into emotions and responds through its own vibrations, its own music. Menuhin stated that „there is sound right in the middle of the vibrations’ cycle. I am very sure that music helps us stay in touch with all the vibrations in the world. When the lowest sounds of a big church organ are heard, we can feel the vibrations in the whole body: also the violin which releases sounds up to the seventh octave has a similar impact on us” [4]. The human body responds to a sound with another sound due to the resonance phenomenon. While the science phenomenon of resonance has been known for a long time, its impact on health has just recently been studied. In 1665, The Dutch physicist and mathematician Christiaan Huygens (who is also the scientist who developed the undulatory theory of light) noticed that two pendulums located one next to the other on the same wall show a tendency to synchronize their oscillatory motion, getting the same rhythm by a mutual transfer of energy [5]. In fact, the two pendulums mutually synchronize their own frequency. Similarly, sounding a tuning fork which

emits a sound wave with a constant frequency of 440Hz, will determine another sounding fork to start vibrating spontaneously in response to the sound waves released by the former. Resonance has an impact on the whole universe and manifests itself at sound, electromagnetic, nuclear and gravitational levels. If we carefully listen to the effect that a speaker has upon some glasses positioned in its vicinity, apart from the music from the speaker we will perceive some other sounds emitted by the glasses that have started resonating with the vibrations from the sound source. Upon trying various types of music we will notice that vibrations bear different impact on the glasses. The same is true when the human body is in contact with sound vibrations, in cases such as being in a concert hall, or producing sounds ourselves. Not all sound sources have a positive impact on health: for instance, atonal contemporary music creates a physical and mental state of discomfort in the body by the multitude of dissonances, and so do hard rock and heavy metal music, as well as the noise in the surrounding environment. Doctor of alternative medicine Masaru Emoto (b. 1943) made it possible to visualize the effects of vibrations generated by music, words, and feelings based on research results related to wave fluctuation measurement in water. Frozen water crystals previously subjected to vibrations were photographed in special conditions and showed that due to resonance, the transmitted vibrations had changed the water's crystallographic structure to a great extent. In Masaru's opinion, this structural modification is valid in the case of water contained by the human body as well, taking into account that water in the human body amounts to a huge ratio (90% at birth, 70% in adulthood and 50% in old age). The classic music „that we exposed the water to resulted in well-formed crystals with distinct characteristics. In contrast, the water exposed to violent heavy metal music resulted in fragmented and malformed crystals at best.” [6] The picture gallery authored by Emoto comprises harmonious images of crystals created using pieces by composers Bach, Vivaldi, Mozart, Beethoven, and Tchaikovsky.

### **3 Frequency-Following Response (FFR) and Binaural Beats history**

The resonance phenomenon accounts for brain waves-related occurrences. Even though by nature people are characterized by a specific combination of different brain waves, research shows that related individuals exhibit a cerebral synchronization of as

much as 90%. These findings have created opportunities for assessing phenomena such as empathy, telepathy, and couple affection. As well, it has been found that when brain was subjected to visual, sound or electric impulse, it had a natural tendency to synchronize itself with the transmitted impulse. The phenomenon was called Frequency-Following Response (FFR). For example, when the cerebral activity induced stress in the body and the subject was exposed to a different frequency stimulus corresponding to a state of relaxation, the brain would modify its activity due to resonance with the induced pattern. These investigations were the starting point that led to the discovery of frequencies called Binaural Beats. The technology was uncovered in 1839 by the German physicist Heinrich Wilhelm Dove (1803–1879) and tested on the encephalograph by the American biophysicist Gerald Oster (1918-1993) in 1973 at Mount Sinai School of Medicine in New York.

### **4 The biological effects of the Binaural Beats on brain waves**

The Binaural Beats phenomenon occurs when two sounds of different frequencies are released in a headset each in one ear and the brain makes the frequency difference between the two sounds. The brain processes the two different sounds of 1000Hz maximum frequency and creates the sense of a third sound called Binaural Beats. This sound must not exceed 30Hz so that the brain may be stimulated in a positive way only, thus inducing the desired cerebral wavelength. The audible sound wave frequency ranges between 30 and 15000 vibrations per second. Given the fact that humans do not perceive infrasound-ranging sound waves less than 30Hz, this special technique comes in necessary to „trick” the ears. Electronics and the computer science applied to music make it possible to use these frequencies via some special sound waves. Depending on the stimulus frequency, a certain cerebral wave corresponding to a certain state of the body is induced. To conclude, Binaural Beats are in fact a subliminal aural message because they cannot be captured by the human ear and are perceived unconsciously at brain level.

