

# The Polyvagal Theory for Treating Trauma

A Teleseminar Session with  
Stephen W. Porges, PhD  
and Ruth Buczynski, PhD

The National Institute  
for the Clinical Application  
of Behavioral Medicine

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A complete transcript of a Teleseminar Session  
featuring Stephen W. Porges, PhD and conducted by Dr. Ruth Buczynski, PhD of NICABM

## The Polyvagal Theory for Treating Trauma

with Stephen W. Porges, PhD  
and Ruth Buczynski, PhD

**Dr. Buczynski:** Hello everyone, I'd like to get started. Welcome back to this last teleseminar in our series on the treatment of trauma. I'm Dr. Ruth Buczynski a licensed psychologist in the state of Connecticut and the President of the National Institute for the Clinical Application of Behavioral Medicine. And I'm so glad that you're joining us tonight for what will be a very, very exciting call.

But before we begin, as has become our tradition at NICABM I'd like to share with you just some of the countries that were represented on last week's call. From New Zealand there were 26 people, from Mexico there were 9, from Denmark there were 8, from Argentina there were 7, from Portugal there were 2, from Taiwan there was 1 and from Russia there was 1.

All together, not counting tonight, there have been 71 countries represented over the last 5 calls, from the last 5 Wednesday nights. And so, just think of it that right now as you're listening, thousands of people are listening all over the world. And we're joining together participating in this effort to work on how we can help heal people who have suffered from trauma.

In addition to that we represent a wide range of professions. We are physicians and nurses, and psychologists, and social workers, and marriage and family therapists, and counselors, mental health counselors. We are nurse practitioners, physician assistants, chiropractors, physical therapists, occupational therapists, dietitians. We are energy workers, body workers, massage therapists, stress management consultants and coaches. And some of us aren't practitioners at all, some of us are lay people and if you're not a practitioner and you're a lay person we just want you to know we're glad you're here on this call.

Now, my guest tonight is Dr. Stephen Porges. Stephen is Professor of Psychiatry and Bioengineering and the Director of the Brain Body Center at the University of Illinois at Chicago. He is the author of a very, very new book, pretty much hot off the press. It is called *The Polyvagal Theory*. And let me just say this, NICABM has been trying to get him to be part of our series for over two years. I am sure many of you have heard about polyvagal theory. We are so glad that we finally are able to talk to the man himself and to find out so much more about what it is all about.

I do think that you are going to find that this is very important to our understanding of a wide range of disorders, and really to our understanding of part of the human experience.

So let's jump into the call and Stephen, welcome!

**Dr. Porges:** Thank you. It is a pleasure to be here and I am really pleased to finally make connections with you.

### What Practitioners Need to Know About Trauma and the Nervous System

**Dr. Buczynski:** I am going to jump right into what practitioners need to know about trauma and the nervous system. I think I would say that Stephen's work will create a shift in how we understand what

is happening *internally* during a traumatic event and actually with other disorders as well. When a person is in trauma, can you sketch that out for us? What is actually happening internally?

**Dr. Porges:** One of the major problems in the treatment of trauma is that it has fallen under a general category of stress-related disorders. And by doing this something has been lost in our understanding of how the human body and mammalian bodies in general, respond to life-threatening situations.

**“Something has been lost in our understanding of how the human body responds to life-threatening situations.”**

Most people think that we merely have one defense system, the “fight/flight” system. This defense system is described in every book and is central to discussions about stress and anxiety. However, lost in these discussions is an accurate description of reactions to life threat when the body immobilizes.

When the body immobilizes, it goes into a unique physiological state that is potentially lethal for mammals. Many of us have observed this response in a common small mammal, the common house mouse. When a mouse is caught in the jaws of a cat and it looks like it is dead, but it is *not*. We label this adaptive reaction by the mouse, “death feigning” or pretending to be dead. However, this is not a conscious response. It is an adaptive biological reaction to the inability to utilize fight/flight mechanisms to defend or to escape.

In part, the difficulties in treating trauma reflect a lack of awareness of this adaptive biological reaction. Unfortunately, many dedicated clinicians working a variety of disciplines dealing with trauma patients were never taught about an immobilization defense system. In fact, tracking the scientific literature on this phenomenon suggests that due, in part, to the incompatibility of an immobilization defense system with the dominant theories of stress that focus on the adrenals and the sympathetic nervous system to support mobilization defense strategies, an understanding of the neural mechanisms mediating immobilization defense has been written out of the literature.

**“The polyvagal theory emphasizes that our nervous system has more than one defense strategy.”**

The polyvagal theory basically emphasizes that our nervous system has more than one defense strategy and the selection of whether we use a mobilized flight/flight or an immobilization shutdown defense strategy is not a voluntary decision. Outside the realm of our conscious awareness, our nervous system is continuously evaluating risk in the environment, making judgments, and setting up priorities for behaviors that are adaptive, but are not cognitive.

For some people, specific physical characteristics of an environmental challenge will trigger a fight/flight behavior, while others may totally shut down to exact same physical features in the environment. I want to emphasize that we have to understand that it is the response, and not the traumatic event, that is critical.

For some people, so-called traumatic events are just events. And for other people, they are really life-

**“For some people, so-called traumatic events are just events, and for other people, they are life-threatening experiences...similar to the mouse in the jaws of the cat.”**

threatening experiences, and their body responds as if they are going to die; similar to the mouse in the jaws of the cat.

**Dr. Buczynski:** So that would explain why troops of soldiers can go to war and endure horrific events, and some will get PTSD and some won't. I should say that would explain *part* of it anyway.

**“...clinicians understand that when a client has a specific diagnosis, it doesn't mean that...the treatment that has been effective with one person will be effective with another.”**

**Dr. Porges:** Yes. The problem, again, is that whenever we elect to discuss a psychiatric disorder, we are describing a variety of symptoms that don't always cluster together. It is like a restaurant menu where you would choose a variety of food items to define a lunch or a dinner. Some people may enjoy the selected foods, others may find the same foods disgusting and may even regurgitate. When a clinician arrives at a diagnosis based on a collection of features, it doesn't mean that everyone with that diagnosis has the same underlying neural physiological challenges or will have the same clinical outcome.

Most clinicians understand this. They know that when a client has a specific diagnosis, it doesn't mean that they are going to be similar to any other patient that they have seen, or that the treatment that has been effective with one person will be effective with another.

## How the Polyvagal Theory Refines Our Understanding of Trauma

**Dr. Buczynski:** So let's get into polyvagal theory and how that sheds light on our understanding of trauma.

**Dr. Porges:** Before I discuss the polyvagal theory, I would like to give a little background about why there is a polyvagal theory. So if you don't mind, I would like to provide a little bit of history.

**Dr. Buczynski:** That's great!

**Dr. Porges:** Okay. I always like to say I never really was looking for a polyvagal theory. I didn't want to find one. My academic life was much easier for me before I structured the theory. I was doing good research. I was publishing. I was enjoying developing what I thought were better measurements of vagal activity, which I thought provided an easily monitored portal of a protective feature of our nervous system.

