

Polyvagal Theory and Speech-Language Pathology

Hello, my name is Joe Falkner, and welcome to the Flexible Mind Therapy Podcast. It has been a long time since my last podcast, since last October actually. I've been very busy with some studying, integrating some new therapeutic interventions into my practice, and growing my practice. I've also been stuck when it comes to where to go with the Sexuality and ASD podcasts, so I will get back to those in the future. For now, I'm going to cover a topic that has received more and more coverage over the last several years, particularly in the mental health and trauma fields, which is the Polyvagal Theory. I want to cover it from a slightly different standpoint than those that have already been discussed, from that of a speech and language pathologist. I have had the opportunity to study Dr. Stephen Porges' work over the last better than a decade and have been integrating principles related to the Polyvagal Theory into my practice for some time now. I have also had the opportunity to incorporate the Safe and Sound Protocol, an innovative listening program that was developed by Dr. Porges, in my practice since it came out just over a year ago. I believe, that just as with individuals in the mental health and trauma fields, the Polyvagal theory holds a great deal of promise for those in speech-language pathology, as well as other educational and rehabilitation professionals. For detailed discussions of the Polyvagal Theory, I would refer you to Dr. Porges' Books:

- The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, and Self-Regulation
- The Pocket Guide to the Polyvagal Theory: The Transformative Power of Feeling Safe

There are also a number of articles, podcasts, and YouTube videos that are available if you Google the Polyvagal theory or if you go to Dr. Porges' website: stephenporges.com. In today's podcast, I will try to discuss some of the principles of the polyvagal theory; how this may influence processes such as cognition, executive functioning, learning, prosody, facial expressions, and social interactions; and finally, some of the ways that I have found to integrate this into how I work with some individuals with these difficulties.

In many ways, the Polyvagal Theory has had one of the biggest influences on my practice over the last better than a decade since I first read Dr. Porges' paper, *The polyvagal theory: phylogenetic substrates of a social*

nervous system. I can't remember how I came across this work, or Dr. Porges' many other papers, but I know I remember two important facts from that time: first, this theory challenged my understanding of how the autonomic nervous system, and subsequently multiple higher order systems that interfaced with it, work and interact; and two, I would need to do a great deal more study of this theory if I was going to be able to meaningfully utilize it to guide intervention ideas, and just as importantly if I was going to explain it adequately to my client's, families and colleagues so that we could create the type of environment where these interventions could be explored.

In her recent chapter on "Safety is the Treatment" in the book "Clinical Applications of the Polyvagal Theory" (2018), Dr. Bonnie Badenoch talked about her journey in coming to understand and apply the Polyvagal Theory. My own path mirrored hers in that like her, I had been studying the work of interpersonal neurobiology, and Dr. Daniel Siegal, and "how we are constantly shaping one another's brains, (and) how devoted our systems are to maintaining ongoing connection with one another at every stage of life." (Badenoch, "Safety is the Treatment", 2018) Where Dr. Badenoch had been studying these in relationship to her clinical practice and has written about this in relation to mental health and trauma, I had been studying this in relation to my practice with individuals with autism and other difficulties with social interaction, difficulties with executive functioning (particularly impulsivity and rigidity), and difficulties with communication. I was working with groups of individuals in the schools who had not been successful with other therapists (many of whom had been either discontinued from speech therapy due to noncompliance or had never been considered for speech therapy because their behaviors were considered too severe or bizarre).

As I began learning how to work with these individuals, I learned that much of my traditional speech therapy training had left me ill-prepared to adequately meet their needs. As I learned about Dr. Siegel's work and interpersonal neurobiology, I developed a first understanding of how I might be able to work with these individuals. Our brains develop within, and are molded by, the relationships that we have with others throughout our lives. But, something was preventing my students from benefiting from these relationships to help them to develop social, executive functioning, and communicative skills. It wasn't until I read Dr. Porges' works that I came to understand what was missing.

To a person, the individuals who I was working with who had either been noncompliant with their prior therapy or had never been considered for therapy due to their behaviors had difficulty with a process that Dr. Porges calls neuroception. Neuroception is the process by which the neural circuitry of our bodies distinguishes whether situations or people are safe, dangerous or life threatening.

“A neuroception of safety is necessary before social engagement behaviors can occur. These behaviors are accompanied by the benefits of the physiological states associated with social support.” (Porges S. , Neuroception: A Subconscious System for Detecting Threats and Safety, 2004) “In response to cues of safety, the nervous system promotes a state of safety with emergent properties including an increased proximity, openness and welcoming to others, a bias towards exploration, a sense of presence, and a neural “desire” or drive to co-regulate with another.” (Porges S. , Foreword: Safety is Treatment, 2018)

- Dr. Porges writes in his journal article *Making the World Safe for our Children: Down-regulating Defence and Up-regulating Social Engagement to ‘Optimise’ the Human Experience* that:
 - “We live in a culture that chiefly defines safety as the exclusion of risk from injury. Studies provide little information to operationally define safety, other than as an absence of the frequently quantified features of danger. Moreover, our view of safety is embedded in contemporary attitudes that often confuse safety with visible displays of law and order and the punitive treatment of those make us feel ‘unsafe’. We are more focused on managing those who threaten or hurt us, than on understanding what our nervous system needs to feel safe.” (Porges S. W., *Making the World Safe for our Children: Down-regulating Defence and Up-regulating Social Engagement to ‘Optimise’ the Human Experience*, 2015)
 - “This emphasis on the features of danger neglects the profound sensitivity that humans have to features of safety and how exposure to these features can promote development and foster resilience. Safety is critical in enabling humans to optimise their potential in several domains. Safe states are a prerequisite not only for optimal social behaviour, but also for accessing the higher brain structures that enable humans to be creative and generative. Thus, it is not merely the removal of features of

danger, but the active presentation of features of safety that our nervous system craves.” (Porges S. W., Making the World Safe for our Children: Down-regulating Defence and Up-regulating Social Engagement to ‘Optimise’ the Human Experience, 2015)