For example, if a sound of 510Hz frequency is released in the right ear and another of 500Hz is simultaneously released in the left ear, the difference of 10Hz will be perceived and decoded by the brain which in turn will be stimulated as a reaction to the new sound generated by this innovative technique. Binaural Beats are brain's auditory responses

coming from the superior oval nucleus of each cerebral hemisphere. (Fig.1)

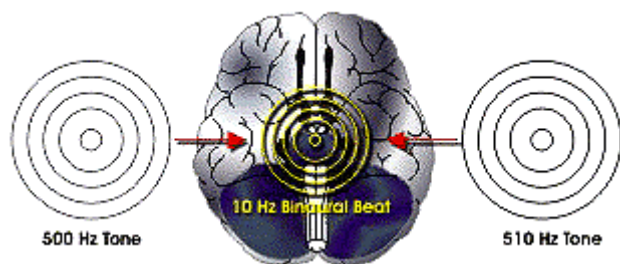


Fig.1 Graphic representation of the Binaural Beat wave

„In the case of binaural beats, the brain acts like a mixer. These impulses encourage mental training. In ancient cultures monoaural beats were used to induce a state of trance in the brain using rhythmic drum sounds and other instruments that generate such waves, a specific example being the Zulu and the South American rituals.” [8]

The brain is in a permanent flow of electric and chemical activity, releasing electric impulses called brain waves: Delta, Theta, Alpha, Beta, and Gamma whose combinations determine an individual's different states of conscience. In order to understand the underlying principles in beneficial subliminal music it is necessary to understand our brain waves activity. The states of conscience are associated with brain waves frequency patterns illustrated by the electroencephalograph. These waves frequency calculated in Hz varies depending on the individual's state of conscience. The brain waves used in the binaural technology have been categorized into four frequency bands which correspond to the four frequency patterns reflecting different brain activities. Delta waves ranging between 0.5Hz and 4Hz correspond to deep physical and mental relaxation of deep, dreamless sleep. They also define the clinic condition of unconsciousness and are produced in either self-degeneration or self-healing processes. Theta waves which are located between 4Hz and 8Hz accompany deep meditation and REM dream-type sleep. They also associate with artistic, creative processes as well as with eager study habits. Children, more than adults, are by nature in the Theta stage, therefore learning and retaining information is much easier for them. Alpha waves have a frequency ranging between 8Hz and 14Hz and characterize the vivid yet relaxed state of conscience, calm and receptive mind, and are typical of meditation. Beta waves ranging between 14Hz and 30Hz underlie our

fundamental activities related to survival and are associated with brain's alert intellectual activity. The EEG signal dominant frequency establishes the brain's state: if, for instance, the Alpha wave amplitude is higher than the others', the brain is in the Alpha state. If Beta waves are predominant and a 10Hz stimulus corresponding to Alpha waves is induced, the cerebral activity will change and get synchronized with the frequency to which it was exposed, thus changing the individual's mood. When leading the cerebral cells to a certain „emission” state is desired, it is necessary to apply a frequency corresponding to their „wavelength” at that moment, after which the frequency will be increased or decreased so that the brain may be in continuous resonance with the induced stimulus until the desired state is reached. The cerebral synchronization occurs naturally on a day-to-day basis but only incidentally and on short term periods. The majority of people in modern society use the vigil state of their brains, leading to Beta wave predominance. This wave frequency is typical of analytic thinking as well as permanent tension, concern and anxiety, based on which most of the cerebral wave transformers attempt to convert Beta waves in Alpha ones.

## 5 Applications of Binaural Beats and their biological effects

The easiest methods of brain stimulation are put into practice using auditory and visual subliminal stimuli. Many companies have applied the Binaural Beats technology in creating the so-called Mind Machines which induce the desired state in the brain thus yielding similar effects to yoga meditation, autogenous training, but in a much shorter time and through easier techniques.