As a little background, the vagus is a cranial nerve that exits the brainstem and travels through much of our body. It is primarily a sensory nerve with approximately eighty percent of its fibers sending information about the viscera to the brain. However, about twenty percent of the fibers are motor and the brain's dynamic regulation of these motor pathways can dramatically change our physiology with some of these changes occurring within seconds. For example, the motor pathways can cause our hearts to go faster or they can cause our hearts to go slower.

In its tonic state, the vagus functions like a brake on the heart's pacemaker. When the brake is removed, the lower vagal tone enables the heart to be beat faster. Functionally, the vagus is an inhibitory nerve that

slows our heart up and enables us to, for instance, calm down. Thus, the vagus has been promoted by many as an “anti-stress” mechanism.

However, there is another literature contradicting these positive attributes of the vagus and linking vagal mechanisms to life threatening bradycardia and functionally to sudden death. Basically, the same nerve proposed as an anti-stress system is capable of stopping the heart and producing defecation in response to life threatening experiences.

**“The vagus is functionally an inhibitory nerve that slows our heart up and enables us to calm down.”**

I am sure when you were in graduate school you learned some of the same points about the autonomic nervous system. Specifically, we were taught that the vagus is the major part of the parasympathetic nervous system, an opposing system to the sympathetic nervous system. The sympathetic component of the autonomic nervous system mobilizes the body, gets us moving.

**“...in most psychology books, the autonomic nervous system is described as a paired antagonistic system.”**

In virtually every anatomy book, every physiology book, and in fact in most psychology books, the autonomic nervous system is described as a paired antagonistic system. I frequently say that we were taught that the sympathetic nervous system was portrayed as our “mortal enemy,” and the parasympathetic nervous system had the capacity to inhibit the debilitating influences of this enemy. The net result was a balance between these antagonistic systems.

In the clinical world, terms like “autonomic balance” are used with an expectation that we should be more parasympathetic and more vagal, so that we’re calmer. And if we retract this vagal activity and reduce our vagal tone, we become tense and reactive. Well, that was a nice story but it is only partially true. It is partially true, because most of our visceral organs have neural connections from both the parasympathetic and the sympathetic nervous systems with most of these parasympathetic neural fibers traveling from the vagus.

The utility of this prevalent model broke down when I was conducting research with human newborns. I was developing new methodologies to measure from the heart rate response vagal activity, as a protective feature in human newborns. My research was demonstrating that if newborns had good clinical outcomes if they had a lot of this vagal activity, which is represented in a rhythmic heart rate modulation and which is called *respiratory sinus arrhythmia*, basically it means that the heart rate is going up and down with breathing. And if the babies had functionally flat heart rates without this oscillation, they were really at risk for serious complications.

Based on these findings, I wrote a paper that was published in a journal called *Pediatrics*. The goal of the paper was to educate neonatologists about the utility of measuring heart rate variability in the newborn nursery.

Following the publication the paper, I received a letter from a neonatologist. The neonatologist wrote that the article was very interesting. However, he noted that when he was in medical school, he had learned that the vagus could kill you. He then suggested that perhaps too much of a good thing was bad.

His comments startled and motivated me to challenge the discontinuities in our understanding of the autonomic nervous system.

I immediately understood what the neonatologist meant. From his perspective, the vagus can kill, since it is capable of promoting life threatening bradycardia and apnea that are characterized by massive slowing of heart rate and cessation of breathing. For many preterm infants, bradycardia and apnea are life threatening.

I took his comments very seriously and started to think about what I observed in my research. I realized that I never saw bradycardia or apnea in the presence of what I was calling *vagal activity*, measured by quantifying *respiratory sinus arrhythmia*. I now framed what I called the vagal paradox. How could the vagus be both *protective* when it was expressed as reparatory sinus arrhythmia and *lethal* when it was expressed as bradycardias and apneas?

**“...the vagal paradox:  
How could the vagus  
be both protective and  
lethal?..”**

For months I carried the neonatologist’s letter in my briefcase. I continued to try to explain this paradox. However, my knowledge was too limited. I then decided to investigate the neuroanatomy of the vagus to find out if there were different vagal circuits regulating these contradictory response patterns?

This paradox motivated me to develop the polyvagal theory. The development of the theory uncovered and defined the anatomy and function of two vagal systems, one system mediating bradycardia and apnea and the other system mediating respiratory sinus arrhythmia. One system being potentially lethal and the other system being protective.

**“There are two vagal  
pathways coming  
from different areas  
of the brainstem.”**

There are two vagal pathways coming from different areas of the brainstem. Through the study of comparative anatomy, I learned that the two circuits evolved sequentially. Basically, we have a built-in hierarchy of autonomic responses based on our phylogenetic history and that became the core of the polyvagal theory.

Immobilization, bradycardia, and apnea are components of a very old, reptilian type of defense system. If you go to a pet store and look at the reptiles, what do you see? You don’t see much behavior, do you? Because immobilization is the primary defense system for reptiles. But if you look at the small mammals, such as hamsters and mice, they are running around. They are socializing and then they come together *socially* to immobilize.

Using evolution as an organizing principle, you start seeing different neural circuits involved in different adaptive behaviors in different phylogenetic stages. What I really started to uncover was that there was a very primitive defensive system still embedded within our mammalian nervous system, the nervous system that humans share with other mammals, a defensive system of immobilization. And that immobilization reaction, although very adaptive for

**“...there is a very primitive  
defensive system still  
embedded within our  
mammalian nervous system...”**

reptiles, is potentially lethal for mammals. If a life threat triggers a biobehavioral response that puts a human into this state, it may be very difficult to reorganize to become “normal” again.

**Dr. Buczynski:** So that would be our most primitive...

**Dr. Porges:** Yes.

**Dr. Buczynski:** Okay. And you would get into that state through...

**Dr. Porges:** Okay, I will help you out, if you don't mind. How do you get there and how do you get out of there, right?

**Dr. Buczynski:** Right!

## Autonomic Nervous Systems

**Dr. Porges:** So as the theory developed, it resulted in a new model of the autonomic nervous system. Within the context of the polyvagal theory, we basically have three functionally different autonomic

**“We basically have three functionally different autonomic nervous systems...”**

nervous systems. We have an old immobilization, conservative, shut-down system. The shut-down system works well if you are a reptile, because reptiles don't need much oxygen and don't need to support a big brain. Through modifications of this system, some reptiles can go underwater for several hours and will be fine.

But mammals can't do that. Reptiles have this old defensive system, which is regulated through vagal pathways. However, this reptilian vagal system represents a phylogenetically ancient vagus that is not myelinated. Mammals have two vagal circuits, an unmyelinated shared with reptiles and a uniquely mammalian circuit that is myelinated. The two vagal circuits originate in different areas of the brainstem. The myelinated pathways provide more rapid and more tightly organized responses. The evolution of the autonomic nervous system in vertebrates starts with the unmyelinated vagus that supports immobilization behaviors. Even primitive fish like cartilaginous fish, such as sharks and rays, have an unmyelinated vagus.

Phylogenetically, starting with bony fish, the sympathetic nervous system comes on-line and provides an antagonistic input to the unmyelinated vagus. An autonomic nervous system characterized by the paired antagonism between the unmyelinated vagus and the sympathetic nervous system enable bony fish to swim in groups, to dart, and to stop.

