



PEMF Prime Academy

Certified PEMF Expert

Module 5

Using Brainwave Entrainment (Color Light and Binary Beats) in Conjunction with PEMF

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Brief History of Brainwave Entrainment

- ◆ 1934 Brainwave Entrainment was first identified
- ◆ After the discovery of the Alpha brainwave by Hans Berger in 1929, researchers found, that the strength of the wave could be “driven” beyond its natural frequency using flickering lights, called “Photic Driving”: another word for Brainwave Entrainment using photic (light) stimulation
- ◆ In 1942, Dempsey and Morison discovered, that repetitive tactile stimulation could also produce entrainment
- ◆ In 1959, Dr. Chatrian observed auditory entrainment in response to clicks at a frequency of 15 per second (15 HZ)
- ◆ By the 1960s entrainment started to become a tool
- ◆ Anesthesiologist M.S. Sadove, MD, used photic stimulation to reduce the amount of anesthesia needed for surgery
- ◆ Bernard Margolis published an article on Brainwave Entrainment used during dental procedures, noting less anesthesia required, less gagging, less bleeding and a general reduction in anxiety

Brief History of Brainwave Entrainment

- ◆ 1973 issue of Scientific American, Dr. Gerald Oster examined how combining 2 pure tones resulted in rhythmic beats called Binaural and Monaural Beats
- ◆ Comparing Binaural and Monaural beats, Oster noted, that Monaural beats were shown to elicit extremely strong cortical responses, which is the electrical activity responsible for entrainment
- ◆ 1981 Michael Hutchison also wrote his landmark book “MegaBrain” outlining the many uses of entrainment from meditation to enhancing creativity
- ◆ 1980, Tsuyoshi Inouye and associates at the Department of Neuropsychiatry at Osaka University Medical School in Japan found, that photic stimulation produced “cerebral synchronization”
- ◆ Research has also been conducted into Chronic Fatigue, Chronic Pain, Seasonal, Affective Disorder, Hypertension and a number of other disorders

What is Brainwave Entrainment?

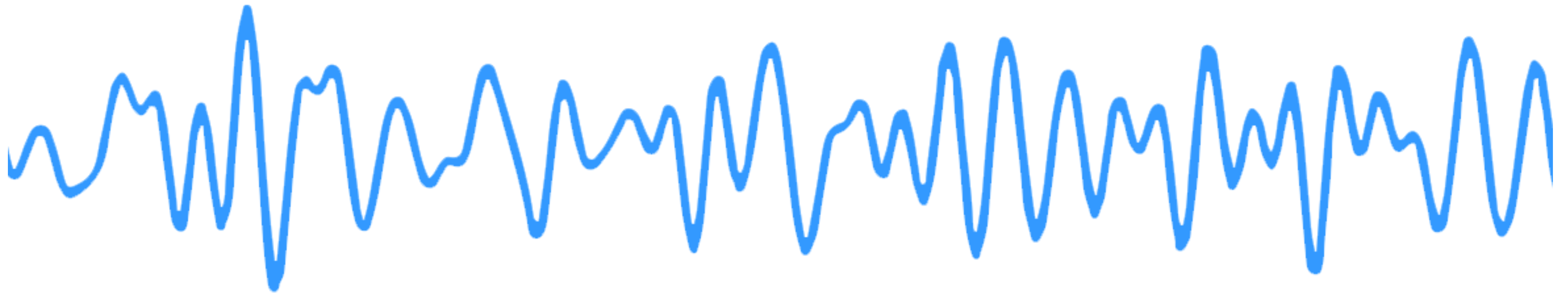
- ◆ Brainwave Entrainment refers to the brain's electrical response to rhythmic sensory stimulation, such as pulses of sound or light
- ◆ If given a stimulus, through the ears, eyes or other senses, it emits an electrical charge in response, called a Cortical Evoked Response (CER)
- ◆ When presented with a rhythmic stimulus, such as a drum beat, the rhythm is reproduced in the brain in the form of these electrical impulses
- ◆ If the rhythm becomes fast and consistent enough, it can start to resemble the natural internal rhythms, called brainwaves
- ◆ The brain then responds by synchronizing its own electric cycles to the same rhythm – also called the Frequency Following Response (FFR)

