

## SPECIAL ISSUE

# Arousal and Identity: Thoughts on Neurofeedback in Treatment of Developmental Trauma

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*This article addresses the issue of arousal in developmental trauma. The article suggests that emotional disturbance can be seen as a disruption in rhythmic regulation. The author presents a treatment approach that emphasizes training the regulation of emotional arousal and discusses the impact of this approach on identity in this population. The major affect of concern is fear, and the primary goal of neurofeedback is seen as the reduction of fear and reactivity. The article attempts to elucidate the clinical challenges confronted when this is accomplished.*

### The Cost of Developmental Trauma

The neglect and assault of children is catastrophic, in terms of the sheer numbers of children who endure it (8,755,000 per year in the United States; Centers for Disease Control and Prevention, 2009), in terms of its costs (estimated at \$104 billion per year in the United States; Wang & Holton, 2007), and in terms of the lifelong effects on the individual. Trauma and neglect in childhood lay a hard and often permanent claim on all who have suffered them.

All emotional disturbances can be seen as disturbances of organizing rhythms, a kind of dysrhythmia (Buzsaki, 2006). Our work as neurofeedback clinicians is to help our patients regain emotional rhythm and flow, whatever the nature of the problem. In cases of severe early childhood neglect and abuse, we may be helping people to establish these rhythms for the first time. In this article, the rhythms and rhythmic disturbances referred to are broadly neurobiological. *Rhythm* refers to the measurable cortical and subcortical rhythms seen on the electroencephalograph, the interpersonal rhythms of the mother-infant bond, and the emotional rhythms of the adult. In the healthy individual, the support and nurture of early parenting bonds provide the organizing rhythms for both emotional regulation and the development of the nervous system. In individuals with developmental trauma, each of these rhythms is profoundly dysregulated.

In his talk at the EEG Spectrum Clinical Interchange Conference in April 2009, Bessel van der Kolk, the renowned trauma researcher, opened with a description of the vital nature

of early rhythmic attunement between a child and his mother (van der Kolk, 2009). Optimally, the mother is able to regulate the emotional distress of her baby, attune to his delight, and settle into his need to rest and disengage. Mother and baby learn each other's emotional rhythms. In the absence or impairment of this alignment, chaos reigns in the developing brain. The rhythmic breakdown suffered by those patients who have had these disturbed childhoods affects every system, from handwriting, to bowel function, to ability to inhibit fear and anger, and, as has to follow, to the very sense of self. One patient had a very literal manifestation of dysrhythmia. Before neurofeedback, she could not reliably join into the clapping of a crowd. Another told me, despairingly, "I don't have a self. I am just a pile of symptoms." When she spoke of her "self" at all, she used the disembodied concepts therapists had given her in more than 18 years of therapy.

### The Concept of Developmental Trauma

In the same talk, Dr. van der Kolk introduced a diagnosis that he and others are proposing to the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-V), committee: developmental trauma disorder (DTD). DTD is a diagnosis that calls for recognition of dysregulation across all systems: affect, sensory integration, behavior, learning, memory, cognition, relationships, and the body. Severe abuse and neglect dysregulate children in most if not all domains of function. He proposes that, in children with these histories, these are not comorbid disorders but one disorder. Developmental trauma profoundly dysregulates brains and the bodies they serve. Whether or not the American Psychiatric Association adopts this diagnosis, clinicians need to recognize developmental trauma when they see it. This may be particularly true for neurofeedback clinicians, because if we can see it for what it is, we will learn how to approach it. Children with DTD are routinely diagnosed with attention-deficit hyperactivity disorder (ADHD) or bipolar disorder. Adults are often given a personality disorder diagnosis, a diagnosis that can act to obscure the root of the problem. A personality disorder diagnosis is understandable—if not useful—because the primary dys-

regulation can so overtake a person as to become “who they are.” But as this article will try to show, “who we are” is in great part a construction of states, and inasmuch as we have access to regulation of state, we have access to change.

Most people come to the attention of professionals because they cannot regulate their emotions or their behavior. Behaviors that we see as symptoms (and many that we do not) can be seen as attempts to regulate the brain. Cutting, drinking, bingeing, and head banging are all attempts to make the brain do something differently. The fact that these are failed attempts is cognitively apparent to most DTD patients, but they find these symptoms difficult to control. Most behavioral theory suggests that symptoms are reinforced by secondary gain, but this is not the primary problem in extinguishing behavior. Every dysregulated person would receive more satisfying attention were they able to regulate themselves. Instead, it appears that symptomatic behaviors become hard wired in the brain’s circuitry because they work, at least intermittently, to ease fear. It is Donald Hebb’s principle “what fires together wires together” at savage play. The neuronal patterns of the symptoms that address fear are associated with the neuronal patterns of fear, and they arise together. These associations are neurologically self-reinforcing and well learned.

A central thesis in Joseph LeDoux’s (1998) book *The Emotional Brain* is that fear is a core emotion in all psychopathology. For no group is this more true. People who have been abandoned and assaulted as children live in unmitigated fear. It is, then, the central job of neurofeedback clinicians who are working with developmental trauma to mitigate fear. As fear subsides, multiple symptoms—emotional, behavioral, physical, and cognitive—subside as well and new relational capacities emerge.