For my students who were struggling, their systems seemed to be responding to some cues of danger or life-threat (whether external or internal) that inhibited active engagement. Some of these students had the types of case histories that were consistent with the types of adverse childhood experiences that might lead to developmental trauma. Some of the difficulties that these students had might be predicted by the impacts of that trauma, and the subsequent evaluation of danger or life-threat, on the students’ neurological system. Other students had the types of neurobiological differences that Dr. Porges described in his 2005 chapter on Autism, and fit the model based on their neurobiological differences. But, for many of the others, it was the internal stressors of their particular social, communicative, or cognitive/executive functioning difficulties, and/or their experience of being out-of-sync with individuals in their environment due to these difficulties, that may have contributed to the internalization of danger or life-threat. For these individuals, the differences with how they processed their world, how they were able to communicate with others, and their ability to develop and maintain meaningful relationships significantly impacted on their neurological systems’ abilities to distinguish situations and people as being safe. Their systems became prone to neuroception of danger or life-threat.

Regardless of the etiology of the difficulties, this neuroception of danger had led to the behaviors that people had responded to by withdrawing or withholding services. For me, it seemed only natural that we needed to find some way to restore a sense of safety prior to, or contemporaneously with, working on the communication, cognition/executive functioning, and social communication skills.

Before we dive a bit more into understanding how this neuroception of danger or life-threat impacts on communication and cognition, and some ways to address this, I’d like to spend a little bit of time talking about the neural circuitry underlying the Polyvagal Theory. Bhat and Carleton (2015) describe “The ANS (as being) very basic or primitive, coordinated mainly by the “reptilian brain” (i.e., brainstem, medulla, pons) involuntarily, and has most interconnections with the right hemisphere of the brain (Schore, 1999,

2000, 2009) and the limbic system, which is part of the midbrain, sometimes called the “emotional brain.” The hypothalamus (a part of the midbrain) is very much involved in regulating ANS processes, such as stress, arousal, basic survival needs, including hunger, thirst, and sexual behavior, as well as aggression, pain perception, and the experience of pleasure.” (Bhat & Carleton, 2015)

“The unconscious activity of the ANS is mainly interconnected within the right hemisphere of the brain and the limbic system (Damasio, 2000). In the limbic brain, the amygdala and hippocampus are necessary for the storage and processing of emotional and traumatic memory to be recorded in the brain’s cortex. The amygdala plays a distinct part in fear conditioning (LeDoux, 1998), and becomes active when there is a threat, which signals the survival system leading to ANS preparation for the fight, flight, or freeze reaction.” (Bhat & Carleton, 2015)

When I learned about the autonomic nervous system, I learned about it as “...a two-part antagonistic system, with more activation (sympathetic nervous system) signaling less calming and more calming (parasympathetic nervous system) signaling less activation.” (Wagner, 2016) I had learned that the sympathetic nervous system activated the “fight or flight” response and the parasympathetic system activated the “rest and digest” response.

The Polyvagal Theory discusses a hierarchical organization of the autonomic nervous system which includes the responses to threat as well as the autonomic nervous systems most phylogenetically (or evolutionarily) recent development that allows for social engagement, bonding and attachment. “The autonomic nervous system responds to sensations in the body and signals from the environment through three pathways of response. These pathways work in a specified order and respond to challenges in predictable ways. The three pathways (and their patterns of response), in evolutionary order from oldest to newest, are the dorsal vagus (immobilization), the sympathetic nervous system (mobilization), and the ventral vagus (social engagement and connection).” (Dana, *The Polyvagal Theory in Therapy: Engaging the Rhythm of Regulation*, 2018)

“Dorsal vagal complex. The dorsal vagal complex is located in the brainstem and consists primarily of two nuclei, the dorsal nucleus of the vagus and the nucleus of the solitary tract. This area integrates and coordinates sensory information from visceral organs via sensory pathways

in the vagus that terminate in the nucleus of the solitary tract with the motor outflow originating in the dorsal nucleus of the vagus that terminate on visceral organs. The vagal pathways originating in the dorsal nucleus of the vagus have been referred to in various publications as the dorsal vagus, the subdiaphragmatic vagus, the unmyelinated vagus, and the vegetative vagus." (Porges S. W., *The Pocket Guide to the Polyvagal Theory: The Transformative Power of Feeling Safe*, 2017) The Polyvagal Theory focuses on the role of the Dorsal vagal complex in immobilization during life-threatening situations.

- "The Life-Threatening modality...reflects (perceptions of) danger (where the) danger is so overwhelming that it is associated with the Freeze response. The Freeze response is mediated not by the SNS, but rather by a special branch of the (un-myelinated) Parasympathetic Nervous System (PSNS) emanating from the Dorsal Vagal Complex in the brain" (Ross, 2018)
- Dana (2018) explains it like this: "the dorsal vagal pathway responds to cues of extreme danger. It takes us out of connection, out of awareness, and into a protective state of collapse. When we feel frozen, numb, or "not here," the dorsal vagus has taken control." (Dana, *The Polyvagal Theory in Therapy: Engaging the Rhythm of Regulation*, 2018)
- Typical responses of the dorsal vagal complex outside of life-threat include: baseline metabolism, rest and rebuilding, meditative states, sexual arousal, and sleep (Chitty, 2013)
- Stress responses include: immobility (freeze), dissociation, depression, indecisiveness, seclusion, catatonia, sleep disorders, parasympathetic shock, slower/deeper respiration, slower heart rate, decreased blood pressure, pupil constriction, flat affect, increased digestion & peristalsis (Chitty, 2013)