With mammals, a newer circuit, a uniquely mammalian myelinated vagus comes online. With the addition of this new vagal circuit, the adaptive functions of the autonomic nervous system becomes very interesting. The new mammalian vagus is linked in the brain stem to the brainstem areas that regulates the muscles of the face and head.

**“Mammals have two vagal circuits, an unmyelinated...and a uniquely mammalian circuit that is myelinated.”**

**“...with clients who are traumatized, there is lack of intonation and the upper face will have little emotion expressed...”**

Every intuitive clinician knows that if they look at people’s faces and listen to their voices, which are controlled by muscles of the face and head, they will know about the physiological state of their client. They know that when they are dealing with clients, who are traumatized, there is no prosody (a lack of intonation in the voice); they know that the upper face will have little emotion expressed. In addition, these same clients will also have difficulties in regulating states and may rapidly transition from a calm to a highly reactive state. Now we can start to see this physiological play act out in different contexts.

The polyvagal theory led to a conceptualization that the autonomic nervous system was not solely a paired antagonistic system, but was a hierarchical system in which newer circuits inhibited older circuits. When we get challenged, the real question is, how do we switch into these different circuits, and why.

**“The polyvagal theory led to a conceptualization that the autonomic nervous system was...a hierarchical system...”**

**Dr. Buczynski:** Exactly.

**Dr. Porges:** Well, when we get challenged, those systems basically degrade to older and older circuits, as an adaptive attempt to survive. What are the cues or the triggers of the process? We live in a world in which people are *extraordinarily* cognitive, so we want to know what is the motivation, what is the cost/risk benefit, and what am I going to get for this? Basically, we are not voluntarily controlling whether we shift in or out of these states. When confronted in certain situations, some people, as clinicians report, will experience a variety of autonomic responses such as an increase in heart rate, a pounding of the heart, and sweating hands. These responses are involuntary. It is not like they want to do this.

**Dr. Buczynski:** Right.

**Dr. Porges:** What about the real reactions to fears, such as public speaking, that only some people have? If they stand up in front of people, they are fearful that they are going to pass out! Is that a voluntary response? Some feature in their environment is triggering their nervous system to recruit the unmyelinated vagal circuit.

**Dr. Buczynski:** So how do our circuits decide which situations are safe?

**“We will probably learn that early experiences play an important role in changing the threshold or vulnerability to... maladaptive reactions.”**

**Dr. Porges:** On the surface we really don’t know. However, as more research is conducted we will probably learn that early experiences play an important role in changing the threshold or vulnerability to express these apparently maladaptive reactions. If we are protected with the newer vagal circuit, we do fine. However, if we lose regulation of this newer vagal circuit, we become, in a sense, basically defensive fight-flight machines.

But humans and other mammals, as fight-flight machines, only work if they can move and if they can do things. However, if we are confined, if we are placed into isolation, or if we are strapped down, our nervous system reads those cues and functionally wants to immobilize or disappear.

**“If we lose regulation of this newer vagal circuit, we become...basically defensive fight-flight machines.”**

I can give you two interesting examples: one is a news clip I saw on CNN and the second comes from my own personal experience.

A few years ago, I was at a conference and was watching a CNN news broadcast before I went to the plenary session to give my talk. The broadcast showed a video clip of a plane having difficulties as it approached the airport. The wings were tipping up and down as the plane was tossed by the wind. Although the plane looked very unstable, the plane *did* land safely and the reporter went to interview the people on the airplane. Of course, the reporter wanted to interview the people because he thought they would say, “I was so scared. I was ready to scream. I wanted to jump out of my skin.” He went up to one of the passengers and asked her to explain how it felt to be in a plane that looked like it would crash. Her response left the reporter speechless. She said, “Feel? I passed out.”

For this woman, the cues of a life threat triggered the ancient vagal circuit. We don’t really have control over this circuit. However, losing consciousness has certain advantages that change how we experience a traumatic event including raising our pain threshold.

**“...people who report abuse especially sexual abuse...often describe a psychological experience of not really being there.”**

Therapists are aware that many people, who report abuse especially sexual abuse, experience being held down or physically abused. These abused clients often describe a psychological experience of not really being there. They dissociate or pass out.

For these individuals, the abusive event actually triggered an adaptive response, maybe not fully, but part of it, to enable them not to experience the traumatic event. The problem, of course, is how do you get people back out of that?

## **Neuroception - Detection Without Awareness**

I call the mechanism that triggers the neural circuits regulating the autonomic nervous system, “neuroception.” I am careful how I use the term, because in my model neuroception is not *perception*. Neuroception, distinct from perception, does not require an awareness of things going on.

**Dr. Buczynski:** So let’s get a definition. Neuroception is the neurological perception of what is going on?

**Dr. Porges:** No, no – we have got to throw away the word “perception.”

**Dr. Buczynski:** Okay. So, neurological...

**“Neuroception, distinct from perception... is detection without awareness.”**

**Dr. Porges:** Detection. It is detection without awareness. It is a neural circuit that evaluates risk in the environment from a variety of cues. We will talk about the specific cues that our nervous system detects that shift us into different states. Neuroception had to be postulated as a mechanism to move our nervous system into the three broad categories of autonomic state and to emphasize the potent role of mammalian social engagement system, the face, heart, and myelinated vagus in down-regulating the defensive systems.

**“When the social engagement system is working and down regulating defenses, we feel calm...”**

When the social engagement system is working and down regulating defenses, we feel calm, we hug people, we look at them and we feel good. However, the two defense systems take priority when risk increases. In response to danger our sympathetic nervous system takes control and supports metabolic motor activity for fight/flight. *Then* if that doesn’t help us become safe, we recruit the ancient unmyelinated vagal circuit and shut down.

The beauty of the model is that we do know the features of neuroception that trigger the social engagement system, the uniquely mammalian part of our autonomic nervous system that enables social interactions to calm our physiology and to support health, growth, and restoration.

**“...we do know the features of neuroception that trigger the social engagement system...”**

Now, I was going to give you one other example. I view myself as a kind of a, well, reasonable human being, I’m not a panic-type person. I like to think that I am an engaging person. However, as you already know, often we see ourselves in ways that may or may not be shared by others.

I had to get an MRI. And I was really quite interested in this procedure, because many of my colleagues conduct research using the MRI, and I thought, “This will be a very interesting experience.”

I went to the MRI center. To get a brain scan with a MRI, you have to lay down flat on a platform and the platform is then moved into the magnet. I enthusiastically lay down on the platform and was ready for this new experience. I felt really good. I was not anxious. Slowly the platform moved into a very small opening of the MRI magnet. When it got up to my forehead, I said, “Could we wait a moment? Could I get a glass of water?” They pushed me out and I took my glass of water. I lay down again on the platform and it moved until my nose was in the magnetic. Then I said, “I can’t do this.” I could not deal with the confined space; it basically was putting me into a panic attack.

I use this as an example, because my perceptions, my cognitions, were not compatible with my body’s response. I wanted to have the MRI. I wasn’t scared. It wasn’t dangerous. But, something happened to my body when I entered the MRI. There were certain cues that my nervous system was detecting and those cues triggered a defensiveness of wanting me to mobilize, to get out of there.

