Chapter 19: Rewiring the Brain: Neurofeedback

Chapter 19: *Rewiring the Brain: Neurofeedback*. The summer following my first year of medical school, I found myself working as a part-time research assistant in a sleep lab at Boston State Hospital. My responsibilities involved preparing and monitoring study participants while analyzing their EEG, or electroencephalogram, readings. Subjects would come in, I'd attach electrodes to their scalps and around their eyes, and set up machines to record brain activity throughout the night, all while analyzing the data and even taking time for a quick check of baseball scores on the radio. These quiet nights, spent observing the brain's electrical signals during sleep, ultimately contributed to key findings in sleep research, but also led me to question how electrical activity in the brain could provide deeper insights into psychiatric disorders.

The relationship between electrical signals in the brain and psychiatric conditions became clearer through studies in the late 20th century. Initially, much of the focus was on pharmacological treatments, but research dating back to the 1920s, when Hans Berger first recorded brain activity using EEG, showed that different mental activities produced different brain wave patterns. For example, certain brain wave frequencies appeared when individuals were solving problems, suggesting that brain activity could potentially be mapped to mental states. However, this insight didn't immediately lead to the breakthroughs scientists hoped for in understanding the neurological roots of psychiatric issues. As I navigated my own medical career, EEG results from my patients rarely helped in identifying clear patterns tied to emotional instability, and the lack of effective treatments often left me frustrated with the limitations of brain wave analysis.

This changed when I came across a 2000 study by Dr. Alexander McFarlane and his team in Adelaide, which explored the differences in brain activity between traumatized individuals and non-traumatized subjects. The study revealed that, while both groups responded to external stimuli, the brains of those with trauma showed more erratic patterns of attention, with regions failing to coordinate properly. Specifically, the traumatized subjects struggled with filtering out irrelevant information, a phenomenon that explained why so many individuals with trauma, like those with PTSD, find it difficult to focus or learn from their experiences. This discovery illuminated how trauma could alter the brain's wiring, preventing it from fully processing daily information, making ordinary life a challenge for many survivors.

Building on these insights, I was introduced to neurofeedback, a treatment approach designed to retrain the brain's electrical activity. Neurofeedback is rooted in the concept that the brain can be trained to regulate itself by providing real-time feedback on its own activity. This was further exemplified when I met Sebern Fisher, a clinical director using neurofeedback to help children with emotional and developmental challenges. Fisher demonstrated how neurofeedback could produce remarkable changes, such as in a young boy whose behavior and drawing abilities improved significantly after undergoing neurofeedback treatment. Witnessing such transformations in a relatively short time was a turning point in my understanding of the potential for neurofeedback to address deep-seated brain dysfunctions, especially in trauma survivors.

The core principle behind neurofeedback is simple yet powerful: by offering the brain feedback on its electrical patterns, it can learn to adjust and self-regulate. This is akin to observing someone's reactions in a conversation; if they smile or nod, you continue speaking, but if they seem bored, you adjust your approach. Neurofeedback uses a similar reward-and-punishment system to train the brain to enhance certain frequencies and suppress others, ultimately improving focus, emotional regulation, and overall mental function. By altering these patterns, neurofeedback can aid in the treatment of a wide range of conditions, including PTSD, ADHD, anxiety, and more.

Furthermore, neurofeedback has proven beneficial in addressing the complex neural imbalances that often accompany trauma. Through targeted training, individuals with PTSD can learn to regulate their emotional responses, reduce hyperarousal, and improve their ability to focus on the present moment. For example, studies have shown that veterans dealing with PTSD have benefited from neurofeedback by learning to calm overactive brain regions associated with fear, leading to improvements in mental clarity and emotional stability. This process of rewiring the brain isn't just about diminishing symptoms; it's about enabling individuals to regain control over their mental and emotional states, empowering them to respond to life's challenges with greater resilience and awareness.

In conclusion, neurofeedback offers a revolutionary approach to understanding and treating psychiatric disorders. By directly engaging with the brain's electrical patterns, this treatment helps individuals build healthier neural pathways, leading to lasting changes in their emotional and cognitive functioning. As research in this field continues to grow, neurofeedback stands as a promising tool for not just treating trauma and mental health conditions, but for enhancing cognitive performance in a variety of domains, from sports to artistic endeavors. Its applications are vast, and its potential continues to unfold as we better understand how the brain's electrical rhythms influence our thoughts, behaviors, and experiences.

This chapter has explored how the brain's electrical patterns influence mental and emotional functioning and highlighted the potential of neurofeedback to retrain the brain. With continued research, this innovative therapy could become an essential tool in the treatment of various psychological conditions, helping individuals rewire their brains for greater emotional stability and cognitive health.