Brainwave Frequencies

- ◆ The discovery of brainwaves led to the conclusion, that electrical activity in the brain changes depending on what a person is doing
- ◆ Brainwaves of a sleeping person are very different from the brainwaves of someone wide awake
- ◆ **Beta (38 Hz - 12 Hz)** - Normal waking consciousness occurs in the beta range. This category is associated with cognitive tasks, such as problem solving, decision making, verbal communication, and general mind wandering. Higher levels of beta brainwaves can be linked to stress, anxiety, and panic
- ◆ **Alpha (12 Hz - 8 Hz)** - Awake, but deeply relaxed. Simply closing your eyes will produce alpha brainwaves. This category is associated with daydreaming, visualization, imagination and light meditation
- ◆ **Theta (8 Hz - 3 Hz)** - Light sleep, dreaming, REM sleep, creativity, access to unconscious material, access to long-term memory, emotional healing, intuition, deep reverie, and spiritual wisdom. Hypnotists have found theta to be the range of hyper-suggestibility, where one can program or reprogram beliefs
- ◆ **Delta (3 Hz - 0.2 Hz)** - Deep, dreamless sleep, trance, deep hypnosis. Brainwave expert Judith Pennington calls it the "Doorway to Universal Consciousness"
- ◆ **Gamma (100 Hz - 38 Hz)** - Last discovered and least explored, associated with higher learning, strong focus and concentration, high flow of information, mystical and transcendent experiences. Gamma waves are being researched in the context of focused meditation

The Significance of Brainwaves

- ◆ You can tell a lot about a person simply by observing their brainwave pattern
- ◆ Example: anxious people produce an abundance of high beta waves
- ◆ People with ADD/ADHD produce an abundance of slower alpha/ theta brainwaves
- ◆ Research has established, that not only are brainwaves representative of mental state, but they can be stimulated to change a person's mental state, and this in turn can help with a variety of mental issues



Color Therapy (Chromotherapy)

- ◆ Egyptians used specially built solarium rooms with different colored glasses
- ◆ Others used colored silk clothes to filter shades of light onto their bodies
- ◆ Chromotherapy is a narrow band in the cosmic electromagnetic energy spectrum
- ◆ Visible color spectrum composed of reds, greens, blues and their combined derivatives
- ◆ These colors fall between the ultraviolet and the infrared ranges of energy
- ◆ Their unique wavelengths and oscillations, when combined with a light source and selectively applied, provide the healing energy required by the body
- ◆ Light affects both the physical and etheric bodies
- ◆ Colors generate electrical impulses and magnetic currents or fields of energy
- ◆ They are activators of the biochemical and hormonal processes in the human body
- ◆ Many natural therapists are using chromotherapy on their patients
- ◆ Colors influence us differently, because they have different wavelengths and frequencies, and affect different parts of the brain

Colors and their Effects

RED: stimulation, vitality, life force, energy, revolution, change, ambition, grounding, passion, alertness, pioneering, positivity, survival, awakening, emerging.

In relation to the physical body, RED is documented to create positive effects on circulation, chronic illness, non-infected wounds, scar tissue, strengthens kidneys, heart, muscles, blood, lungs, bones.

ORANGE: joy, happiness, warmth, creativity, pleasure, sensuality, sexuality, generosity

In relation to the physical body, ORANGE is documented to create positive effects on depression, cramps, sclerosis, heart disease, boosts immune system, circulation, raises blood pressure, artery disturbance (especially in legs), genitals, endocrine balancer (when used with blue) and purifies hormonal system.