"Sympathetic nervous system. The sympathetic nervous system is one of the two main divisions of the autonomic nervous system. The sympathetic nervous system functions to increase blood flow throughout the body to support movement. Polyvagal Theory focuses on the role that sympathetic nervous system has in increasing cardiac output to support movement and fight-flight behaviors." (Porges S. W., *The Pocket Guide to the Polyvagal Theory: The Transformative Power of Feeling Safe*, 2017)

- “The perception (or neuroception) of ‘manageable’ Danger (or threat)...activates the flight / fight response and thus the SNS” (Ross, 2018)
- Dr. Porges writes that: “there appears to be a coordinated response that functions to promote metabolic activity and mobilization behaviors by withdrawal of vagal tone through the myelinated vagus and increasing both sympathetic activity and activation of the HPA (hypothalamus-pituitary-adrenal) axis. In general, the functioning of the adrenal cortex and the secretion of cortisol appear to be integrated into the mobilization function of the autonomic nervous system by increasing sympathetic activation and circulating catecholamines. These effects suggest that, consistent with the phylogenetic approach described in the polyvagal theory, cortisol secretion may be related to maintenance of mobilization (i.e., the conversion of norepinephrine into epinephrine) for fight-or-flight behaviors and in the recovery from the lactate buildup that may contribute to a functional oxygen debt (i.e., gluconeogenesis).” (Porges S. W., Stress and Parasympathetic Control, 2009)
- Typical responses of the sympathetic nervous system outside of responses to danger include: mobilization, daytime alertness, recreational excitement, vocational initiative, muscular activity, and sexual climax (Chitty, 2013)
- Stress responses include: alarm, agitation, hyperactivity, anxiety, orienting, hypervigilance, fight/flight, discharge (shaking), faster respiration, quicker heart rate, pupil dilation, increased sweating, decreased digestion & peristalsis, suppression of immune function (Chitty, 2013)

“Ventral vagal complex. The ventral vagal complex is an area of the brainstem involved in the regulation of the heart, bronchi, and the striated muscles of the face and head. Specifically, this complex consists of nucleus ambiguus and the nuclei of the trigeminal and facial nerves regulating the heart and bronchi through visceromotor pathways and the muscles of mastication, middle ear, face, larynx, pharynx, and neck through special visceral efferent pathways.” (Porges S. W., The Pocket Guide to the Polyvagal Theory: The Transformative Power of Feeling Safe, 2017) The Polyvagal Theory focuses on the role of the Ventral vagal complex in social engagement.

- The social engagement system is: “A sophisticated set of responses supporting massive cortical development, enabling maternal bonding

(extended protection of vulnerable immature cortex processors) and social cooperation (language and social structures) via facial functions." (Porges S. W., *The Polyvagal Theory: Neurophysiological Foundations of Emotions Attachment Communication Self-Regulation*, 2011)

- Dana (2018) states that: "The Social Engagement System is our "face-heart" connection, created from the linking of the ventral vagus (heart) and the striated muscles in our face and head that control how we look (facial expressions), how we listen (auditory), and how we speak (vocalization) (Porges, 2017a). In our interactions it is through the Social Engagement System that we send and search for cues of safety. In both the therapy setting and the therapy session, creating the conditions for a physiological state that supports an active Social Engagement System is a necessary element. "If we are not safe, we are chronically in a state of evaluation and defensiveness" (Porges, 2011b, p. 14). It is a ventral vagal state and a neuroception of safety that bring the possibility for connection, curiosity, and change." (Dana, *The Polyvagal Theory in Therapy: Engaging the Rhythm of Regulation*, 2018)
- Typical functions of the social engagement system include: "Love," Communication & language, Social organization, Sex- Flirting, Prosody, Vocalization, Reciprocal play, Eye and voice contact & Interaction, Spontaneous feelings in social contexts, Capacity for empathy, Involuntary physical responses to contact with, or memories of, significant people and events. (Chitty, 2013)
- Stress responses include: In-crisis contact and communication, first aid "tend & befriend," empathy, comfort, touch, emergency teamwork, and group psychology (Chitty, 2013)

Dr. Porges writes that: "Optimally, the nervous system evaluates risk and matches neurophysiological state with the actual risk of the environment. When the environment is appraised as being safe, the defensive limbic structures are inhibited, enabling social engagement and calm visceral states to emerge." (Porges S. W., *Making the World Safe for our Children: Down-regulating Defence and Up-regulating Social Engagement to 'Optimise' the Human Experience*, 2015) Conversely, if there is actual risk in the environment, then the defensive limbic system is activated with all of the subsequent downstream responses (depending on the level of risk or

threat), including activating the HPA axis and sympathetic or parasympathetic systems with the resulting neurological and physiological responses (again depending on the level of risk or threat) until the risk has been dealt with or the threat has passed.

