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Understanding the Patient's Brain: The ABCs

Tiff Thompson, Registered Intern
2014 Annual Conference Presenter

I had no plan to be a therapist. This was, at least, my stated intention after earning my MA in Counseling Psychology. I liked working with clients, and I liked therapy. But at that time, I had a successful and lucrative career developing renewable energy power plants. I had all I needed. I felt the MFT route was a career I would never pursue.

That all changed the day I saw my brain on a computer screen. A green bar stood in front of me with the words “What Is,” and a red bar: “What Isn’t.” I was told my first goal was to make the green bar bigger and the red bar smaller. I was captivated. But it wasn’t until the next screen that I was completely smitten. For round two, a grey mandala stood in front of me. The instructions were to make the mandala bigger and more colorful using my brain.

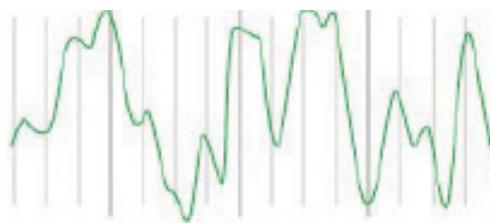
The mandala program was called Brain Paint and the therapist was named Dr. Hana Yin. I stumbled into Dr. Yin’s Hawai’i clinic on a whim while I was on vacation. Less than 24 hours later, I was back in Santa Barbara and looking for anyone and everyone local who was doing this work. I found a local psychologist who agreed to mentor me through my Board Certification in Neurotherapy and I was off to the races. That was the beginning of my foray and current journey through the beautifully complicated brain.

I was taken with neurotherapy because it helped me understand the relational etiology between psychopathology and its biology. The 2.5-pound hunk of flesh inside your skull is much more than it seems. It holds the ego, the id, the unconscious, time, space, recognition of the other, all five senses, emotion, action, and the unconscious. It oscillates from its deepest recesses to the cortex, creating tiny electrical impulses that we can observe and measure. And the brain is hungry. It consumes 40%-60% of the blood glucose your body produces (Tryer, 1988). The treatment of psychological issues can be greatly abetted by our understanding of the biology of the issues.

Given the daunting amount of research and data on brains, especially as of late, it is increasingly important that therapists know the fundamentals of the neuroscientific and neuropsychological underpinnings of states of being. If we can separate the information useful for clinicians from the scientific jargon (however impressive), we will be able to apply the gems of knowledge to our clients’ respective conditions and likely get a better handle on how to treat them moving forward.

EEG 101

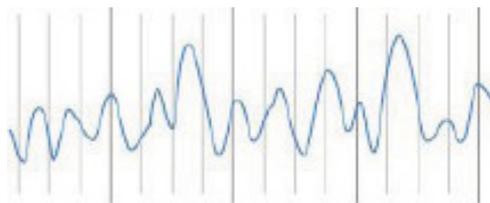
In 1924 a German physicist named Hans Berger found brainwaves via his invention, the electroencephalogram (EEG). For five years he waited to compile enough evidence to introduce the scientific and medical community to his water-tight research documenting the recording of electrical activity of the human brain from the surface of the head. Although German medicine and science scoffed and met his discovery with incredulity, today the EEG stands as a phenomenal tool allowing us to peek under the lid of flesh and bone into the dimensions of psychology and consciousness.



Delta

(Delta brainwave)

Delta is the slowest brainwave, oscillating between 0-4 times-per-second (0-4 Hz). Humans’ raw EEGs show most brainwaves at any given time (kind of like how unhomogenized milk contains skim milk, 2%, and whole milk), but delta is the dominant brainwave during deep sleep in healthy adults. It is high amplitude (meaning the wave forms are big, relatively speaking). Babies in utero and in early infancy (between 3 months to 1 year) spend a great deal of time in delta—it is thought to be responsible for neurogenesis (the genesis of neural connections). Delta has been linked to the production of human growth hormone and serotonin. From a psychological perspective, delta has been linked to the unconscious, as well as the Jungian notion of the collective unconscious (Wise, 1995).

