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• [Home](#) • [Articles](#) • [Press Releases](#) • [Associates](#) • [Projects](#) • [Gifting](#) • [Education](#) • [Consulting](#) • [Private Sessions](#) • [References](#) • [Registry](#) • [On-Line Testing](#) • [Source](#) • [Contact Us](#) • [Testimonials](#)

Center for Neuroacoustic articles

The Clinical Use of Sound

Notes written by Dr. Jeffrey Thompson

Human beings have been using sound to access deeper states of consciousness, expanded awareness and heal the body for thousands of years. Chanting, toning, Tibetan singing bowls, Chinese meditation gongs and the use of mantras are just a few examples.

Today, with highly sophisticated technological equipment, we can observe the functioning of the body and the brain in unprecedented detail.

Research projects in major universities across the country have explored the neurophysiology of meditation, deep relaxation states and mind/body interactions during healing. In one study a simple meditation technique used for 20 minutes a day caused profound changes in blood pressure, stress handling ability, immune response and feelings of well being - never mind using any kind of high-tech approach which could bring consciousness to very deep levels of relaxation. Using this technology as a daily tool for mind/body integration and stress reduction can have many positive benefits.

Brainwave Entrainment

The definitive work on the discovery of the phenomenon of acoustic brainwave entrainment - the ability to change brainwaves and states of consciousness with sound - was done by a medical researcher at Mount Sinai Hospital and published in the Oct 1973 issue of Scientific American entitled "Auditory Beats in the Brain". In this article, he outlined the research he had conducted which showed a brainwave entrainment response to something he called "Binaural Beats". These beats occurred when two separate tones were tuned slightly differently from one another - to be precise: within 18% of one another - a range called the "Critical Bandwidth". The speed of the beats is governed by the difference in the frequency of the two notes: a left channel tone of 100 cycles per second (Hz) and a right channel tone of 105 Hz would cause a 5 Hz pulse to arise as an interference pattern. The brain would entrain and slow its function to this 5 Hz speed and therefore an altered state of consciousness would result. He also found, that listening to these two frequencies through headphones caused not only the brainwave entrainment phenomenon, but a synchronicity of the electrical activity of the right/left hemispheres as well.

Hemisphere Synchronicity

This phenomenon of hemisphere synchronicity is due a quirk in how the brain processes information and the physics phenomenon of the Critical bandwidth. When two tones are tuned within 18% of one another (or within the critical bandwidth) the brain cannot distinguish two separate tones, it hear one single tone with a pulse within it. The speed of the pulse it hears is the difference between the two tones. Through headphones, however, the opposite hemispheres, which process sound information from each opposite ear, have to compare information in order to hear the pulse. Actually the brain is manufacturing the pulse out of thin air, moment by moment. When the hemispheres compare information, they synchronize their activity: thus hemisphere synchronicity.

We know from other research efforts that brainwave synchronicity doesn't happen often and when it does it's only for an instant. We know it is associated with the "aha" moment, the moment when the answer to a problem pops into the mind, in times of great inspiration, and certain high states of revelrie and meditation. With this new technological method of entraining brainwaves with binaural beats using headphones, however, it is possible to float the brain in this hemisphere synchronicity state for prolonged periods of time. Each time we do this, it is like exercising a new brain function - which makes the brain more able to engage this function as it's normal repertoire of behavior. Kind of like going to a gym on the inside and working the "muscle" of your brain.

Using sound in these ways, it is possible to make profound changes in brainwave patterns and states of consciousness, observable on brainwave mapping equipment (EEG), as well as positive changes in the body, measurable with blood tests, bio-feedback equipment and other sophisticated procedures. We are also able to influence the core balance and functioning of the brain and central nervous system as a whole.

In a series of recordings based on these principles I have used sound frequency patterns built into the music that have been shown clinically to cause positive changes in consciousness, brainwave and body function.

This process involves the use of digital technology, electronic keyboards and computer programs which make it possible to take any recorded sound - instrument sounds, nature sounds, human voice sounds, etc. - and precisely alter the tuning of the right/left channels of these sounds (a precision of 100 steps of tuning between two notes on a piano) which causes an interference pattern of pulses to arise by the difference of tuning. If the speed of these pulses is calibrated to a brainwave speed (Beta, Alpha, Theta, Delta), then the brainwaves will follow the speed of these pulses and brainwave entrainment will occur.