Colors and their Effects

YELLOW: mental activity, learning, intellect, acquired/ learned knowledge, individuation, alertness, concentration, focus, cheerful, warmth, cleaning, fear, empowerment, self-esteem, confidence.

In relation to the physical body, YELLOW is documented to create positive effects on combating fear (obsessive, habitual), digestion, stomach, gall bladder, liver, immune system, fortifies endocrine and nervous systems, motor stimulant, assimilation, lateral disturbances.

GREEN: sedative, cooling, calming, fluidity, growth, balance, money/prosperity, birth, new beginnings, nature, health, healing, heart, loving, curiosity, trust, feelings, integrity, harmony, seeking truth, relationships.

In relation to the physical body, GREEN is documented to create positive effects on liver, swelling or growth, anti-inflammatory, eye problems, bronchial catarrh, gout, diabetes, cysts, tumors, pituitary stimulant, washes out endotoxins, promotes healthy bones, painful joints and allergies.

Colors and their Effects

TURQUOISE: is a bridging color, higher heart, introspection, communication of the heart, studying and gathering information, learning, unconditional love, self-respect, respect for all life, taking individual responsibility.

In relation to the physical body, TURQUOISE is documented to create positive effects on immune system, skin (burns and infections), mental relaxation, acidic, regulates lung/large intestine systems. TURQUOISE stimulates the thymus center.

BLUE: calming, deep inner peace, rest-fullness, openness, cooling, relaxing, assists in deep changes, higher mental activities (3rd eye), insight, wisdom, sky, water, sadness, unity, safety, communication that comes through us, clarity.

In relation to the physical body, BLUE is documented to create positive effects on anti-bacterial, anti-infection, anti-cramping, headaches, helps farsightedness, facilitates restful sleep, pain relieving, nervousness, insomnia, hemorrhage, herpes, warts, lowers blood pressure, fever.

Colors and their Effects

INDIGO/ROYAL BLUE: the higher mind, that is connected to the all-that-is, the akashic records, the cosmic library. It is the color that makes contact with your “inner vision” or intuition, that part of you, which sees beyond the five senses.

VIOLET: stimulates emotions, meditation, inspiration, intuition, inner emotional release, opening inner doors, stimulates dreams, wisdom, spirituality, higher mind, power, letting go, vision, transformation, loyalty, integration, mysticism, balance of male and female.

In relation to the physical body, VIOLET is documented to create positive effects on menopause, spleen, sedative, relaxant, build leucocytes, lymphatic relaxant, soothes, solar plexus, neutralize mercury from fillings, anti-viral.