When we perceive cues of safety, Dr. Porges writes how “(t)he neural regulation of the muscles of the face and head influences how someone perceives the engagement behaviors of others. More specifically, this neural regulation can reduce social distance by allowing humans (including infants) to:

- Make eye contact;
- Vocalize with an appealing inflection and rhythm;
- Display contingent (and appropriate) facial expressions; and
- Modulate the middle-ear muscles to distinguish the human voice from background sounds more efficiently.” (Porges S. , *Neuroception: A Subconscious System for Detecting Threats and Safety*, 2004)

(But, Dr Porges writes) when we perceive danger or life threat cues, the tone of these muscles is reduced, which may cause the following to occur:

- “The eyelids droop;
- The voice loses inflection;
- Positive facial expressions dwindle;
- Awareness of the sound of the human voice becomes less acute; and
- Sensitivity to others’ social engagement behaviors decreases.” (Porges S. , *Neuroception: A Subconscious System for Detecting Threats and Safety*, 2004)

Girotti, et al (2017) write the following about the acute stress response, or acute neuroception of danger that is then integrated and resolved. “The stress response is a highly conserved process essential for survival under conditions of environmental challenge (McEwen et al., 2015; McKlveen et al., 2015). Thus, the response to acute stress (i.e. to a temporary challenge to the organism homeostasis (McEwen, 2004, Selye, 1973)) rapidly mobilizes the autonomic and neuroendocrine systems, producing a nearly instantaneous release of catecholamines and HPA axis hormones (CRF, ACTH and glucocorticoids), which alter several physiological functions, such as cardiovascular capacity, metabolic resource allocation, and immune activation in order to effectively respond to a threat. Acute catecholamine effects are short-lived, disappearing within an hour; in contrast, glucocorticoid effects can be both rapid (with onset within minutes after the stimulus) and long-lasting. The long-term effects develop over the course of several hours and comprise transcriptional effects of activated glucocorticoid

receptors (Henckens et al., 2010, 2011). The acute stress response also has a strong impact on cognitive function. Acute stress in humans has been shown to activate saliency networks centered around the amygdala, cingulate cortex, hypothalamus, insula, striatum, and locus coeruleus, and is responsible for enhancing sensory gain and environmental scanning, resulting in better performance (Cousijn et al., 2010; Oei et al., 2012; van Marle et al., 2009, 2010). Conversely, processes underlying working memory, problem solving and cognitive flexibility are negatively affected by acute stress (Oei et al., 2006; Plessow et al., 2011, 2012; Schoofs et al., 2008, 2009; Steinhäuser et al., 2007). Together, these results are consistent with an adaptive strategy that, for the short term, ensures allocation of resources to cognitive functions that increase sensory hypervigilance, scanning attention, and rapid (but more rigid) behavioral responses, at the expense of high order cognitive engagement. These effects require the actions of catecholamines as well as the rapid effects of glucocorticoids." (Girotti, et al., 2017)

Cozolino (2016) goes on to say: "The human brain is well equipped to survive brief periods of stress without long-term damage. In an optimal state, stressful experiences can be quickly resolved with good coping skills and the help of caring others." "The consistent high levels of stress and cortisol production generated by the human cortex and modern society are poorly matched to our Paleolithic primitive stress systems. It is apparent that this system was designed to cope with brief periods of stress in emergency situations, not to be maintained for weeks or years at a time. Because of their negative...effects, the biological processes related to stress need to be reversed immediately after the crisis has passed in order to allow the body to return to functions of restoration and repair." (Cozolino, *Why Therapy Works: Using Our Minds to Change Our Brains*, 2016)

Prolonged periods where we perceive danger cues, or life-threat cues, are experienced as chronic stress. Chronic stress can have profound effects on the brain. Chronic stress can cause high levels of the catecholamines (or neurotransmitters) dopamine, epinephrine (adrenaline) and norepinephrine (noradrenaline), which are released during the body's stress response. "Research suggests extreme levels of dopamine are associated with impairments of working memory and attention." (Hunter, Hinkle, & Edidin, 2012) "Similar to dopamine, norepinephrine in ... high levels of the neurotransmitter, often in response to stress, appears to hinder PFC responsivity." (Hunter, Hinkle, & Edidin, 2012) Chronic exposure of high levels of glucocorticoids (the body's stress hormones) can have neurotoxic effects on the brain. Cortisol, in particular, has been studied for its effects on the hippocampus. High levels of cortisol can lead

to degeneration of dendrites, deficits in myelination, and cell death in the hippocampus. "...prolonged stress exposure (also) causes architectural changes in prefrontal (cortex) dendrites" (Arnsten, 2010) "Chronic stress impairs...oscillatory coherence between the mPFC and other brain systems (as HPC {hippocampus} and thalamus) in behaviorally relevant frequency bands (theta, gamma, and SWR). This impairs neural synchrony necessary for synaptic plasticity, impacting the formation of neural assemblies. On the other side, reduced neural synchrony affects the coordinated firing of prefrontal neurons, resulting in a reduced activation of previously formed neural assemblies." (Negrón-Oyarzo, Aboitiz, & Fuentealba, 2016) Finally, "(t)he amygdala, an area of the brain that contributes to emotional processing, was seen to be very susceptible to stressful events, modifying its functionality and morphology. These alterations involve genetic, epigenetic and molecular mechanisms as well as dendritic and synaptic reorganization processes." (Andolina & Borreca, 2017)

So, as we experience these chronic cues of danger, or this chronic stress, our system begins to search for these cues more and more and may not notice the cues of safety. At the same time, we may experience more difficulties in skills like communication, language, prosody, social engagement, cognition, and executive functioning because of differences in the social engagement system and/or structural and functional changes that occur in the brain.

I noticed that this held true for this group of students that I had been working with. As they were experiencing more difficulties with these skills, they seemed to be experiencing more internal stressors caused by the:

- Confusion, disappointment, and anger brought on by difficulties with communication and language, and/or the...
- Loneliness, frustration, disconnection, fear, and annoyance brought on by difficulties with social engagement, cognition, and certain aspects of executive functioning (particularly difficulties with flexibility, impulse control, and working memory)

These particular students, and a number of students that I have worked with since and clients in my private practice, experienced the impacts of their particular speech, language, cognition, and/or executive functioning difficulty (and/or their underlying diagnoses) on their neuroception of safety. And, for these particular individuals, it seemed that these difficulties and their increased neuroception of danger and/or life-threat cues seemed to have a reciprocal nature, so that as one aspect worsened so did the other.

