

Entrainment of Brain Waves

A variety of ways exist to expand one's awareness, improve wellbeing, and enhance the experience of life. One of these methods is incredibly old and over the last decade or so, has been given a technological upgrade. Meditation coupled with binaural beats, or brain entrainment, is a process based on rhythms. We use it all the time. When someone is feeling depressed or anxious, particularly children, what do we do? We stroke them or caress them. A simple tactile rhythm elicits a calming effect. Entrainment is to bring two disharmonious actions into harmony. In our case, the entrainment of brain waves brings the two hemispheres of the brain into a more harmonious rhythm. The two hemispheres appear to generate separate brain wave patterns.¹ For us to process information, active neural pathways need to be synchronous.² This suggests the more synchronous the hemispheres are, the more information can be processed. It is the activities of the neural pathways, specifically the firing of neurons, that generate our brain waves,³ of which there are at least five patterns. The frontal lobe, our problem-solving part of the brain, is more likely to generate theta waves and the occipital lobe, where our vision is located, generates alpha waves.⁴

Of the frequencies produced by brain activity, alpha waves are more important. These waves are indicative of information processing tied to working memory, attention, and vigilance, to name a few.⁵ When alpha waves are strong, the brain is working. When they begin to decrease in strength, we may be sleeping or meditating, because they lead us into theta wave activity. The occipital, or rear area of the brain, is where alpha waves are found. When we begin to focus our attention on a task, the wave strengthens as it appears to expand towards the frontal area.⁶

During our normal state of consciousness or activities, we are in what is called the beta wave state. When beta waves are present, they appear irregular, or desynchronized.⁷ This is not bad; it is our

¹ (Kraus & Porubanova, 2015)

² (Belov, getmanenko, Kilodyazhanye, & Kanunikov, 2009)

³ (Aparecido-Kanzler, Cidral-Filho, & Prediger, 2021)

⁴ (Lavalley, Koren, & Persinger, 2011)

⁵ (Kraus & Porubanova, 2015)

⁶ (Stewart, 1974)

⁷ (Soldatos & Paparrigopoulos, 2005)

normal state. The waves suggest our attention not as focused. We are told they are connected to optimism, self-confidence, and socialization,⁸ suggesting our focus is upon ourselves. We are social creatures by nature and must be aware of a variety of conditions. Thus, our brainwaves are typically dissimilar.

Bringing these hemispheres into synchronization is what brain entrainment does. As stated earlier, this is accomplished through rhythm. Those of us who have had the pleasure of caring for children or pets will have noticed how they become calm when resting upon our chest. The beating of our heart brings their brain hemispheres into a synchronization allowing them to sleep or settling their nervousness. Studies into this phenomenon have demonstrated improved blood flow and neuroplasticity.⁹ Plasticity is the reorganization of functions after experiencing damage.¹⁰ When talking about neuroplasticity, we are referring to the brain's ability to repair itself after being damage.

Binaural beats are an audio neurotechnology proven to be advantageous towards psychological outcomes. Benefits include the reduction of headaches, premenstrual syndrome, and pain related to surgical procedures.¹¹ Other benefits may include enhanced concentration, vigilance, and information processing.¹² Meditation is about focusing the mind and expanding our awareness or meta-cognition,¹³ this is where our interest with binaural beats rests.

Two other types of audio stimulation exist besides binaural. Isochronic and monaural beats may also harmonize the brain. Isochronic tones or beats are typically evenly spaced.¹⁴ We hear this in music emanating from the percussion and bass sections of a band or orchestra. This may be why many of us may meditate or go to sleep with music. Another practice that produces isochronic tones is drumming. Drumming has demonstrated the ability to improve mood, brain function, and other physiological processes. Drumming also increases theta wave patterns which help the brain re-wire itself,¹⁵ which is the process of neuroplasticity.