Brain Lateralization

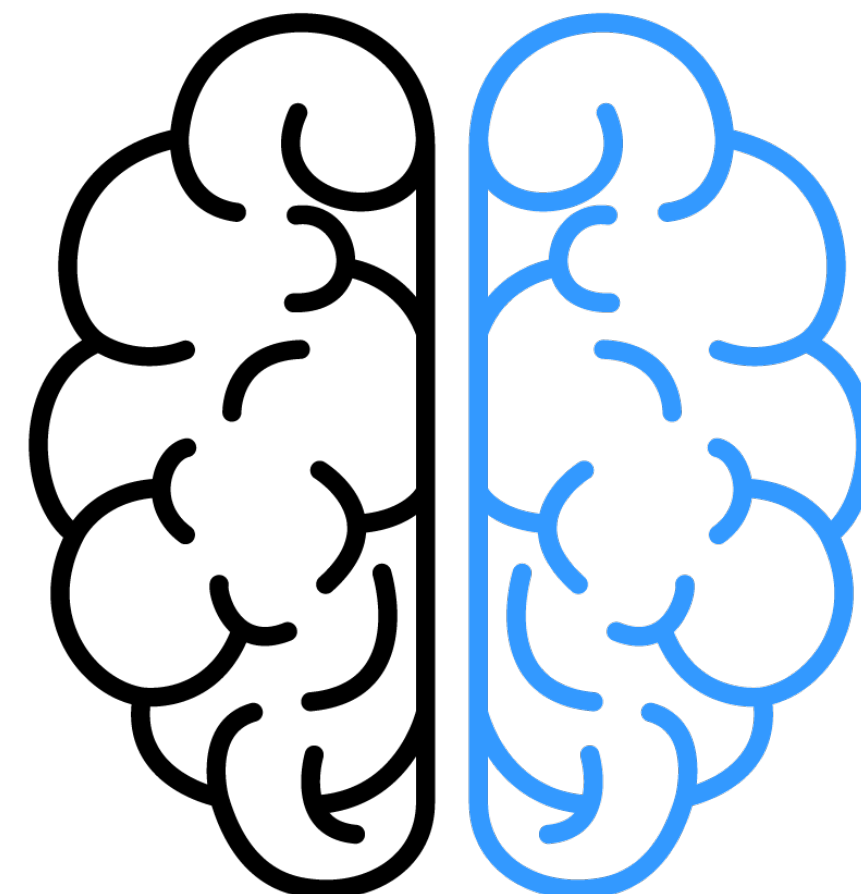
- ◆ The brain consists of two hemispheres, connected through the corpus callosum
- ◆ Left hemisphere associated with analytical thought, logic, reasoning and language
- ◆ Right hemisphere associated with creativity, imagination, intuition, and emotions
- ◆ Most have unbalanced brains, one hemisphere has greater activity - brain lateralization

Binaural beat expert Bill Harris on the problems associated with brain lateralization

“Because the brain filters and interprets reality in a split-brained way, we tend to see things as separate and opposed, rather than as connected and part of the oneness spoken of by the great spiritual teachers (and, in the last few decades, by quantum mechanical physicists).”

Brain Lateralization

- ◆ The dual structure of our brain with brain lateralization predisposes us to see and experience ourselves separate from or in opposition to the rest of the world
- ◆ We do experience interconnectedness between us and everything else
- ◆ Childhood programming builds on this inborn tendency, trains us to seek this and avoid that, move toward pleasure and away from pain, do good and not bad, and so on
- ◆ The greater the lateralization in the brain, the greater the feelings of separation - and the greater the feelings of separation, the greater the fear, stress, anxiety, and isolation



Hemispheric Synchronization and Brainwave Entrainment

- ◆ 1970s, neuroscience found, that when experienced meditators were deep in practice, harmonious activity between both hemispheres of the brain started to occur
- ◆ This phenomenon is known as hemispheric synchronization
- ◆ When both hemispheres work in unison, benefits are creative insight, emotional stability, enhanced mental performance, better learning capabilities, deeper focus, increased connection with one's environment, and feelings of deep tranquility
- ◆ Meditation, mantra, breathing exercises, and certain body movements were aimed to counter the effects of brain lateralization and move the mind towards a unified, synchronized system
- ◆ Brainwave Entrainment is a reliable solution to counter brain lateralization
- ◆ 1980 Japanese researcher Tsuyoshi Inouye of Osaka University Medical School discovered, that photic stimulation causes brain synchronization
- ◆ Unlike traditional meditation, Brainwave Entrainment is a reliable, predictable, and consistent tool allowing to harmonize various areas of your brain at will. With regular practice, new neural connections begin to form between the two hemispheres for cumulative, long-term benefits

Audio Entrainment

- ◆ The deliberate use of sound to modify the mind has been chronicled throughout history
- ◆ Instruments: aboriginal didgeridoo, Tibetan singing bowl, Native American flute, tribal drum, used as powerful tools of transformation
- ◆ Modern neuroscientists found audio entrainment to bring about these same binaural beats and tones, induce super learning, memory improvement, creativity

Auditory Beats

- ◆ The most basic forms of audio entrainment are auditory beats
- ◆ They form, when two pure tones of a slightly different pitch are played together
- ◆ Auditory beats typically come in the form of binaural or monaural beats