It is helpful here to understand how both the Polyvagal Theory and changes in the brain that may result from chronic stress predict changes on the mechanisms of speech, language, cognition, and executive functioning. With chronic stress and enhanced neuroception of danger or life-threat, it may be predicted that the individual may:

- Become less aware of the sound of the human voice as they are focusing on sounds of danger or threat. This happens below the level of awareness or consciousness. (Porges S. , Neuroception: A Subconscious System for Detecting Threats and Safety, 2004) Because the individual is less aware, or responsive to the sound of the human voice they may develop phonological, or speech, errors, and they may not attend to language during development that is essential for development of more complex language forms.
- Become more hyper-vigilant, seeking cues of danger, while having more difficulty attending for speech, language, concepts, and learning. Because of this hypervigilance, the ability to attend for any length of time may be impaired and/or the ability to switch attention may be impaired.
- Have a flatter affect, make less eye contact, and pay attention less to cues of facial expressions. (Porges S. , Neuroception: A Subconscious System for Detecting Threats and Safety, 2004) They may have more difficulty displaying emotions, particularly more positive emotions. This may lead to difficulties reading emotions, taking the perspective of others, empathy, and social engagement. They may also be prone more to attributions of negative emotions or intents in others.
- Have less inflection in their voice (Porges S. , Neuroception: A Subconscious System for Detecting Threats and Safety, 2004). They may appear to be more monotone or flat in their speech. They may also have difficulty reading the prosody, or musicality of other people's voices.
- Appear more concrete in their thinking, less able to understand abstract/inferential/ ambiguous/figurative language, less able to respond flexibly and adaptively to others and to their environment and may appear to be over-controlled.
- Appear more egocentric in their perspective. They may appear at times to only be able to take their own perspective. They may also appear at times to lack empathy for the experience of others, or alternatively, not seem to take into account how their actions will affect others.

- With changes in the hippocampus, the individual may experience difficulties with new learning, explicit memory (or short-term declarative memory), spatial reasoning, memory encoding and retrieval. (Cozolino, 2016) (Purves, 2010)
- With changes in the prefrontal cortex, the individual may experience difficulties with several cognitive and executive functions such as working memory, selective attention, behavioral flexibility, and decision making (Negrón-Oyarzo, Aboitiz, & Fuentealba, 2016)
- With changes in the amygdala, coupled with changes in the prefrontal cortex, the individual may experience increased emotional reactivity, with reduced ability to use language and executive functioning strategies to modulate the intensity, duration, or valence of the emotion.

Now, it's important that I emphasize that I don't believe that all individuals with speech, language, social, and/or cognitive difficulties experience this type of chronic stress pattern, or neuroception of danger, that may develop secondary to their difficulties with speech, language, cognition, or executive functioning (or diagnoses that may contribute to these difficulties). But, it has been my experience that there are individuals who do experience these difficulties. It is difficult to determine which came first, the difficulties with speech, language, cognition, and/or executive functioning, or the neuroception of danger or life threat. And, again, it is undeniable that some of these individuals that I have worked with have experienced the types of adverse childhood experiences that can lead to significant trauma, which does certainly fit the developmental pattern described by others (see *Safety and Reciprocity: Polyvagal Theory as a Framework for Understanding and Treating Developmental Trauma* by van der Kolk and *Realizing "Deep" Safety for Children Who Have Experienced Abuse: Application of Polyvagal Theory in Therapeutic Work With Traumatized Children and Young People* by Tucci, Weller, & Mitchell in *Clinical Applications of the Polyvagal Theory: The Emergence of Polyvagal-Informed Therapies* (2018)).

But, for many, it has been their speech, language, cognitive, and/or executive functioning difficulties (or the underlying diagnosis that may have contributed to these difficulties) that contributes to their experience of chronic stress or the neuroception of danger/life-threat. It has been my experience that these individuals often struggle with participating in and benefiting from many different types of traditional therapies (both within speech therapy and within mental health therapy, where they are often variably treated for a diverse range of diagnoses, including: ASD, ADHD, anxiety, depression, etc.). For a number of the individuals that I have worked with, they have needed to have both the neuroception of safety and

the speech, language, cognition, and/or executive functioning, addressed to be able to make significant gains. The problem has been that their treatment has either focused on traditional speech and language treatment (that is often very goal-oriented but may not adequately address the neuroception of safety), or traditional mental health treatment (which may address the neuroception of safety, but may be too talk-oriented, require too much flexibility in thinking, etc.).

How do we address their neuroception needs? One big part of the treatment should have become obvious by now, and that is safety. Dr. Porges writes that "Safety is Treatment." (Porges S. , Foreword: Safety is Treatment, 2018) Taking us back to his quote from earlier, "In response to cues of safety, the nervous system promotes a state of safety with emergent properties including an increased proximity, openness and welcoming to others, a bias towards exploration, a sense of presence, and a neural "desire" or drive to co-regulate with another." (Porges S. , Foreword: Safety is Treatment, 2018) We need to create an environment, and cultivate a relationship, that allows for the development of co-regulation and safety. It is my belief, that there are six key components or practices that are involved in creating an environment and relationship that fosters co-regulation and safety.