**Dr. Buczynski:** So beyond your control you had the process of neuroception going on.

**Dr. Porges:** Yes! And I couldn’t do anything about it.

**Dr. Buczynski:** You couldn’t *think* your way out of it.

**Dr. Porges:** Oh, not at all! I couldn’t even close my eyes and visualize my way out of it. I had to get out of there! Now when I have a MRI, I take medication. I am very appreciative of the fact that drugs can

actually enable you to not be as reactive. Not that I am a big fan of drugs, but under certain conditions they are very helpful.

**“The unstable airplane triggered a shutting-down in a passenger and in my situation the MRI triggered mobilization.”**

The point that I want to emphasize is that in both those situations, the one with the woman in the airplane and in my situation in the MRI, the responses were involuntary. The unstable airplane triggered a shutting-down in a passenger and in my situation the features of the MRI triggered mobilization. If you were to interview more people on the airplane, some of them may have been really screaming, and yelling, and wanting to mobilize and get out of the plane. Other passengers may have held the hand of the person next to them and calmly experienced the event.

The critical point here is that the same event can trigger different neuroceptive reactions in different people resulting in different physiological states.

**Dr. Buczynski:** From there, if you had said, “Get me out of here” when you were in the MRI machine, and no-one responded, would you then have reverted to the more primitive?

**Dr. Porges:** Ah, now we’re talking! Potentially. Okay, so now I am stuck in there, I can’t get out; I am in this confined area. What would happen to me? That would be *totally* like being physically abused, being held down, going through all these same types of things.

**“The critical point here is that the same event can trigger different neuroceptive reactions...”**

We often forget that medical procedures have many of the cues that physical abuse has. We need to be very careful about how we deal with people and whether or not even *medical practices* trigger some of the features of PTSD.

## Triggering PTSD

**Dr. Buczynski:** Tell us some of the practices that you think might trigger features of PTSD?

**Dr. Porges:** Well, I think being held *down*. And, again, if we go back to the history of medicine, the issue is when people were, in a sense, “acting out” they were being held down. I think certain types of surgical procedures when anesthetics weren’t really working as well, people were held down. I think anesthesia has a very profound effect, on a positive level, of enabling people *not* to experience some of these features of neuroception.

**“...in the medical environment, many features of self-regulation and safety are disrupted.”**

But remember, several features in the medical environment trigger a neuroception of defense. For example, medical environments often remove access to the moderating social support features that we have in our normal everyday life. Our clothing is taken

away from us. We are put into a public place and predictability is gone. Many of the features that our nervous system uses to self-regulate and to feel safe are disrupted.

**Dr. Buczynski:** They tell you not to wear contacts and then they remove your glasses so you can't see very well.

**Dr. Porges:** Right. And then there is another set of features, which I haven't discussed. These include the acoustic features of the world we live in. One of the most potent triggers of neuroception, or at least the neuroception of safety, is through the use of acoustic features.

**“One of the most potent triggers of neuroception... is through the use of acoustic features.”**

If you think about babies and a mother's lullabies, about folk music or love songs, they are not using low frequencies and the higher frequencies that you are hearing are actively being modulated. The sounds are similar to a female voice. A lullaby will not work with the low frequencies of a male voice, especially in the range of a bass. Our nervous system responds to both the frequency band and the modulation of acoustic frequencies within this band.

**“In *Peter and the Wolf*, the friendly characters are always the violins, clarinet, flute, and oboe. And the predator is always conveyed via lower-frequency sounds.”**

In my talks I use *Peter and the Wolf* as an example because Prokofiev had an intuitive understanding of the effectiveness of acoustic stimulation in the process of neuroception. In *Peter and the Wolf*, the friendly characters are always the violins, clarinet, flute, and oboe. And the predator is always conveyed via lower-frequency sounds.

What are the acoustic features of the MRI? The MRI produces massive amounts of low-frequency sounds. In general, the acoustic features of hospitals are dominated by noise, especially the low frequency sounds of ventilation systems and equipment. Our nervous system responds, without our awareness, to these acoustic features and shifts physiological state.

## The Role of Social Engagement and Attachment

**Dr. Buczynski:** We have so much to do here. I am trying to decide where to spend our time. Let's talk a little bit about attachment. What is it that we are thinking now about how early attachment affects all this?

**Dr. Porges:** In terms of attachment, in surveying the literature, there always seems to me to be something missing. It is what I call the *preamble to attachment*, which I call *social engagement*. I started to partition the development of, let's say, a good social bond, basically by dividing it into two sequential processes: social engagement and the establishment of social bonds.

**“ I started to partition the development of a good social bond by dividing it into two sequential processes: social engagement and social bonds.”**

Let's start with social engagement. This is the process in which we use vocalization, we use listening to intonation in the voice, and we use facial engagement. We also use ingestive behaviors, the baby nurses. But when we are adults, we use the same systems in different contexts. But what do we do? We go out to lunch or we go out for a drink, as a way of socializing. Ingestive behaviors use the same neural mechanisms that we use for social behavior.

**“We use ingestive behaviors, to calm people down and to develop social engagement.”**

In a sense, we use ingestive behaviors, to calm people down and to develop social engagement. And when *that* is done, the physical distance between people can be modulated and we can come close.

As we observe development, we notice that very young infants are less discriminatory early in life regarding whom they interact with, the social engagement aspect. Thus, there is tremendous plasticity in the system for babies to be held by many different people. But as the baby gets older, the process of neuroception, which detects features of safety, becomes more and more selective in identifying familiarity and defining safety before the baby can be held.

**“...young infants...are less discriminatory early in life regarding social engagement...they have tremendous plasticity...”**

I work with autistic children and one of the features that the parents report is that the child is afraid of their father. And what do they mean by that? They mean that the child is afraid of the father's *voice*. Why? Because the voice is characterized by low frequencies, sounds that through evolution mammals have associated with predator.

**“...many of the behaviors we see... are really adaptive behaviors due to faulty neuroception...”**

So the issue is, we understand that many of the apparent behaviors that we are seeing in various clinical disorders are really adaptive behaviors due to faulty neuroception or the body detecting that it is in a dangerous place.

Now let's go back to your question about attachment, I think that safety moderates the ability to develop secure attachments. Whether or not an individual feels safe with other people during early development might moderate individual differences in vulnerability to trauma.

## **What Do Autism and Trauma Have in Common?**

**Dr. Buczynski:** Okay. You raised the issues of autism and trauma just now. You know, when I was preparing for our call, I was thinking as I was reading your book, from your perspective, there are a lot of similarities between autism and trauma, in terms of what is going on auditorily.

**Dr. Porges:** Yes, I think there is a lot of commonality between all critical diagnostic categories. There is actually a dialectic between science and clinical practice. Science is interested in processes and clinical practice is often interested in diagnosis. There is a practical component to that because with diagnosis

comes the ability to use certain billing codes in a variety of other issues, as well as believing that if you can give it a name, you have a better grasp of the disorder.