### Developmental Trauma and Identity

It is accurate, but not sufficient, to say that neurofeedback addresses dysregulated arousal and the core affects, fear and reactivity. There is a further consideration. The identity of most adults who have lived in fear all of their lives is inextricably bound to fear. As fear begins to quiet, they face significant challenges to a cohesive sense of identity. Many people who reach this point in their training have expressed a need to cling to the terrorized self because it is the only self they know. This presents a profound developmental dilemma and potential crisis in treatment. For some period of time during training, they can become unknown to themselves. They live a terrible, seemingly irreconcilable confound. One woman asked me, “If I am not afraid, how will I know if I am safe?” Although they cannot bear the terror they live in, they fear, almost as much, the end of it.

The dissolving of fear threatens them with obliteration. To complicate the issue of fear and identity further, most of these patients have little if any external validation of the origins of their dysregulation and anguish. Few families or adults acknowledge neglecting or abusing their children. In these cases, their unbearable suffering is the only validation that something terrible occurred. What happens to them, to their reality, when this validation also disappears?

These are the complex issues that both the patient and the therapist confront when neurofeedback is added to the therapeutic regime. The template that is proposed simplifies this process but hopefully does it no injustice.

### Neurofeedback and the Arousal Model

When I began my training in neurofeedback, I learned the arousal model. No single model is adequate to the brain’s complexity, but the arousal model is economical and clinically useful. Simply put, this model recognizes that states of arousal are underwritten by the frequencies at which the brain fires and that we can change arousal by addressing these frequencies. In this model, people can be understood as overaroused, underaroused, unstably aroused, or, in this population all too often, all of the above. Different parts of the brain require different operating frequencies to support different functions. Using detailed assessment of arousal and function throughout the patient’s system, initially and in an ongoing way, the therapist finds the optimal placement, frequency inhibits, and frequency rewards for each individual.

*Arousal, narrative, and identity.* The underlying template is as follows. Firing underwrites arousal, arousal underwrites state, frequently practiced states give rise to traits, and traits in turn organize our personality and even more deeply our sense of who we are—our identity. (States can be thought of as “weather” and traits as “climate.”) States create narratives that justify the state. “I’m pissed off because that guy just cut me off.” We routinely believe these narratives as if they were fact and recruit agreement from others to support them. States and traits and the narratives they produce are practiced and applied. States of anger practiced often enough become the trait of anger, and the person with these traits becomes known to himself and/or others as an angry man. His narrative of self and the world is an angry narrative. Anger informs his identity. *Practice* here refers not so much to repeated behavioral manifestations but to the complex neuronal circuitries that underwrite and perpetuate them. Each time these circuits fire, they are reinforced. Hebb’s law applies.

The woman I wrote about above came to me with an assigned identity. She introduced herself as “borderline.” Others may come with more nuanced narratives of themselves, but they all have fear-bound identities. This is where

we begin, and with more or less success, we are able to slowly quiet the fear that is the core experience of being. This process requires therapeutic skill and clinical collaboration between therapist and patient. As we quiet the ravages of fear, we begin to disassemble the person as he knows himself. As we regulate the brain, we regulate affect. As we regulate affect, we diminish the frequency and intensity of negative states so ubiquitous to trauma survivors. They are less often startled or enraged or ashamed. Over time, the traits dependent on the rehearsal of these states begin to dissolve. You are no longer working with an angry person or a shame-based person or even, given time, a developmentally traumatized person.

*Neurofeedback and transformed identity.* This clinical situation is unique to neurofeedback. We do not challenge identity with psychotherapy or with psychotropics. It is important that the clinician anticipate this challenge and have the vocabulary for it. Helping a patient at this point means helping her or him not so much to regulate affect—this crisis occurs because much of that work has already happened—as to negotiate with them a changing and unfamiliar identity. There is a neck-and-neck race here between the entrenched affects of fear and reactivity and the emerging capacity for calm acceptance. There is a struggle over which affects will govern the sense of self. There is much to be said about how to help the patient make this transition, but the first step is to recognize that the patient's very identity is under challenge. (It is important to note here that this is not a problem reported by child therapists. Children appear to seamlessly absorb their new regulation into their developing sense of self.)

People with DTD are, typically, overaroused, although they may also have symptoms of underarousal and/or instability of arousal. Early childhood trauma and neglect disrupt development most profoundly in the right hemisphere. The right prefrontal cortex fails to develop adequately (Schore, 1994), so there is little ability for this brain to regulate the amygdala or its emotions: fear, rage, and shame. Regulated amygdala function is also necessary for emotional valence and significance. Many people with DTD are diagnosed with alexithymia, the inability to know what they feel. The goal in working with these patients is to help them regulate fear wherever it dominates their function. The brainstem, cerebellum, right parietal, temporal, frontal, and prefrontal are all candidates in this exploration. (There is emerging literature that suggests that poor development and/or dysregulation of the cerebellum plays a prominent role in all mental illness. The scope of this article does not allow this discussion, but neurofeedback therapists may need to reorient

toward the back of the head.) The protocols used to date have been primarily T4-P4, FZ, and FPO2, at frequencies most comfortable for each individual. If these are either ineffective or incomplete, other sites should be explored, following principles of function and arousal suggested above.

### Conclusion: Arousal, Regulation, and Identity

One young woman spoke eloquently to the connection between arousal, regulation, and identity. She was born prematurely, left in a shoe box at an orphanage, fed with an eye dropper, and after a year, adopted into a dysfunctional family. She was diagnosed with ADHD, learning disabilities, bipolar disorder, and ethanol dependence. In fact, she had suffered severe developmental trauma and was dysregulated in all spheres. After 6 months of intensive neurofeedback and psychotherapy, she said, "I have never been more myself and never known less who I am." This neurofeedback koan underscores the central theme of this article: When we change arousal, we can profoundly challenge identity.

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