The first of these is **Presence**. Daniel Siegel writes that "(p)resence is an emergent property of our existence in which we are open and receptive to ourselves and to others, ready to receive and ready to connect. Presence emerges with an awareness that lets go of preexisting judgments and expectations—what some might call a mindful awareness." (Siegel, *The Developing Mind: How Relationships and the Brain Interact to Shape Who We Are*, Second Edition, 2012) Geller and Greenberg refine this a bit to the therapeutic fields in their definition: "Therapeutic presence is the state of having one's whole self in the encounter with a client by being completely in the moment on a multiplicity of levels — physically, emotionally, cognitively, and spiritually. Present therapists become aware of both their own experience and that of their client through bodily sensations and emotions, and this awareness helps them to connect deeply with the client. Therapeutic presence is not a replacement for technique, but rather a foundational therapeutic stance that supports deep listening and understanding of the client in the moment." (Geller & Greenberg, 2018)

On her website, Dr. Geller describes: "The *process* of presence for the therapist involv(ing) (a) being **receptively open** to the client, (b) being **inwardly connected** to their own experience and (c) **extending** the therapists' inward experience to make contact with the client through

words, images, and silence. Therapeutic presence invites a neurophysiological experience of safety in the client that allows for a feeling of calm, openness, and engagement in effective therapeutic work." (Geller S. , 2018) This is in fact true not only for therapeutic relationships but also for relationships between ourselves and others (regardless of the nature of the relationship).

There are several things that attempt to draw our presence (or awareness) away from our clients (and, really the other individuals in our lives). We have all heard of the intrusive nature of technology. The boops and beeps that signal each little thing that we just have to pay attention to at that moment. Unfortunately, these take our awareness from the individuals that we are with at the time. We are no longer present with them. Equally intrusive are the judgements and biases that exist in our heads that we have about other people. These flash through our brains, at times without our even being aware of what we have based them on. They color how we develop relationships with, work with, and judge the behaviors of the individuals around us. A third draw can be our own unmet needs. When we ourselves have needs that are unmet, when we may not feel safe, then we may not feel able to adequately be present with others.

Our goal needs to be to present with others and ourselves, so that we can engage in the next, very closely related component or practice, that of **Attunement**. Dr. Siegel describes attunement as "...we focus our attention on others and take their essence into our own inner world. The physical side of interpersonal attunement involves the perception of signals from others that reveal their internal world: noticing not just their words but also their nonverbal patterns of energy and information flow. These signals are the familiar primarily right-hemisphere sent and received elements of eye contact, facial expression, and tone of voice, posture, gesture, and the timing and intensity of response. The subjective side of attunement is the authentic sense of connection, of seeing someone deeply, of taking in the essence of another person in that moment. When others sense our attunement with them, they experience "feeling felt" by us." (Siegel, *The Mindful Therapist: A Clinician's Guide to Mindsight and Neural Integration*, 2010)

We can see in attunement it's close connection to presence. Now in attunement we are focusing our attention, awareness, and presence, on what signals are coming from those other individuals in our lives. As Dr. Siegel describes these different elements, he is, in many ways, describing many of the different components that Dr. Porges describes as being

affected by neuroception of safety, danger, and/or life-threat. By attuning with another, we are engaging in the process of co-regulation. The process of “feeling felt” by us can be profound and can allow others to open up and work on things that they would otherwise be unwilling to work on.

Babette Rothschild discusses a process that she calls Autonomic Nervous System: Precision Regulation in her book *The Body Remembers Volume 2: Revolutionizing Trauma Treatment* (Rothschild, 2017). In this process, Ms. Rothschild links an awareness of what is happening with the individual, what is essentially an attunement with the individual’s autonomic nervous system, and how we may respond therapeutically. By linking these, Ms. Rothschild gives us the opportunity to link our therapeutic responses to our attunement with the individual so that the individual may “feel felt” by us for the experience that they are having autonomically (or due to their neuroception of safety or of danger). The ability to feel that others understand when we feel unsafe, and that they will make efforts to mitigate those factors that they are able to can help us become more open to working on those things that may be contributing to our difficulties. This also allows the co-regulation to occur that can be so important in developing a neuroception of safety that can lead to increased openness.

The third component is **Trust**. Interpersonal trust is “the expectancy held by an individual or group that the word, promise or written statement of another individual or group can be relied upon.” (Bussey, 2010) “There is a growing body of evidence demonstrating that interpersonal trust across the course of development is linked to: physical health (e.g., Barefoot, Maynard, Beckham, Brammett, Hooker, and Siegler, 1998), cognitive functioning (e.g., Harris, 2007; Imber, 1973), social functioning (e.g., Rotenberg, Boulton, and Fox, 2005; Rotter, 1980), and the development and maintenance of close relationships (e.g., Holmes and Remple, 1989). Certainly, interpersonal trust plays a crucial role for physical health and psychosocial functioning during childhood and adolescence. Furthermore, because of developmental trajectories, interpersonal trust during childhood and adolescence should affect individuals by adulthood both directly (i.e., early trust affects later trust) and indirectly (i.e., via earlier links to health and psychosocial functioning).” (Rotenberg, 2010) As we can see from this definition and these facts, individuals’ and families’ abilities to trust in us is essential. Trust is developed as individuals and families experience our words and our actions being in harmony with one another. As individuals and families experience trust in us, they also experience the safety to work on the areas that have been identified.

“Trust has been conceptualized and defined in the literature in a number of different ways. One conceptualization that has been suggested by Rotenberg (1994, 2001) ... (as) a 3 (bases) x 3 (domains) x 2 (dimensions) model. The three bases of trust are: (1) reliability, which refers to keeping one's promise or word; (2) emotional, which refers to the belief that other individuals will not cause harm by doing things like breaking confidentiality, purposely embarrassing an individual, or passing criticism; and (3) honesty, which consists of telling the truth and having a person's best interests in mind (Rotenberg, 1994, 2001). These three bases of trust are further defined by three dimensions: (1) cognitive/affective, which involves an individual's beliefs about and emotional reactions to the three bases of trust; (2) behavior-dependent, which is defined by the behavioral tendency to expect others to behave in ways that are reliable, emotional, and honest; and (3) behavior-enacting (i.e., trustworthiness), which is defined by behaviorally acting reliably, emotionally, and honestly. Finally, the three bases and the three dimensions are further defined by the following two domains of the "target of trust": (1) specificity, which refers to the differing responses for a person in general versus a specific individual; and (2) familiarity, which refers to the differing response to a person with whom one is unfamiliar or only slightly familiar versus a person with whom one is very familiar.” (Nowakowski, Vaillancourt, & Schmidt, 2010)

Trust is essential. And, the ability for others to trust in us is dependent upon our ability to act in ways that are trustworthy. There are so many opportunities for us to do little things that may be perceived as untrustworthy to the individual who is “primed” to perceive cues of danger. When individuals become used to attending to cues of danger or life-threat, we may need to work extra hard on trust. They may perceive something in our actions that is different than our intentions. It is key that we use our presence and attunement to help us take their perspective to understand how trust may have been violated in their eyes.