There are other methods for building pulse rates into soundtracks that cause brainwave entrainment, but are not based on the idea of binaural beats. We can modulate the amplitude, filters and pitch of the sounds as well. This means we can build a pulsing loudness level, a pulsing bass/treble level and a pulsing sharp/flat level in the sounds. All of these systems work to cause the entrainment response, but only the binaural beat through headphones technique causes the hemisphere synchronicity response in the brain.

A good part of the stress we all experience in the twentieth century is due to the advancements of our own technology. This same technology, combined with our traditional techniques for healing and achieving balance, may help neutralize the stress we created.

In the recordings I have produced, I have used three coordinated methods for bringing the mind/body into a state of deep relaxation and balance; "Primordial Sounds," "Brainwave Entrainment" and "Multi-layered music" all recorded in 3D.

Primordial Sounds

Many of the sounds you hear on these recordings are sounds you don't even notice. Certain sounds have the power to awaken deep levels of recognition in the subconscious mind. I call these sounds "Primordial Sound," sound primordially recognizable to the subconscious mind regardless of race, sex or language.

Our first sensory experience in life as a fetus in the womb is of sound and vibration. We float in body temperature amniotic fluid - weight-less. We have fluid in our nose and mouth, which eliminates the senses of smell and taste. We have our eyes closed and are in the dark-no sense of sight. We have fluid in our ears pressed right up against the eardrum - but sound travels through water five times more effectively than through air, therefore our sense of hearing is actually amplified. The symphony of sound patterns we experience at this time will be deeply imbedded in our subconscious mind for the rest of our lives - water wishing sounds, arterial pulse sounds and voice sounds. These are our first experiences of "Primordial Sounds."

Recordings of these types of sounds form some of the "primordial sounds" you hear on this recording. Each of these sounds is intentionally altered and disguised by slowing them down and speeding them up. By changing the speed of these sounds we can side step the rational/thinking mind, which will no longer recognize the sounds, and tap into the subconscious directly, with sounds it deeply recognize and respond to. In one sense, the organic/biological intelligence, the same intelligence that grew our entire body out of two cells, will certainly be awakened with a recognition of sounds recorded from this body.

An interesting thing happens when recordings of people speaking are speeded up and slowed down. If these recordings are doubled in speed three times (raising the pitch by three octaves), human speech sounds remarkably like birds chirping. When raised in speed by eight octaves, these recordings sound just like crickets. Slowed down from normal speed by three octaves they sound like dolphins and at eight octaves slowed down, like the ebb and flow of the ocean.

It's interesting that recordings from the human voice should sound like nature sounds. What happens if we take cricket sounds and slow them down? They sound like nature sounds. What happens if we take cricket sounds and slow them down? They sound like birds chirping. Bird sounds slowed down sound like dolphins and dolphin sounds slowed down sound like people speaking!

The famous Psychiatrist, Carl Jung would have been pleased-this seems to fall directly in line with his theory of the "collective unconscious." A level of the unconscious mind deeper than our personal unconscious shared by us all, populated with

universal archetypal images ("primordially recognizable" images) just as these sounds seem to be "primordially recognizable" sounds. It's almost as if the whole universe is one organic being with many parts all designed from variations of the same blueprint.

Sounds From Space

In 1989 contact was made with an aerospace engineer with sound recordings from the Voyager spacecraft. These recordings were taken as Voyager passed by the outer planets of our Solar System - Jupiter, Saturn, Uranus, and Neptune.

These were recordings of charged electromagnetic particles (ions) in the magnetic fields of these planets vibrating within the range of human hearing. What did they sound like? Dolphins, choirs of voices singing, crickets, birds, Tibetan bowls, and ocean sounds (plus other sounds too strange to identify but which seem very familiar). Could these sounds be deeply recognizable a deeper level of the "collective unconscious?"

It is these three classes of sound ("Primordial Sounds", "Brainwave Entrainment" and "multi-layered mystical music") that are embedded in all the soundtracks and recordings to awaken the various levels of the subconscious mind.

It is at this inner level of ourselves that our bodies are self-organized from two cells by the same inner system from which daily functions of this body are coordinated and directed. It is from here that the knowledge of our problems and the answers and solutions to them reside.

This is what I mean by the use of "Primordial Sounds" to access a deep level of ourselves for healing, relaxation and balance. These sounds are mixed into the soundtrack in a way that they can be heard but not necessarily recognized for what they are by the rational-thinking mind. Some of the nature sounds you hear are actually space sound recordings or human body sounds.