Fig.2 Reson-8

One such device is Reson-8 (Fig.2), a miniature Binaural Beats generator that synchronizes the cerebral hemispheres to the Alpha, Theta or Delta wavelengths. Reson-8 is equipped with a microprocessor containing eight audio programs on different frequencies: three programs for inducing

Alpha waves, three for Theta waves, and two programs for Delta waves. The use of the device is very simple, requiring mere program listening using a headset. Reson-8 was created to improve the learning processes, to help cure insomnia and headache, addiction to medicine, drugs, alcohol, or smoking, and to support excessive weight loss. Ronald Montplaisir from Saint Louis, State of Missouri (USA) shared his experience using Reson-8 wave generator „to help me learn to create more endorphins so I could quit taking morphine. I have a rare bone disease (Erdheim-Chester). [...] I searched the Internet and found the brain wave generator. I set up a 10 voice profile and used it for 4 months almost non stop day and night. Next month I stopped taking Zoloft and 13 months later I was completely off pain killers. From time to time the pain rises up and I use the generator for a few days. [...] My case is very well documented and I would be happy to discuss it. This technology is quite remarkable.” [9] Rod Paille from Mount Carmel, State of Illinois (USA) stated that „for years I have been suffering from cycles of insomnia, sometimes sleeping only 4 hours a night for days in a row. As owner of a health food store I have access to all herbal products for sleep. These would help sometimes but only for a while. [...] When I tried the brain wave generator I was able to design some presets that have worked extremely well for me. I fall asleep easily and if I wake up usually a few minutes with the tape is all it takes. My insomnia has decreased by at least 90%. I am greatly impressed!” [10]

The subliminal cell phone is one of the Samsung Company's notable achievements, apart from cell phones capable of fingerprint recognition or movement detection. Samsung SCH-S350 promoters state that this cell phone can induce Alpha waves in order to increase mental vividness and focus. The Alpha waves are released by a cell phone-integrated MP3 player.

## 6 The Monroe Institute: Hemi-Sync sound technology and Metamusic

The Binaural Beats phenomenon was also researched by Robert Monroe at the research centre bearing his name The Monroe Institute (TMI), founded in 1974 and aimed at the human potential development. In his experiments, Monroe proved that certain sounds can be mixed to the outcome that they modify the cerebral activity, triggering a change in the individual's mood from deep relaxation or sleep to expanded consciousness states.

The technology studied and developed by Monroe based on the Binaural Beats phenomenon was called Hemi-Sync. Robert Allan Monroe (1915-1995) was an American engineer, business person, inventor, a pioneer in investigating the human consciousness, a radio station producer and director, and was also known as a radio, TV and cinema music composer. In 1956 he created a research and development department to study the effect of various sound patterns on human consciousness. He initiated experiments of methods and techniques aimed at learning processes acceleration, including the possibility of learning while sleeping. Furthermore, Monroe worked in close connection with physicists, biochemists, doctors, psychiatrists and psychologists to add more perspective to his initial findings. His preliminary studies were published in his first book „Journeys Out of the Body” (1971) available in 8 languages. His research led to remarkable discoveries on the nature of human consciousness. In 1975 Monroe patented the scientifically-based and clinically proven audio technology called Hemi-Sync. Monroe's research initiated a whole mind-focused audio products industry that have since benefited millions of people. Monroe Institute's programs are coupled with Metamusic CDs to benefit and entertain the listener which do not contain subliminal messages. Metamusic combines Hemi-Sync technologies with different types of music, from classic to New Age music.

### 6.1 Metamusic examples

Examples of metamusic audio materials released by The Monroe Institute: „Einstein's Dream” is aimed at intensifying mental abilities using the Mozart Effect [11]. It addresses the spirit and the intellect, stimulating focus and imagination. It is also meant to help patients suffering from Attention-Deficit Hyperactivity Disorder (ADHD), dyslexia and other learning challenges. The CD includes Albert Einstein's favorite pieces, i.e. Mozart's thaumaturgic Sonata for Two Pianos in D major, K. 448 to which the Hemi-Sync sound technology was added in order to facilitate the desired cerebral synchronization. „Portraits” use Hemi-Sync sound technology to balance and focus the brain and includes music by Bach, Mozart and Beethoven in recognition of their genius. The CD is exploring the imaginary possibility for the three composers to create using the presently available technology and puts forward a reevaluation of the existent audio material. „Baroque Garden” contains pieces composed by Bach, Vivaldi, Corelli and Albinoni combined with the Hemi-Sync technique in order to create a suitable environment for concentration and

creativity. The music on this CD is interpreted by Arcangelos Chamber Ensemble and produced by Richard Lawrence and Joshua Leeds. For instance, the first entry on the CD is the second part Largo in Vivaldi's Concerto for Oboe and Violin, RV 548. Comparing the original to the recording, it may be noticed that the musical form's integrity in the original composition has been maintained, although some modifications are present as follows: the three instruments in the original piece - oboe, violin, and harpsichord have been reduced to two - a violin and a flute that replaces the oboe, the harpsichord was eliminated; the recorded version is a simplification of the soloist melody line obtained by eliminating the melody ornaments and theme variations; the violin's figurative accompanying performance in arpeggios is rendered pizzicato. All these alterations were performed for the recording to accomplish the CD's declared vision of a „Baroque Garden”. The audio material rearranged by Richard Lawrence does not infringe on the beauty of the original composition: it offers a new perspective to which value was added by means of interpretational accuracy.