We may also need to become very used to doing something that can be very difficult in our society: apologizing. And, of course, I don't mean a general “I'm sorry.” But the specific, emotion-honoring version of apologizing. Even when we don't believe that we did something wrong. This happens to me when I tell a Client who is under 18 that, at the end of a session, I just want to talk with their parent for a couple of minutes before they go. Two-to-three minutes turns into five minutes very quickly, and for the individual who is scanning for cues of danger, and who may have difficulty trusting, this may be a violation. It is my responsibility to apologize genuinely, in a way that honors their experience. This has tended

to help rebuild trust, when it has been violated in some way. By doing so, I work to essentially recalibrate cues that might have signaled danger to cues that signal safety.

The fourth component, which builds on the previous three, is connectedness. **Connectedness:** "Connectedness is the ability to mutually (synchronously and reciprocally) regulate physiological and behavioral state." (Porges S. W., 2016) Dr. Porges has proposed that connectedness is a biological imperative. (Porges S. W., Making the World Safe for our Children: Down-regulating Defence and Up-regulating Social Engagement to 'Optimise' the Human Experience, 2015) When we are connected with one another, we feel "safe" with others, we can tolerate others in physical proximity to us, we can touch and be touched by others, and it allows for the establishment of "trusting" social relationships. Surrey and Jordan (2012) write that: "Our bodies and brains are wired for connection...we need relation to thrive and indeed to survive. When faced with isolation or exclusion our brains and bodies suffer. Cortisol levels rise, neurons die. Eisenberger and Lieberman (2004) have shown that the pain of exclusion travels along the very same neuronal pathways of the anterior cingulate cortex (ACC) as the pain from physical injury. Whether at a personal or a societal level, being excluded or devalued hurts us biologically, neurologically, and psychologically." (Surrey & Jordan, 2012) Hopefully, you can see how this builds on the previous areas.

Individuals who struggle with feeling safe, regardless of the cause, will have difficulty with connectedness, and its closely related area, co-regulation. I can often sense when I am not connected with someone. There is a lack of reciprocity. I will feel out-of-sync with them. When I feel out-of-sync with an individual or family this is often a time that I do some reflection to ask myself what might be going on. Have I previously been in-sync with this individual/family and now am not? If so, is this something in my own life that I am bringing into the session? Is there a mismatch between what my "intention" or goal is in a session and what the person, or family, may need? Is this something that the individual is bringing into the session from outside of the session? Or, is there something that I was not adequately present for or attuned to during the session, so that I missed something that the individual or family was telling me?

If we have previously not had this connectedness, then I want to explore what I need to do to develop it. The first three areas of presence, attunement and trust should lay the groundwork for this connectedness. If something is preventing me from attuning and developing trust with

individuals and families, I explore what that is, and that becomes the focus of my early work. I ask myself many of the questions that I asked myself if I had already had developed connectedness with the individual and/or family.

These questions allow me to stop myself from activating my judgments or biases about the person, and instead see our being out-of-sync as a cue to the individual's connectedness, particularly if this is a pattern that he or she exhibits with others. Changes in our ability to become in-sync with one another may be cues of the individuals overall neuroception of danger or life-threat. We can then use our work on these first four areas to attempt to address this neuroception of danger or life-threat.

All of this occurs within the context of the fifth component or practice that facilitates co-regulation and safety, and that is **Collaboration**.

Collaboration is one of those loaded words. I know of very few therapists out there who don't endorse being collaborative. I also know very few therapists who don't get irritated when the beautiful plans that they proposed get nixed by the individuals and families that they work with, either intentionally or unintentionally.

I certainly know that I've been that way. During the time that I was working with the students I've described, I remember a conversation that I had with a good friend who is a psychologist about a social skills group that I was running. I remember going into his office and telling him how upset I was that the new student that I had added to "My" group was ruining the group for everyone. My friend, being both a good friend and a good psychologist (from a Jungian background to boot), simply reflected back my words, so this is "Your" group, and who is the student ruining it for? In that moment, despite my years of training, and many times I'd discussed being collaborative, I realized (not without a bit of irritation and shame, mind you) that I had made this about me and not about my student, or the group. It reminded me then, and continues to remind me through this day, that in working with others, we need to apply all four of the prior components within the context of a collaborative partnership.

I do this by working in partnership with the individual and family where I strive to be supportive rather than persuasive. I work alongside the individual and/or family rather than in front of or opposed to them. A positive atmosphere is created that is conducive to change. I work to be just one member of the team. I show respect for a variety of ideas about how change can occur and can accept differences between my ideal plan

and what the individual and/or family are willing to endorse or adopt. (adapted from: (HMA, 2018) and other Motivational Interviewing resources) As hard as it is for me, I remind myself that I cannot make individuals or families change, I can only serve as a facilitator and guide for change.