Brainwaves can be controlled with sound waves using a technique called "Brainwave Entrainment." This involves creating special pulse rates in the recording that cause a sympathetic response in the brain - as mentioned earlier.

3-D Psychoacoustic Processing and Acoustic Pacing

Brainwave entrainment is part of a larger biological function called "Biological Sympathetic Oscillation". Our biological "clock" sets itself to external cosmic events; day length cycles, full moon cycles and seasonal cycles to name a few. The body will set itself to the most powerful external pulse cycle it is exposed to. In this case we can create powerful sound frequencies pulsing at exact brainwave speeds and cause the brainwaves to alter themselves to match the sound frequencies - that is entrain themselves to the sound pulses.

This has formed the basis for another method I developed for entraining the entire biological network in the body, which I call "Acoustic Pacing". In Acoustic Pacing I am taking nature sound recordings - recorded with special Psychoacoustic 3-D microphones - and slowing these recordings down over time in the soundtrack. Since all the audio memories stored in the brain from past experiences are 3-D sound memories, a 3-D soundtrack fools the brain into assuming these nature sounds are real. Since, as part of the larger world phenomenon of "Biological Sympathetic Oscillation", mentioned before, our bodies time themselves to larger nature cycles, when 3-D recordings of nature sounds are slowed down over time, the body automatically adjusts it's internal timings accordingly and a global body-based entrainment of slowing down occurs. Brainwaves slow in response to the whole system slowing in this method.

When these elements are combined together - relaxing music, nature sounds in 3-D slowing down over time, brainwave entrainment pulses built into the harmonics of the music and nature sounds - a more all inclusive and powerful relaxation response takes place in the whole organism.

We know from many research endeavors that certain deeply relaxed states of consciousness are associated with specific brainwave patterns on an EEG brain monitor. We also know that with brainwave entrainment we cause brainwaves to sympathetically "lock on" to an external sound-pulse at a brainwave speed. This gives us the tools to gently guide brainwave function and states of consciousness into deeply relaxed and balanced states.

On all of the soundtracks these pulse frequencies are built into every sound you hear, including each instrument sound, voice sound, nature sound and NASA space sound on the recording.

Certain types of sounds and music have a proven effect in creating states of relaxation, balance, healing and visualization. Generally these include certain

types of lyrical, flowing melodies and chord arrangements. Certain chord arrangements can create an atmosphere of peace, mystery, awe and openness. .

It is best to listen when with headphones on and lights out with eyes closed to get the full effects of the 3-D sound and brainwave pulse-wave information that requires the right/left sound images to be completely separated from one another. You will hear the sounds moving around you in three-dimensional space. You can get a more powerful effect using Vibro-Tactile Therapy sound delivery systems, such as specially designed sound chairs and sound tables. This way you will also feel certain parts of your body resonating with certain sound tones in the music. .

Physiologic Response to Vibro-Tactile Induction Technology

The obvious stress reduction benefits of listening to relaxing music have been proven through numerous research projects in hospitals, universities and private clinical practices over the course of many years. Normally, hearing involves sound waves pushing air pulses against the ear drum, moving the mechanical joints of the middle ear bones which amplify these vibrations to the inner ear, which pushes fluids into wave pulses, which move tiny nerve endings, which fire signals through the 8th cranial nerve directly into the Temporal lobe of the brain, which interprets these impulses as "sound". .

By delivering these sound frequencies through the body directly, an entirely different system of the body - spinal cord and areas of the brainstem and brain - are brought into play, with the possibility of a much deeper whole-body response. With this delivery system we have the possibility of direct cellular stimulation. Direct stimulation of living cellular tissue using sound frequency vibration has shown marked cellular organelle response with a corresponding measurable increase of cellular metabolism and therefore a possible mobilization of a cellular healing response. Since the human body is over 70% water and since sound travels 5 times more efficiently through water than through air, sound frequency stimulation directly into the body is a highly efficient means for total body stimulation, especially at a cellular level. .

Sound frequency pulse waves played directly into the body also has a profound effect on the nervous system. The entire posterior 1/3 of the spinal cord consists of nerve tract bundles whose sole purpose is the transmission of vibration sense data to the Brain Stem, Cerebellum, Pons, Medulla, Hypocampus/Limbic System (emotional processing areas) and various areas of the Cerebral Cortex. .

Far-reaching possibilities are inherent in using this type of vibrational technology in the areas of massage, energy work, physical healing, emotional release work, hypnosis, meditation, relaxation and stress reduction.

[Back to top.](#)

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