But scientists are less interested in the clinical diagnosis and more interested in the underlying processes. There are many underlying processes that cross several clinical disorders. They are not studied at the level that they should be, because they are not specific to any *one* clinical disorder. I am going to focus on one process, auditory hypersensitivities.

**“...scientists are less interested in the clinical diagnosis and more interested in the underlying processes.”**

**“...people who are traumatized often don’t like to be in public places...”**

If you were to study trauma, you would immediately realize that people who are traumatized often don’t like to be in public places because noise or sounds bother them and they have great difficulty extracting human voice from background activity. Well, individuals with autism report the same problems. Over sixty percent of autistic individuals have auditory hypersensitivities. They suffer from what is often viewed as a paradox and that is they are hypersensitive to sound but have great difficulty in extracting human voice.

If we generalize from autism and trauma to other psychiatric diagnoses, we will see similar features in depression and schizophrenia. All these disorders have an underlying state regulation disorder, an underlying flatness of affective tone expressed on their faces, an underlying lack of prosody in their voices and they also tend to be in an autonomic state that supports defensive behaviors, meaning they tend to have higher heart rates, less vagal activity.

These core processes related to the expression of emotion are actually integrated into what I call the “social engagement system,” which is regulated in a part of the brain stem that regulates the mammalian or new vagal system.

When a person is facially expressive, has vocal intonation, has an expressive face and whose eyes are open when we talk to them, this expressive individual is also contracting middle ear muscles that facilitate the extraction of human voice from background sounds. When people are smiling and looking at us, they are basically better able to pull out human voice from back ground sounds, but they are doing this at a price.

The “adaptive” price we pay for social behavior is really the pivot point in understanding the application of the polyvagal theory to psychiatric disorders. We pay a price by down-regulating our ability to hear low-frequency sounds, sounds which through our phylogenetic history were associated with predator. For individuals with autism, PTSD, and various other clinical disorders, this system is compromised. However, these individuals with the compromised social engagement system functionally have an advantage in detecting predator. So they are better able

**“...individuals with compromised social engagement systems functionally have an advantage in detecting predator.”**

to know if someone is walking behind them and they can hear low-frequency sounds but they do not understand what you're saying.

**Dr. Buczynski:** And that is because something is different in their middle ear structures?

**Dr. Porges:** Well, in part. But we do not assume that these differences are permanent. Here is an example. Where do you live? What town do you live in?

**Dr. Buczynski:** I live in Storrs, Connecticut.

**Dr. Porges:** Okay. If you were to walk through New Haven in the old days, when it wasn't very safe, and you were walking with someone else and that person was talking to you, would you understand what that person was saying? Or would you hear the footsteps behind you?

**Dr. Buczynski:** I'd be in a careful mode.

**“In potentially dangerous environments, we shift from a safe social engagement system to a surveillant vigilance system.”**

**Dr. Porges:** The careful mode is that you wouldn't really hear what the person is saying, but you would hear the steps behind you.

**Dr. Buczynski:** Right.

**Dr. Porges:** So if you go into new environments, which are potentially dangerous, we shift to a surveillance vigilance system from a safe social engagement system.

From a cognitive perspective, we use terms like *allocation of attention*. But from a neurophysiological model, it is not simply allocation of attention. We have shifted physiological state. We have shifted neural tone to the middle ear structures so that we are better able to hear low-frequency predator sounds. But we do that at the expense of having difficulties in hearing and understanding human voice.

**Dr. Buczynski:** And I did that involuntarily?

**Dr. Porges:** Yes! One hopes! Because if you are focusing on human voice, you might miss things that might be a real threat to your life.

**Dr. Buczynski:** So let's say that people aren't picking up on danger when they should be. What is structurally, physiologically, going on?

**Dr. Porges:** Well, if they are not picking up on danger and they have the ability to focus on human voice; in a sense, their nervous system has prioritized the social features of vocalization over the features of danger of a predator.

**“...the nervous system has prioritized the social features of vocalization over the features of danger...”**

And you will see that if you go with groups of people and you go into novel environments, some people very reflexively become hyper-vigilant and break out of the group dialogue and other people are just, you know, talking and talking until someone comes up behind them and something not good may happen.

One other comment, if we use this type of model that emphasizes the adaptiveness of our neural regulation in the middle ear, we could ask questions about language delays in various subpopulations. If a child comes from a dangerous neighborhood or an unsafe family will the child have language delays? Children, who live in these environments, are usually tuned to pick up predator and their nervous system will not easily give up the ability to detect predator. Will their language delay be due to their inability to clearly hear human voice? They may hear people vocalizing but not hear the ends of words well with the higher frequencies dropping out.

**Dr. Buczynski:** So they can hear chatter but they can't absorb the meaning of it?

**“...the features of human voice that convey the meaning of words rely on frequencies higher than the fundamental frequency of the voice.”**

**Dr. Porges:** Yes. Because the features of human voice that convey the meaning of words rely on frequencies higher than the fundamental frequency of the voice. I'll give you another example. The natural course of aging and some of us are on this trajectory.

**Dr. Buczynski:** Some of us, yes!

**Dr. Porges:** Some of us, not all of us! As mature adults when we go to bars or noisy restaurants and people are talking to us, do we hear the ends of their words? We know they are talking, we can hear sounds but can we understand what they are saying? However, when we think back to when we were teenagers, or in college, and we remember that when we went to concerts and bars, we were able to meet new people, to listen and to talk in environments that we would now perceive as noisy. But when we were younger words were never lost, we heard *everything*.

We could understand what people were saying, because we had a functional neural system that effectively regulated the middle ear structures and this changed as we mature. But what would our language and social skills be, if we started out with what we have now? If our middle ear neural regulation was compromised the way it is in older people and we had to learn a language like a young infant, we may have had great difficulty because we would have difficulty extracting the words from the background noise. I think this is the sensory world that is experienced by many children with autism.

## Treatment of Autism Disorders

**Dr. Buczynski:** I want to switch us, in the last half of our call, into what this means to treatment. So since we are talking about autistic children, let's start there, and then we will circle back to focusing more on treating people with PTSD and so forth. Let's start with autistic children.

**Dr. Porges:** We could actually cluster both PTSD and autism together, because the pivotal point is, can we get people to feel safe? Safety is a powerful metaphor. And it is a metaphor that carries with it a physiological state. So if we feel safe, we have access to the neural regulation of the facial muscles, we have access to a myelinated vagal circuit that is capable of down-regulating more traditional fight/flight and stress responses, and we have an opportunity to play.

**“...the pivotal point is, can we get people to feel safe?”**

**“Play requires an ability to mobilize with the sympathetic nervous system and then to down-regulate the sympathetic excitation with face-to-face social interaction...”**

I actually wanted to bring into this discussion the concept of play. An inability to play is a frequent characteristic of many individuals with a psychiatric diagnosis.

And what I mean by *play*, is not playing with a Game Boy or computer. Instead it requires social interaction. Play requires an ability to mobilize with the sympathetic nervous system and then to down-regulate the sympathetic excitation with face-to-face social interaction and the social engagement system.