The final component that facilitates co-regulation or safety is a quality of the therapist known as **Authenticity**. To be authentic is to be genuine, real, and open. **Authenticity**: "...designates a human being as the genuine author of his or her relationships, both to him- or herself (openness) and to other persons (transparency)." "From an ethical point of view, authenticity is the response-ability which answers the call to respond to another person's needs, whether in therapy, or in any personal relationship." (Schmid, 2001)

When we act authentically, this provides the individual with cues of safety. When we act inauthentically, we give subtle nonverbal cues (i.e., micro-expressions, prosodic fluctuations) that may trigger the cues of danger or life-threat in individuals whose neuroception is predisposed to these two states.

I always have choices about what I may be open with myself about, and transparent with others about, but the key here is my awareness and that I am making the choice. When I am unaware, I lack the ability to make a choice. Because of this awareness, I, then, also have the ability to see the results of these choices on my authenticity as I work with individuals.

The sum of these six components or practices: Presence, Attunement, Trust, Connectedness, Collaboration, and Authenticity, is the further development of a co-regulated therapeutic relationship with the individual and family. This co-regulated therapeutic relationship allows the individual and family the opportunity to focus on cues of safety, both in their environment and in themselves. I have found that integrating these practices/components into my treatment can be an essential component of addressing some of the neuroception of danger and life-threat components that may be further complicating the cognitive, executive functioning, language, and/or communication difficulties that my clients may be experiencing. And again, bringing us back to Dr. Porges' two statements: "A neuroception of safety is necessary before social engagement behaviors can occur. These behaviors are accompanied by the benefits of the physiological states associated with social support." (Porges S. ,

Neuroception: A Subconscious System for Detecting Threats and Safety, 2004) "In response to cues of safety, the nervous system promotes a state of safety with emergent properties including an increased proximity, openness and welcoming to others, a bias towards exploration, a sense of presence, and a neural "desire" or drive to co-regulate with another." (Porges S. , Foreword: Safety is Treatment, 2018) In this theoretical model, and in my practice, as the individual experiences cues of safety they should:

- Become more aware of the sound of the human voice (enhancing work on speech, language, cognition, and executive functioning)
- Less hypervigilant for cues of danger; so that they will have increased attention reserves for focus, concentration, switching attention, etc.
- Have more facial expressions during emotional expression and be more open to learning and interpreting emotional expressions, and making the eye contact necessary for this.
- Have and/or learn to have more inflection in their voice and learn to read the prosody in other's voices.
- Become more open to being flexible in thinking, in developing more abstract/inferential/ambiguous/figurative language and learn to respond more flexibly and adaptively to their environment.
- Become more open to the perspectives of others, and more open to learning about how their actions impact on others. As this happens, the individual becomes more open to learning the complex cognitive and affective process of perspective taking and integrating these two important components together.
- Allow for neuroplastic changes in the prefrontal cortex, hippocampus, and amygdala (as well as a number of other structures that are essential for speech, language, cognition, and executive functioning, like the insula, basal ganglia, temporal cortex, etc.)

Another program that I have had the honor of integrating into my treatment that addresses the neuroception of danger and life-threat by working to re-establish some of the cues of safety is one that Dr Porges has been working on for decades now and has made available only in the last 16 months for providers to utilize in their practices. This program is a tremendously innovative listening program called the Safe and Sound Protocol (SSP). The following is from the Safe and Sound Protocol Manual and Training that I received when I completed my certification training to provide the SSP:

- “The Safe & Sound Protocol (SSP) is a five-day intervention in which the individual listens to specially filtered music through headphones for one hour each day. The Safe and Sound Protocol as an intervention has two components: first, structuring a safe context in which the intervention is delivered; and second, delivering the acoustic features of the sound presented during the intervention that serve as a neural exercise. The safe component is managed by the practitioner delivering the SSP. The sound component is embedded in the SSP acoustic stimuli.” Copyright © 2016 Stephen W. Porges, PhD & Integrated Listening Systems
- “The Polyvagal Theory focuses on how function and structure changed in the vertebrate autonomic nervous system during evolution. As a function of evolution, humans and other mammals have a “new” vagal pathway that links the regulation of bodily state to the control of the muscles of the face and head including the middle ear muscles. These pathways regulating body state, facial gesture, listening (i.e., middle ear muscles), and vocal communication function collectively as a Social Engagement System. Because the Social Engagement System is an integrated system, interventions influencing one component of this system (e.g., middle ear muscles) may impact on the other components.” Copyright © 2016 Stephen W. Porges, PhD & Integrated Listening Systems

I have administered the SSP over 15 times (which for my small practice is significant, but not nearly as much as those who have administered it over 100 times in their practice), with an over 80% positive to excellent response to the SSP. In my practice, I have seen individuals have reductions in behavioral and emotional reactivity, decreased sensory reactivity, decreased auditory hypersensitivity, decreased hypervigilance/defensive reactions, and reduced stress/fear/anxiety; as well as increases in cognitive and behavioral flexibility, impulse control, attention, self-awareness, eye contact, improved emotion regulation, social communication skills, language skills (including direction following and narrative skills), and self-calming.

Between the SSP, and the practices that I mentioned earlier, I have been able to reach several individuals that have struggled to participate in more traditional forms of treatment. For those individuals whose difficulties with communication, cognition, and/or executive functioning are impacted on by their neuroception of danger or life-threat, the SSP and these practices have given me an invaluable set of tools for helping to facilitate cues of

safety that allow them to work on these underlying difficulties with communication, cognition, and/or executive functioning. These practices have been a bridge that facilitates for individuals and their families the process of growth and development that had been inhibited by their neuroception of danger and/or life-threat and experience of chronic stress with its resulting changes in their neurobiology.

This has been the Flexible Mind Therapy podcast and I am Joe Falkner. An outline for this podcast, along with related bibliography, can be found on the flexiblemindtherapy.com website.

Thank you for joining me today.

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