⁸ (Aparecido-Kanzler, Cidral-Filho, & Prediger, 2021)

⁹ (Aparecido-Kanzler, Cidral-Filho, & Prediger, 2021)

¹⁰ (Landi & Rossini, 2010)

¹¹ (Zampi, 2016)

¹² (Kraus & Porubanova, 2015)

¹³ (Schreiner & Malcolm, 2008)

¹⁴ (Engelbregt, Meijburg, Schulten, Pogarell, & Deijen, 2019)

¹⁵ (Sideroff & Angel, 2013)

Theta wave activity is produced in the same area as alpha waves, in the occipital region where the visual cortex is. When the brain waves in this area drop from eight to nine cycles per second, typical of alpha waves, to five to seven cycles, alpha wave activity decreases, and theta wave activity increases.¹⁶ We would like to point out that the transition from alpha to theta waves is a change in frequency. This type of activity is common among those who meditate. Those who regularly meditate have a slower EEG baseline than others.¹⁷ This may suggest lasting effects across the brain, influencing how we think and perceive life. For those pursuing what has been referred to as the gifts, mediumship, or psychic abilities, meditation becomes an obvious necessity in their development. Theta waves are believed to be tied to creativity, intuition, empathy, and a sense of tranquility.¹⁸

Monaural and binaural beats are similar. Monaural beats are two different sounds, whereas binaural beats are similar and are introduced to the ear separately. Both are processed differently.¹⁹ For instance, with binaural beats, each ear hears a separate tone, and the brain introduces a third tone or phantom tone.²⁰ This phantom tone synchronizes the hemispheres more efficiently²¹ than monaural or isochronic tones. The enhancement of other brain waves can be achieved using binaural beats.

Delta waves are found during deep sleep, along with theta waves. During REM sleep, theta waves are dominant, and in non-REM sleep, delta waves are dominant.²² They are indicative of physical and mental recuperation.²³ All of us dream and some of us experience visions during meditation. We can infer that a meditative state is likened to a dream state. The exception being the level of awareness. Delta waves are tied to the body's ability to restore itself, and because we tend to feel refreshed after meditating, we may assume delta waves could be present during meditation.

Comparatively, theta waves are slow, as oscillations increase, we enter alpha, and then beta waves. Gamma waves are between twenty-five and forty cycles per second. With such a high rate, it is connected to high states of arousal,²⁴ and may suggest high anxiety. Nonetheless, research shows brain wave entrainment in the gamma wave area may increase attention, memory, and learning.²⁵ Learning is

¹⁶ (Stewart, 1974)

¹⁷ (Lavalley, Koren, & Persinger, 2011)

¹⁸ (Aparecido-Kanzler, Cidral-Filho, & Prediger, 2021)

¹⁹ (Engelbregt, Meijburg, Schulten, Pogarell, & Deijen, 2019)

²⁰ (Kasprzak, 2011)

²¹ (Kraus & Porubanova, 2015)

²² (Hartman & Zmberoff, 2012)

²³ (Aparecido-Kanzler, Cidral-Filho, & Prediger, 2021)

²⁴ (Lavalley, Koren, & Persinger, 2011)

²⁵ (Ross & Lopez, 2020)

merely another term for adaptation, suggesting this may also aid in expanding awareness. When meditating, we are typically in the alpha wave range. The planet also vibrates in the alpha wave range of 7.8 cycles per second, also known as the Schumann Frequency (SF).²⁶ One may assume when meditating, we are potentially resonating with the earth. The SF frequency has been increasing due to the electronic devices being installed around the planet. In 2016, the frequency was measured at 12Hz, this is in the beta frequency range.²⁷ The increase in frequency suggests an increase in available information. As brain wave frequency rises so does the processing of information. With the earth's natural frequency rising, there is a suggestion of an increase of information within the environment.

A variety of benefits may be attributed to the use of binaural beats. Enhanced behavior, attention, memory, and expanded awareness are only some of the benefits researchers have investigated. Other benefits exist. Using binaural beats to enhance our meditation experience and psychic abilities makes sense. A variety of binaural beat sources can be found on YouTube and companies may provide tailored disks. We suggest you investigate before purchasing any disks. Discover what tones resonate with you. We prefer low frequency tones.

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²⁶ (Tatar, 2016)

²⁷ (Tatar, 2016)

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[Sound Therapy for Anxiety and Stress: Jonathan Adams and Montana Skies at TEDxTelfairStreet - YouTube](#)

