What Is Possible: Advances in Applied Neuroscience

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We seek to improve the human condition by providing real-time access to reducing the brain's stress response. In so doing, we attempt to enable faster onset of sleep, improve human interactions, enhance performance, reduce addictive behavior, and improve inhibitory control and attention. Modern neuroscientific findings about the brain's operating networks provide profound reassessments of traditional applied-neuroscientific models that are now improving the human condition. Curbing the health impacts of physical and psychological symptoms of stress no longer elude the scientific community; applied-neuroscience is giving the general public stress blocking solutions outside of the traditional doctor's or therapist's office.

Outdated Constructs of Human Suffering

The neuroscientific community has a new understanding of human suffering and how long this suffering needs to endure. We are moving away from sayings things like: "she will never get over that;" statements rooted in the belief that once something occurs, a person will forever be stressed or traumatized and cannot go back to baseline or even an improved state. We can now reduce stressful states and their negative emotional outcomes, allowing us to change the conversation about stress. In fact, science has shown over and over again that the right treatments can be curative, even without medication.

People often incorporate their difficulties associated with stress into their identity: *"I'm a worrier," "I have panic"* or *"I am petrified of flying so I only drive."* These statements are examples of what I often hear from new patients that have yet to realize that these conditions are a direct result of the human stress response and can be altered. When ***temporarily*** experiencing stress, one may worry or panic, however, armed with the understanding and tools to neurologically reduce stress, one does not have to BE a worrier or HAVE panic. The field of neuroscience is learning that panic, phobias, and obsessive worry can be effectively treated and oftentimes completely cured.

Science also challenges our cultural belief that *"time heals all wounds."* Time-distance from a negative memory is less a factor in overcoming trauma. Rather, time is merely a measurement of how effective an individual is at processing, internalizing or coping with traumatic experiences. Even after long passages of time, memories of negative events can set off a cascade of distress, physiological symptoms, and even put someone into a fight/flight/ or freeze (F3) state. I have personally seen patients over 90 years of age becoming quite emotional when thinking about negative childhood experiences. Why does this happen? Our brains are wired to actually continue to create the same response when something similar to a prior

stressor occurs. This trigger can be a traumatic memory, an external threat, or even a familiar smell. The stress response can also be triggered even if we are not aware of conscious thoughts that pertain to anything, and this is seen in individuals who suffer with panic, with no precipitating negative thoughts to identify why the physical panic occurred.

Understanding the evolutionary purpose of memory helps us understand why our brain will continue to evoke the stress response despite the passage of time. Memory is an evolutionary tool that aids human learning and memories have important characteristics. Stressful memories act differently in the brain than typical memories and ensure we will avoid situations that can harm us in the future. These situations do not have to be life threatening. In fact, many stressful memories are of interpersonal pain, mistakes, near misses, or experiences of human cruelty. Our brains are wired to maintain an emotional attachment to these past events to help us protect ourselves from future pain or threat, but this is at the cost of re-experiencing pain each time the thoughts are triggered until a new state is somehow introduced through a treatment modality or another source.

So if stress, anxiety, panic, worry, and other conditions can be temporary but time is not the healer, we are left with looking at what treatments are available. There are successful medical, psychological, and neuropsychological treatments that can be effective and a discussion is outside the scope of this paper. Beyond these, people now have access to neuroscience wearable technology that can be a stand-alone aid or part of comprehensive treatment to improve problems associated with the human stress response.

Contextual Common Ground—Your Brain as an Integrator

It is important to understand that people have different responses to external events based on context. Getting a "C" grade on a test might be great news for someone who thought they might fail, but could be devastating news for someone who needed an A grade to obtain a scholarship. Our judgments about the good or bad nature of external events are part of what dictates our response to the event. We also tend to overemphasize the impact of external events without considering how a person's internal, fluctuating brain states contribute to how they respond to a situation. Being chastised by a boss on a day someone is sleep deprived may elicit more of a negative response than on a day that same employee is well rested and has just exercised. The last principle is that the brain is not a passive organ and it is never really "resting." It is constantly integrating salient information from the external world and from internal messages about body functions and thoughts. By altering how the brain integrates the salient information in real time, external stressful events or stressful thoughts can have less of a negative impact because the brain makes different choices about its responses. Furthermore, once we experience something that triggers our stress response, our brains are wired to have that same trigger continue to create the response and this creates unconscious avoidance of further pain because memory is a protective evolutionary tool. So it is advantageous for us to maintain brain states that are not as likely to elicit the stress response when possible.