**Dr. Buczynski:** Say that again – I want to make sure everyone has that. What does play require?

**Dr. Porges:** Okay, I will go through the whole metaphor. I have two little dogs, Japanese Chins, and they weigh about 8 lbs each. They run through the house as dogs do to play. They chase each other; one will try to bite the rear leg of the other. The other one will turn around to look at the other, a face-to-face interaction to ensure that the biting behavior was play and not aggression. So what we are doing is diffusing our response to mobilization behaviors as fight/flight with social engagement.

I use in my talks video clips of Dr. J. and Larry Bird, two famous basketball players. I start off with a clip in which they are *friends*. They are doing an advertisement for sneakers. Then I show a clip of them playing basketball against each other and they are bumping and they are hitting each other. Dr. J. hits Larry Bird in the face and knocks him down to the ground and walks away. And by walking away, he didn't diffuse the cues of the mobilization behaviors from fight/flight to play. And so then Bird goes after him and they have a fight.

We can interpret these behaviors in terms of how people use face-to-face interactions to repair a violation of expectancy. When we play, we mobilize with physiological state changes that also support fight/flight defensive behaviors, but then we down-regulate defensive reactions by looking at each other. If we hit each other by mistake, we say, “I’m sorry.” We use our voice and facial expression to reduce the possibility that the behavior will be interpreted by our nervous system as aggressive.

**“When we play, we mobilize with physiological state changes that also support fight/flight defensive behaviors...”**

So play requires always mobilization. But then to make sure it doesn't move into aggressiveness, play requires face-to-face interactions. During play we start seeing a behavioral reciprocity that involves movements similar to fight/flight behaviors that are followed by face-to-face interactions. We see this in virtually all mammals.

**“Play is actually a neural exercise of using the social engagement system...to regulate our fight/flight behaviors,”**

We can describe other forms of adult play with similar features such as dancing. Most forms of team sports involve face-to-face interactions that include communication via eye contact. So play is not solely practice for aggressiveness.

Play is actually a neural exercise of using the social engagement system, a uniquely mammalian system, to

regulate our fight/flight behaviors, to be able to cap this older defensive system. So we are co-opting an older system. However, it is important to note that individuals with a variety of clinical pathologies often have difficulty *playing*.

Play is not being on a treadmill; it is not solitary. Play is interactive, using face-to-face.

**Dr. Buczynski:** Okay. So back to treatment, let's tie that to treatment.

**Dr. Porges:** Okay, so the issue with treatment is that safety is functionally our transformative state and neural exercises of this safe state enable the social engagement system to work. The neural exercise would be, in a sense, to enable it to dampen sympathetic activity. Play literally becomes a functional therapeutic model, the exercising of the neural regulation of the face through song, through listening, through music, and through reciprocal social interactions. So in a sense talk therapy can be a neural exercise.

What I see as the most profound way of engaging many individuals who have various disorders is to functionally change the physical context. Get rid of low-frequency sounds; enable music or melody to engage people using prosodic voices, voices with great intonation, don't bark at people. Do not treat people as if their disorder is a decision to be compromised, but really is an expression of a physiological state that they are in.

**“...the most profound way of engaging many individuals who have various disorders is to functionally change the physical context.”**

I am not talking about *curing* I am talking about removing some of the symptoms to make life better for people with disorders. I think we understand that physiological state provides, functionally, a platform for different classes of behavior, so that if we are in a physiological state that supports fight/flight, it is just not going to be very good for social behavior. If we are in a physiological state that is shutting down, we are, functionally, immune to social interaction; we are not going to be part of it.

**“...we want to be in a physiological state that enables social engagement.”**

So what we *want* to be in is a physiological state that enables social engagement. But that physiological state is reserved, due to our neuroceptive processes, for only safe environments.

With that knowledge, we need to, in a sense, structure clinical settings to remove low-frequency sounds and to remove the complexity of the physical environment.

**Dr. Buczynski:** So hospitals would insulate their rooms?

**Dr. Porges:** Yes, they would create functionally “safe zones,” not “public zones.” If you go to a hospital, there are few places where you could feel “safe.” Your personal space is going to be invaded. You know that.

**Dr. Buczynski:** Yes. So what does that mean?

**Dr. Porges:** It means that if you are not safe, you are going to be hyper-vigilant. And that means that your social

**“... we need to structure clinical settings to remove low-frequency sounds and the complexity of the physical environment.”**

engagement system is going to go for a vacation, because this system is not accessible in environments in which people are poking things at you.

**Dr. Buczynski:** Yes. They might give you the schedule so that you would have some sense of predictability.

**Dr. Porges:** Predictability – our nervous system likes predictability. Yes.

**Dr. Buczynski:** How about with trauma, PTSD patients?

**Dr. Porges:** I started in my talks to tell clinicians, “Try something different with clients.” I said, “Tell your clients who were traumatized that they should celebrate their body’s responses, even if the profound physiological and behavioral states that they have experienced currently limit their ability to function in a social world. They should celebrate their body’s responses since these responses enable them to survive. It saved their lives. It reduced some of the injury. If they were oppositional during an aggressive traumatic event such as rape, they could have been killed. Tell them to *celebrate* how their body responded instead of making them feel guilty that their body is failing them when they want to be social and let’s see what happens.”

**“Therapy in itself is extraordinarily evaluative... And once we are evaluated, we are basically in defensive states.”**

Now, remember, what is occurring in most therapies? Therapies often convey to the client that their body is not behaving adequately. The clients are told they need to be different. They need to change. So therapy in itself is extraordinarily evaluative of the individual. And once we are evaluated, we are basically in defensive states. We are not in safe states.

**Dr. Buczynski:** And teaching is, as well.

**Dr. Porges:** Yes, yes. Actually I have given a couple of talks on mindfulness, and I started to say, “Well, mindfulness requires feeling safe because if we don’t feel safe, we are, in a sense, neuro-physiologically evaluative of our setting which means we can’t be safe, and we can’t engage. We can’t recruit the wonderful neural circuits that enable us to express the wonderful aspects of being human.”

So if we are able to create safe environments, we have access to neural circuits that enable us to be social, to learn, and to feel good. Clinicians did tell their clients this simple message and I started to get wonderful emails about how much improvement their clients were showing spontaneously. I think this spontaneously occurred because the clients started to see themselves as not having done something *bad*.

That is the other point I always make: there is no such thing as a bad response. There are only adaptive responses. The primary point is that our nervous system is trying to do the right thing and we need to respect what it has done. And when we respect its responses, then we move from this more evaluative state and we become more respectful, and we functionally do a lot of self-healing.

**“...there is no such thing as a bad response; there are only adaptive responses.”**

## A Listening Project - Theory and Treatment

**Dr. Buczynski:** Now, you have an intervention project, a listening project that I think people would like to know about.

**“The polyvagal theory... assumes that if we start to engage the middle ear muscles...it will enable the individual to be more spontaneously social.”**

**Dr. Porges:** Yes. This has actually been going on for about a decade. I decided that I wanted to try out a technology to stimulate features of the Polyvagal theory. The polyvagal theory, especially the part of the theory that emphasizes the social engagement system, assumes that if we start to engage the middle ear muscles, the muscles that help us extract human voice from background sound, it will feed back, change physiological state, and enable the individual to be more spontaneously social. This system should be triggered when listen to voices that are very prosodic with great variation in pitch. It was a pretty nifty theory and when we started to try this, we started to get amazing effects.