## 7 Richard Lawrence and the Advanced Brain Technologies (ABT) Music

Richard Owen Lawrence (1946-2005) was musical director of the Arcangelos Chamber Ensemble and Advanced Brain Technologies (ABT) Music and member of The Listening Program Product Development Team. Born in Troon, Scotland, Lawrence was a violinist, composer, orchestrator, producer and sound engineer and combined his artistic talent to his sound engineering skills. At 12 years of age he won the Edinburgh Music Festival trophy and went on to study the violin at The Royal Scottish Academy of Music in Glasgow. He studied under the Amadeus Quartet's guidance, was a member of the BBC Orchestra in Bristol and of other orchestras and chamber music ensembles in Europe, Canada and America thus completing a vast repertoire. He produced audio recordings for ABT aimed at focus development, learning, thinking, motivation, productivity, inspiration, and relaxation support. Similar to other metamusic recordings, is a series of CDs containing reorchestrated classic music whose parts have been reconnected in order to increase the targeted aim's effectiveness. For instance, „Music to Relax” is focused on mental relaxation, rest and rejuvenation, muscular hyperactivity decrease, and reflective ability

improvement and contains the following musical pieces: 01. Bach - Arioso from Concerto for harpsichord, strings and basso continuo No. 5 in F minor, BWV 1056; 02. Beethoven - Adagio from Piano Concerto No. 5 in E flat Major („Emperor”), Op. 73; 03. Chopin - Largo from Sonata No. 3 in B minor, Op. 58, CT. 203; 04. Corelli - Adagio from Concerto Grosso in G minor („Christmas Concerto”), Op. 6, No. 8; 05. Schubert - Andante from Piano Trio No. 1 in B flat Major, D. 898; 06. Bach - Air from Orchestral Suite No. 3 in D Major, BWV 1068; 07. Bach - Adagio from Concerto for 2 harpsichords, strings, and basso continuo in C Minor, BWV 1060; 08. Vivaldi - Largo from Concerto for violin, strings and basso continuo in A minor Op. 3, No. 6, RV 356; 09. Schumann - Träumerei from Kinderszenen for piano, Op. 15/7; 10. Bach - Arioso from Concerto for harpsichord, strings and basso continuo No. 5, in F minor, BWV 1056. The musical pieces have been selected based on his research and experience as a violinist on one hand and his studies spanning over 20 years to determine the impact of music on the psyche and the human body, on the other hand. In producing the CDs, Lawrence's personal experience was supported by other researchers' findings studying the phenomenon, including the Bulgarian psychiatric physician Georgi Lozanov (n.1926) who studied the effects of baroque slow musical movements on learning and memorization processes, the English composer Cyril Scott (1879–1970) who wrote extensively about several composers' music effects and influence on the social life of the time, the French doctor Alfred Tomatis (1920–2001) who researched the effects of music on the auditory function and cerebral processes, doctor John Diamond (b. 1934) who looked at the effects of music on interpreters and orchestra directors. The ABT project accomplishment was for Lawrence an alternative to the contemporary world' noise. „All of us, children and adults, are bombarded every day by noises and sounds that have deleterious effects on our nervous systems and well-being. Even when we consider our houses to be quiet, there is often a hum from the lights, refrigerator, and other electrical appliances. We have to work hard to <<tune out>> extraneous sounds in order to focus on conversations, our studies, or the task at hand. One practical solution to this modern problem is to create healthy sound to mask the irritating environmental noise pollution.” [12]

## 8 Conclusion

The cerebral hemispheres synchronization technology Binaural Beats was applied by Monroe as Hemi-Sync sound technology by means of mixing cerebral wave frequencies with music, nature sounds, and verbal guidance to the result of something more than music – Metamusic. This acoustic alchemy put into practice has yielded significant results in the exploration of expanded consciousness states, creative capability development, learning processes acceleration, learning disabilities, focus and concentration, wellness, pain relief, anxiety and depression amelioration, as well as in improved sleep, hypnosis induction, meditation and relaxation.

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