The Neuroscience of Intrinsic Connectivity Networks

Old models of looking at brain function relied heavily on left vs. right hemisphere comparisons or a localized view of structural functions in the brain. With technological advances in imaging such as fMRI, diffusor tensor imaging, and electroencephalograms, our knowledge of neuroscience is changing and many scientists advocate for an updated perspective on how the brain's networks influence our functioning and how we can intervene to produce changes within important networks to achieve better

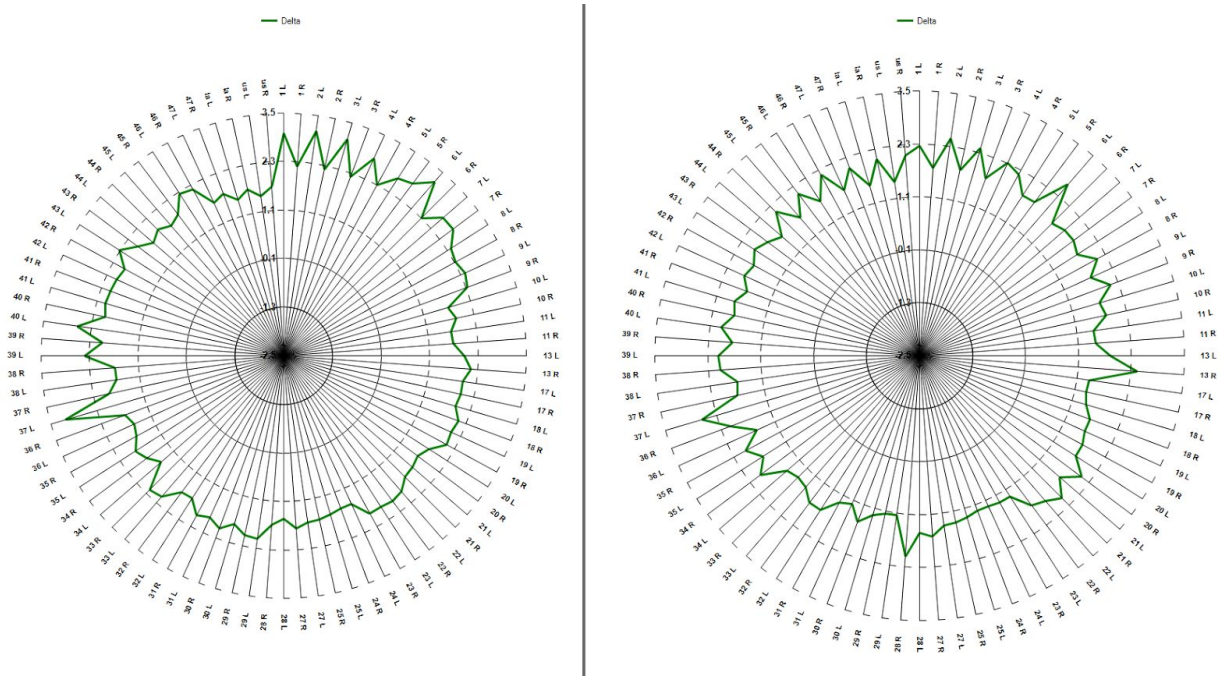
outcomes.

This approach was used in assessing how Bi-Lateral Alternating Stimulation in Tactile (BLAST) Form technology might be of benefit to individuals with stress. EEG findings suggest an overall lowering of amplitude after 30 seconds of using the technology vs. a baseline condition without the use of BLAST (see figure 1). We found significant differences in key areas of the salience network, which is implicated in autism and other conditions. In one Stanford study, the salience network showed the highest classification accuracy in discriminating children with autism vs. controls with 78% accuracy (Uddin et al. 2013). The salience network is thought to modulate the brain's reactivity to stress and to create appropriate behavioral responses to information coming in through the internal body and external sensory information (Uddin and Menon, 2009).

One significant brain structure within the salience network, the insula, is thought to play a key role in the representation of conscious bodily urges and the suppression of those urges (see Naqvi, Rudrauf, Damasio, & Bechara, 2007; Lerner et al., 2009 as cited in Uddin & Menon, 2009), which is important in addiction therapy. Additionally, the subjective awareness of one's feelings (e.g., anger, disgust) is moderated by the insula as well as empathy for others (Craig, 2002 as cited in Uddin and Menon, 2009).

The importance of the salience network combined with the apparent changes in the network when BLAST technology is applied, could explain why BLAST might affect autonomic nervous system function, lower the perception of distressing bodily sensations, improve self-appraisal of internal states, curb addictive behaviors, and impact inhibitory control in general.

Figure 1: EEG pre and post BLAST Delta activity in each Brodmann area. This figure shows a 39-year-old Executive's EEG patterns pre and post BLAST in the Delta frequency band. Notice significant increase in area 13R, the right insula.



Paradigm Changes, Cutting Edge Neuroscience, and A Real Time Solution

Using current theories in neuroscience and understanding what is possible led us to develop Buzzies with BLAST technology to give people a cost-effective, passive, non-invasive solution available outside of medical or therapy offices that represents a solution to the aforementioned problems. Similar forms of BLAST have been used for decades in successful therapeutic treatments in both inpatient and outpatient settings. People now have access to BLAST outside of the doctor's office and can use it in a variety of ways.

We are currently collaborating with several research partners to examine longitudinal effects and outcomes in autism, ADHD, pain, addictions, panic, generalized anxiety, and adrenal function among others. If you would like to conduct research, please contact us at hello@thetouchpointsolution.com.

It is our hope that researchers and clinicians will consider more novel, non-invasive, accessible solutions rather than containing effective methodologies to the medical environment. Please join us in our mission to improve the human condition and impact global change.

For more information, please visit www.Buzzies.com.

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