We have probably run close to two hundred individuals through it over the past decade. About sixty percent of these individuals noticeably reduced their auditory hypersensitivities. Paralleling this reduced auditory hypersensitivity was an increase in spontaneous social behavior, more facial affect. We even measured autonomic state and the intervention resulted in a calming effect.

**“Paralleling this reduced auditory hypersensitivity was an increase in... more facial affect.”**

**Dr. Buczynski:** The two hundred people, were they autistic?

**Dr. Porges:** Yes, most carried the diagnosis. However, your question triggers a whole set of issues. I started off working with autism and then realized that autism was a very diffuse diagnostic category with great variations in symptoms and function. I decided that if I focused on auditory hypersensitivity, I could move into an area that wouldn't be viewed as controversial, as trying to remove some of the symptoms of autism.

Autism is a very complicated area to work with, with a very needy population. And there are also a lot of people who talk about *curing*; there is a lot of controversy in there. So I started to refine the model and the theory towards auditory hypersensitivity.

Over the past decade, we have developed a device to measure the middle ear muscle transfer function and that means we are able to measure whether or not the listening project therapy changes the types of sounds, the characteristics of sound that actually get into the brain or bounce off of the eardrum. When the middle ear muscles tense, the higher frequencies of human voice pass through the middle ear structures and go through the auditory nerve to the brain, and the lower frequencies start bouncing back off. It is like a kettledrum. The eardrum is very much like a kettledrum; if you tighten it, higher pitches get through, if you loosen it, lower pitches.

**“The eardrum is very much like a kettledrum...”**

When we hear lower pitches we are prepared to hear predator, but we have great difficulties hearing human voice. We now have the ability to functionally measure the tension of the middle ear muscles. We developed a new device and have a provisional patent. The device was developed with my former graduate student, Greg Lewis, who just received his PhD in Bioengineering.

**“When we hear lower pitches we are prepared to hear predator, but we have great difficulties hearing human voice.”**

The utility of the device is that, even if you test normal people, you can detect individual differences and identify vulnerabilities in this system that are related to difficulties in understanding voice in background noise. Even with a restrictive range of normal people, we can see the effect. The device can now objectively measure changes in middle ear muscles function in response to the treatment. This is a big breakthrough, because prior to the development of this device, the ability to evaluate auditory hypersensitivities was solely subjective. And when you deal with children who have language problems, well, you are asking their parents for information about the child’s subjective experiences and the parents have to be very attentive.

I will share with you what happened to one of the children that participated in the listening project. This child is autistic. Prior to the intervention, he used to put his fingers in his ears when sounds bothered him. Placing fingers in the ears is a common response to noise for autistic children. This past year, he was participating in the Special Olympics. His father told me that when the starting pistol was shot, all the other kids on the starting line put their fingers in their ears, and he just ran and won.

**“The point is that auditory hypersensitivities are now treatable.”**

The point is that auditory hypersensitivities are now treatable in many of the children with the method we developed. But also another very important feature usually accompanies the reduction of auditory hypersensitivity, the ability to extract human voice better. So with reduced auditory hypersensitivities, you get improved language development.

I have not tried this with PTSD, but my guess is that some of these features might improve as well.

**Dr. Buczynski:** I understand that you have a way to measure this with the child. But then once you have a sense that this is happening, what did you do with this child, for instance, to treat him?

**Dr. Porges:** Oh, I didn’t explain the listening project – thank you for putting me back on track! The listening project is really quite simple. It is listening to acoustic stimulation. In the listening project we use vocal music, because we want to emphasize the prosodic features of the human voice. Remember what I was saying about prosodic features; if we listen to a voice characterized by a great degree of tonal modulation, our nervous system functionally starts triggering a state associated with safety.

**“...if we listen to a voice characterized by a great degree of tonal modulation, our nervous system functionally starts triggering a state associated with safety.”**

With this knowledge, we amplified the prosodic features of the vocal music by custom designed complex computer algorithms that processed the vocal music. If you were to listen to it, it would sound at times like it was disappearing. It would be very thin and then it would become richer, and then thinner again.

And what you would experience, you would functionally try to reach for the sound as the sound disappears, and then when the sound starts to come back, you would feel better.

By modulating the frequency bands, we start to get pulled in and out of the acoustic environment. The objective of the intervention was to trigger the neural circuits with prosodic voice that would normally trigger a neuroception of safety. The intervention amplifies prosody. When I say “amplify” I don’t mean louder, I mean making it more prosodic and removing low frequency sounds, presenting these acoustic stimuli in a quiet room and respecting the fact that the child might have difficulty in dealing with other human beings.

Underlying the entire whole intervention is a motivation to keep the child safe and then to expose the child to modulated acoustic information. Only if the nervous system is not required to be hypervigilant and defensive can the nervous system regulate the middle ear muscles to allow the child to experience the modulated sounds.

You start to see the neural circuit regulating the entire social engagement system come online. In many of the children, the facial muscles become more animated. Prosody is increased in the child’s vocalizations as the child is better able to listen to their own vocalization.

Functionally the children who participate in the intervention are hearing their voice better. The voices change and they yell less. Many autistic children talk very loud without prosody and these features change.

The intervention is merely a neural exercise of passively listening to sounds that are modulated to trigger our nervous system’s need, or let’s say interest in, prosodic or intonation of voice.

May I ask you how old you are? I know this might not be a good question.

**Dr. Buczynski:** That’s fine! I am sixty-one.

**Dr. Porges:** Okay. So then you would remember Johnny Mathis, correct?

**Dr. Buczynski:** Oh yes!

**Dr. Porges:** Now, you said that with kind of a wistful intonation. So *you* tell me what you think of Johnny Mathis’s voice.

**Dr. Buczynski:** Oh, it was sweet and melodic.

**Dr. Porges:** Right. And physiologically, when it was played, how did you feel?

**Dr. Buczynski:** Calm and like singing along.

**Dr. Porges:** Okay. Was it ever used in certain social settings when you were growing up?

**Dr. Buczynski:** It might have been!

**Dr. Porges:** Okay. But to the listeners you need to convey what it was. It was basically used when adolescents were trying to get closer to each other, correct?

**Dr. Buczynski:** Exactly!

**Dr. Porges:** Okay. But what *we* didn't know at that point in time was the prosodic features of Johnny Mathis's voice were triggering the neuroceptive circuit to make us feel safe. And we felt safe and therefore we could be in physical contact. In a sense, the defensiveness was greatly diffused by Johnny Mathis. Remember that?

**Dr. Buczynski:** Yes.

**Dr. Porges:** Okay, you *do* remember that!

**Dr. Buczynski:** Yes!

**“Listening therapy is...an understanding that those frequency bands of prosody trigger a neural circuit that enable a human being to feel safer.”**

**Dr. Porges:** Okay, if you think about that, this is what the listening therapy is really all about. It is, in a sense, an understanding that those frequency bands of prosody trigger a neural circuit that enable a human being to feel safer. Even when you *visualized* and *thought* about Johnny Mathis singing, *your* voice started to have different intonation as well.

