

EEG BIOFEEDBACK: AN INNOVATIVE TOOL IN REHABILITATION COUNSELING

What is EEG Biofeedback?

- Also called **neurofeedback**, neurotherapy, or neurobiofeedback, or NFB
- All forms of biofeedback are based on **operant conditioning**
- A **tool** that enables a person to learn to alter the timing & speed of the brain
- NFB uses an electroencephalogram (**EEG**) to make brainwave activity available to the client and therapist

Brainwave states / frequencies:

- **Delta** (1-4 Hz) = associated with deep sleep states; infants have much higher amplitudes than adults
- **Theta** (4-7 Hz) = also associated with sleep; a creative, intuitive, & out-of-the-box thinking state
- **Alpha** (7-12 Hz) = deeply relaxed & inwardly focused state associated with meditation & inner calm
- **SMR** (12-15 Hz) = sensorimotor rhythm; relaxed but focused state; body is relaxed & mind is alert (i.e.: a cat before it pounces)
- **Beta** (15-20 Hz) = mentally alert & externally focused
- **High beta** (20-40 Hz) = very mentally alert; cognitive processing of logical, sequential, & analytical things
- **Gamma** (40+ Hz) = organizes the brain; is produced most when alert but idle

What does neurofeedback do?

- NFB assumes that there are only 3 types of problems with the brain, resulting in the symptoms of the mental disorder we see: (1) **under-arousal**, (2) **over-arousal**, & (3) **instability**:
 - (1) To increase arousal:
 - reward client (with beeps!) when they produce bigger amplitudes of SMR & beta
 - reward client (with more beeps!) when they decrease alpha, theta, &/or delta amplitudes
 - inhibit client (with no beeps) if they produce more theta &/or delta
 - (2) To decrease arousal:
 - reward client when they produce bigger amplitudes of SMR
 - reward client when they decrease high beta & beta amplitudes
 - inhibit the client if they start to produce more high beta
 - (3) To correct instability issues:
 - a combination of the above varying from client to client
- By increasing or decreasing the electrical activity in the brain we may be altering blood flow and glucose metabolism
- The brain is **plastic**, and can learn to improve its own performance, if only it is given cues about what to change. By making information available to the brain about how it is functioning, and asking it to make adjustments, it can do so

A few definitions:

- **Amplitude** = a measure of micro voltage
- **Arousal** = the level of psychological and physiological activation
- **Attention** = how "focused" we are
- **Synchrony** = high amplitude, low frequency activity
- **Desynchrony** = irregular, lower amplitude, higher frequency activity
- **Coherence** = the average amplitude similarity between the waveforms of a particular bandwidth in two locations over a period of time (epoch)

How is it done?

- Initial interview, assessment, & 1st training session
- The client has electrodes placed on their scalp, at specific sites
- Brain waves are monitored by means of an amplifier and a computer-based instrument that processes the signal and provides the proper feedback
- This is displayed to the client by means of a video game or other video display
- The client is rewarded (by earning points, getting beeps, &/or making a stuffed animal “buzz”) for either increasing or decreasing certain EEG frequencies, while they are playing a game

Types of neurofeedback:

- **SMR/Beta** = eyes open training; used for ADD/ADHD, anxiety, & depression
- **Alpha/Theta** = eyes closed training; used for addictions, PTSD, & deep states relaxation training

How long will training take, what is the outcome & how much \$?

- Sessions are 15-40 minutes, usually 2x a week
- Change in symptoms can be seen with 10 sessions
- Maximal effect may be seen with as little as 20 sessions
- **Individual physiology & presenting symptoms determine length of training**
- However, everyone is different, some clients take 80 or more sessions
- **Effects are long lasting, but not invulnerable**
- Sessions cost between \$50-175
- Many insurance companies do not cover NFB...yet!

Sources of more information:

- A Symphony in the Brain - *Jim Robbins*
- Getting Started with Neurofeedback - *John N. Demos*
- Biofeedback: A Practitioner's Guide - *Mark S Schwartz & Frank Andrasik*
- Getting Started with Neurofeedback - *John N Demos, MA, LCMHC, BCIA-EEG*
- ADD – The 20 Hour Solution - *Mark Steinburg & Siegfried Othmer*
- The Neurofeedback Book - *Michael Thompson & Lynda Thompson*
- Alpha Neurofeedback Training In The Rehabilitation Process Of Stroke Patients - *Herwig Nosko*
- www.eegspectrum.com
- www.eeginfo.com

Professional organizations:

- The Biofeedback Certification Institute of America (www.bcia.org)
- The Association for Applied Psychophysiology and Biofeedback (www.aapb.org)
- International Society for Neurofeedback and Research (www.isnr.org)

Thanks for listening!

More information is available online at: www.C4LE.com/NRCA

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