Binaural Beats

- ◆ Stereo headphones are used to play different high frequencies perceptible to the human ear in both ears
- ◆ Their difference gives the target frequency value
- ◆ Example: you want to tune your brain to 7 Hz you can play a tone with 207 Hz on the left ear and 200 Hz on the right

Monaural Beats

- ◆ Two tones of the same intensity, but in different tone pulse patterns
- ◆ The human ear perceives only a single beat
- ◆ The sounds of the monaural beats can also be heard without headphones, but technology works more effectively with the usage of headphones

Isochronic Tones

Opposed to binaural and monaural beats, isochronic tones do not need two separate tones to form a beat. It uses a single tone, on and off at an evenly spaced pattern.

There are several types of isochronous tones

Sine wave:

- ◆ Sine wave isochronic tones involve a smooth transition between on and off
- ◆ Sine waves are the smoothest sounding tone, and most often used for relaxation

Square wave:

- ◆ Square wave isochronic tones involve instantaneous transitions between on and off. It is a harsher and more powerful tone

Sawtooth Wave:

- ◆ Instead of playing only one note at a regular interval with pause, the saw tooth plays a whole pulse package in a timed order with defined pauses
- ◆ Number of harmonics increase per pulse package, improving the biological resonance

Visual Entrainment: Photic Stimulation

- ◆ Visual brainwave entrainment (photic stimulation) uses constant, repetitive light pulses to entrain the brain
- ◆ These flashes of light are delivered by: television or computer screens, strobe lights, LED eye sets, virtual reality goggles
- ◆ Studies show that visual entrainment is more effective than audio entrainment, because the visual cortex is larger than the auditory cortex
- ◆ When the visual cortex becomes entrained, it affects a greater portion of the brain

Audio-Visual Brainwave Entrainment

- ◆ Audio-visual brainwave entrainment (AVE) simultaneous use of sound and light
- ◆ Although visual entrainment is more effective than audio entrainment, when the auditory and visual cortex are stimulated simultaneously, greater portions of the brain can be entrained
- ◆ The Exagon Brain is a device, that combines rhythmic sound and light stimuli in harmony with the biological organ clock to achieve the best possible Brainwave Entrainment

How To Safely Use Visual Brainwave Entrainment

Visual Brainwave Entrainment can stimulate large areas of the brain. People who shouldn't use this technology:

- ◆ Those who suffer from photosensitivity
- ◆ Those who have history of seizures (especially epileptics)
- ◆ Those who experience headaches/migraines from bright lights
- ◆ Those who suffer from psychosis or brain damage
- ◆ Pregnant women (not mandatory just a precautionary measure)
- ◆ If on medication (especially psychotropic substances), consult physician
- ◆ Under the age of 18 should consult physician

When using photic stimulation device like the Exagon Brain, it is not necessary to keep your eyes open!

How Long Does It Take To Induce Entrainment?

- ◆ Typically 6 minutes to induce Brainwave Entrainment
- ◆ This 6-minute marker to induce alpha waves (12 Hz - 8 Hz). However, if you are looking to to induce theta waves, about 30 minutes
- ◆ Benefits of sessions last for a few hours after
- ◆ Do not initiate an energizing session before bedtime or a relaxing session before an important workday



How Often Should You Have Entrainment Sessions?

- ◆ For long-term results like anxiety relief, or emotional regulation - don't expect results after your first session, it takes consistent effort over a period of time to see the benefits
- ◆ A few weeks of regular BWE is required for your brain to produce new neural connections
- ◆ Be patient - once these new neural pathways are constructed, you can experience results much faster and deeper
- ◆ Consistency is key! Far greater results with 10-minute sessions on 6 separate days than a single 60-minute session once
- ◆ After waking up, or before going to bed is one of the best times of the day for Brainwave Entrainment