The listening project is not a long-term intensive intervention. It is only five one-hour sessions. And the effects, if they are going to occur, normally occur after the third day. The first two days are really for the child to get used to the intervention environment.

The point I am making is that our nervous system is sitting there *waiting* for Johnny Mathis; we are sitting there *waiting* for intonation of voice. We *want* it! And when we start getting it, it changes our physiological state.

The other example that I always like to make is the prosodic features of the typical college professor, you go right to sleep!

**Dr. Buczynski:** Right.

**Dr. Porges:** The issue is why should a person talk like a boring college professor? Because no one is going to understand anything anyway. Because they are not being pulled into the discussion. Because the voice is not seductively engaging us to extract the information. An understanding of how the voice attracts attention is missing in our cognitive world. Our cognitive world focuses on the content of the *words* not on the intonation upon which the words are being conveyed.

Now we have gone full circle. Therapists need to understand that the cues of a therapeutic setting are extremely critical to the clinical process. When people are talking to each other; it is not just the words. Insight is not going to save a person with autism, it is not going to cure them, and it is not going to help them. Insight is not going to do very much with PTSD. But intonation *will* do a lot with both.

**“Therapists need to understand that the cues of a therapeutic setting are extremely critical to the clinical process.”**

**“Insight is not going to do very much to save a person with autism and PTSD. But intonation will do a lot with both.”**

**Dr. Buczynski:** Okay. I have one last question. This training of the middle ear muscles that you do with autistic children, have you ever tried doing that with an aging population, to see if you could help them recover some of their ability to separate background sounds so that they can hear better?

**Dr. Porges:** I have thought of it because you are absolutely right; with aging there is a deterioration of the system. I have used it with myself, and I have even overdosed it with myself. So I tried to figure out, if people think that an hour works, then why not two hours? Why not eight hours? Well, I tried. Basically we are dealing with the smallest muscles in the body and they fatigue very easily.

**Dr. Buczynski:** What did you do? How did you train yourself?

**Dr. Porges:** What happened to me? I listened to the acoustic stimulation from the listening project for six to eight hours a day. And what happened to me? I became so sensitive to higher frequencies that I couldn't even work by my computer because the computer fan was too loud. I could hear the high-frequency sounds, sounds that normally dissipate with slight distances. I could hear my children talking even when they were in rooms at the other end of our house. I got so attuned to human voice with its frequency band, that I couldn't ignore it. It actually took me two weeks for me to re-equilibrate. Now I am very cautious and very respectful of individual sensitivities and vulnerabilities.

The listening project intervention respects the fact that when you are dealing with small muscles, they rapidly fatigue. When they fatigue, they give feedback to the rest of the body. And that is why many of the participants in our projects get very tired after listening for only an hour. They sleep through the night. They are exhausted, because the feedback from the system is just like you've been running a few miles.

**“The listening project intervention respects the fact that when you are dealing with small muscles, they rapidly fatigue.”**

**Dr. Buczynski:** And if they use that muscle more and more will they build up endurance?

**Dr. Porges:** Yes. Well, the issue is that if you trigger the circuit, and they are in the appropriately safe environment, the system will be socially rewarded and continue to be used. So in a sense it will be mutually rewarding in the social setting. When a child talks to his or her parents and the parents look back to the child, the family unit defines an interactive feedback loop, and the child will talk more.

I have another example. I often have children of professionals coming into my laboratory for the intervention. One came from a colleague from another university. I saw him at a conference and I said, “How's your son doing?” And he turned ninety degrees from me and said, “He's doing very well.” The father had all these symptoms of non-social engagement! I said to the father, “If you talk to *him* that way, he's going to have problems quickly again.” I said, “You can't turn away from your son. Even if this is a normal strategy that you do involuntarily, you are going to have to self-monitor.” Because, if the father keeps turning away, it will turn off the child's social engagement system.

**“...if we come from families where parents are depressed or chaotic, we will adapt by...down regulating the social engagement system.”**

We are very, very adaptive. In general if we come from families where parents are depressed, or parents are chaotic, we will adapt by not engaging, and we literally will down regulate the social engagement system. But as we down regulate the social engagement system, we start picking up symptoms of other clinical disorders. It doesn't mean that we are locked into those disorders for life. It means that the system is just, in a sense, down regulated, but may be available if prompted with the appropriate stimuli.

The listening project was developed to maximize the social engagement system in individuals, even if the system may already be compromised.

**Dr. Buczynski:** Okay. I am so sorry but we are out of time. Half of what I had prepared and hoped we would talk about we haven't had a chance to but what we *did* do was *so* fascinating and *so* exciting.

**“The listening project was developed to maximize the social engagement system in individuals...”**

I want to say to everyone, momentarily I will be sending you an email and in that email I will do two things. One, I will give you a link to the Comment Board. I would like you to go to the Comment Board and tell us how you are going to use what you heard tonight. So please put in your first and your last name, your profession, and your city or state and country, and tell us how *you* are going to use what you heard tonight.

The other thing I will do is give you a link to Stephen's book *The Polyvagal Theory*. I am going to give you a link to that on Amazon. That is probably your least expensive place to buy it if you want to buy it or you could print out the review and get your library to buy it. But this is important work. You are going to be hearing more and more about this whole theory and what it means for so *many* of the things that we come into contact with. You are going to hear more and more about this shift as we go along.

Stephen, thank you so much for making time for us and more than that, thank you for your work. This is really profound. It is life-changing, I am sure, for many, many people. It is a paradigm shift and I don't use that word often because I think it is overused. But I would say in this case, this is a paradigm shift. And I just want to say thank you and I have so much respect for what you have done.

**Dr. Porges:** Thank you, Ruth. It has been a pleasure to be on your show. Thank you.

**Dr. Buczynski:** Thank you. Goodnight everyone!

**Dr. Porges:** Goodnight.

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## About The Speaker:



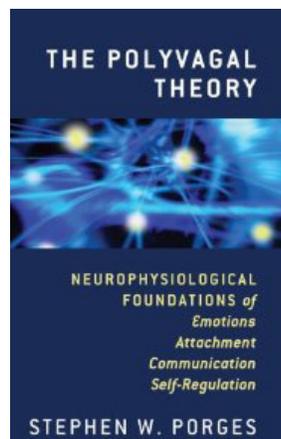
Stephen Porges is currently a Professor in the Department of Psychiatry and the Director of the Brain-Body Center in the College of Medicine at the University of Illinois at Chicago and holds appointments in the Departments of Psychology, BioEngineering, and Anatomy and Cell Biology.

He is a former President of the Society for Psychophysiological Research and has been President of the Federation of Behavioral, Psychological and Cognitive Sciences.

Stephen Porges is married to C. Sue Carter, PhD, who is a biologist and behavioral neurobiologist.

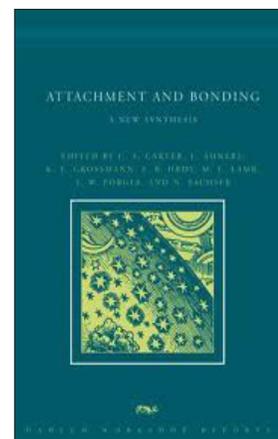
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