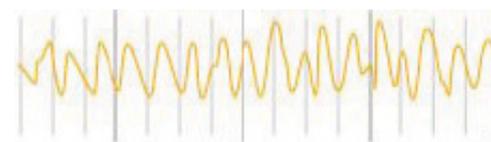


Theta

(Theta brainwave)

Theta brainwaves run at 4-8 oscillations-per-second (4-8 Hz), and are the dominant brainwave in REM sleep, dreams, and

hypnosis. This is the *subconscious* and the borderland to consciousness. Theta is a powerful state for learning in an uncritical fashion. Hypnotherapists will take clients to the cusp of theta and alpha (read: unconscious and conscious) because humans are highly suggestible in this space. Jung felt that dreams were signs referencing complex psychological, emotional, and transcendental realities. Dreams access the storehouse of memories in the limbic system (the amygdala and the hippocampus); our individual dreams are often of a collective reservoir, containing ancient and primitive themes and narratives. When we are in theta, our subconscious offers us images that are symbolic of those repressed or otherwise inaccessible memories and information.



Alpha

(Alpha brainwave)

Alpha is an interesting brainwave—really, the king of brainwaves. Alpha is the most obvious brainwave to spot with the naked eye—it has high amplitude and is often rhythmic. It was the first discovered and classified by Berger, as well as the first brainwave used in experimental self-regulation (later called EEG Biofeedback) by University of Chicago professor Joe Kamiya in 1959. Alpha is the first conscious brainwave and the bridge that links the unconscious brainwaves of theta and delta to the active thinking brainwaves of beta and gamma. Alpha is 9-12 Hz, a relaxed and focused space, responsible for the state of flow, being in the zone, and creating. When we close our eyes, we signal to our body that we are in a position to relax and safely fall asleep. When we close our eyes, a normal response is an increase of 50% or more alpha in the back of the head.

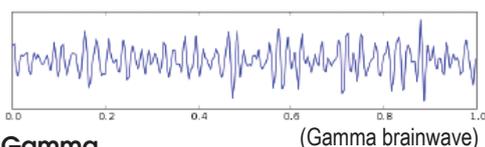


Beta

(Beta brainwave)

Beta brainwaves cover a large spectrum of 12-38 Hz, and are the brain state of our normal waking consciousness. Beta encompasses all forms of action, thinking, and problem

solving—from the mundane (making grocery lists), to the complex (computating mathematical equations). Beta is broken down into three categories (I, II, and III). Beta I is 12-15 Hz and the calmest of all beta brainwaves, often coupled with stillness, presence, and low muscle tone. Beta II is 15-23 Hz and is at work when we undertake tasks involving detail, processing, and meaning comprehension. Beta III is 23-38 Hz and shows during states of high focus and engagement. This state can also be indicative of anxiety and stress.



Gamma (Gamma brainwave)

If alpha is king, then gamma is guru. Gamma brainwaves are 38+ Hz, and have been associated with states of inspiration, hyperalertness, perception, and even enlightenment. Recent studies involving practiced meditators have shown gamma

synchrony as a common finding in levels of heightened meditation and awareness. Gamma has been classically difficult to capture since it's very fast and low in amplitude. It can be easily confused with the muscle artifact from scalp tension in EEG and is, for that reason, currently a difficult brainwave to train via neurotherapy.

Useful in all therapeutic clinical practices, brainwaves can show us so much more about a client's state than testimony alone. This information, as well as psychopathologies related to aberrations in brainwave states and quantities will be covered in greater depth during my presentation at the upcoming CAMFT 50th anniversary conference. I hope to see you there. 



Tiff Thompson is the Executive Director of the Biofeedback Society of California and a Board Certified Neurotherapist with Master's Degrees in Depth Psychology and Rhetoric, from

Pacifica Graduate Institute and University of Maryland, respectively. She is currently completing her PhD in Depth Psychology.

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