The Polyvagal Theory

Stephen Porges & Maggie Phillips

Stephen: The Polyvagal Theory has many attributes. We'll start with the main reason people in trauma got interested in the Polyvagal Theory. Polyvagal Theory identified a second defense system. Before, we tended to think there was only one defense system, and it was fight-or-flight. Clinicians noted that their clients who had been abused or suffered from severe, chronic, or accumulated traumas, would present symptoms of immobilization, dissociation, and behavioral shut-down. Rather than being hyper-reactive and hyper-aroused, as theory would suggest, they were hypo-aroused and hypo-reactive. They really weren't even present. Concepts like "being present" just disappeared.

The Polyvagal Theory then identified that humans, like other mammals, evolved with two defensive systems. One, which we all knew about, was this fight-flight system; but also, there was another system. That system is an immobilization system that we shared with lower vertebrates such as reptiles and amphibians. What does a reptile do when it is under life threat? It immobilizes.

In terms of neurobiology, we understand immobilization to be metabolically conservative, meaning that it uses less energy. When organisms like reptiles are placed under threat, they immobilize to reduce the metabolic demand. Interestingly, it works pretty damn well for a reptile, because their brains don't need much oxygen. If they have to dive underwater, they can hold their breath for two hours.

Maggie: Wow.

Stephen: But their brains are minuscule.

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Maggie: I was going to say: very, very small.

Stephen: Yes–in contrast to mammals. If mammals go into that response, they don't do as well. It's a matter of phylogeny, which is about evolution or evolutionary history. We are primates, we are humans—and, underneath that history, we are more primitive mammals, and mammals evolved from reptiles. What kind of reptile did we evolve from? We didn't evolve from a snake. Snakes broke off of reptiles after mammals did. We didn't evolve like crocodiles.

Maggie: No.

Stephen: We evolved… Our common ancestor is a turtle. What's a turtle's defense system? Autonomically, it pulls in …

Maggie: Into the shell.

Stephen: … into the shell. Immobilization. That's exactly what we do when we have no other option.

The issue is: We have to also understand that defense systems are not voluntary. This is where the Polyvagal Theory brings a different model to the responses to trauma, because the trauma responses of people who didn't really… who weren't motivated… who didn't want to change their behavior… They were being twice victimized: once, victimized by the trauma; and secondly, victimized by the therapy and by the community. The community said, "Why aren't you motivated to do these things? You should do these things." Everything was based on a negative evaluation.

What the Polyvagal Theory emphasizes is that the physiological state was really the mediator of the psychological experience. We shift physiological state sometimes voluntarily: If I get up and get on a treadmill, I can mobilize. But I cannot voluntarily immobilize. I can't shut down on purpose.

Maggie: Right.

Stephen: When a mouse is in the jaws of a cat, which is our perfect example, the mouse functionally faints. We call it "death feigning." Because we call it "death feigning," meaning "playing dead," we assume it's a voluntary type of behavior. It's not. It's a reflex. It's the body's detection of life threat. It's the body's detection that there are no options to fight or to flee.

This is all done outside of awareness. This is done through the process that I discussed as *neuroception*—the nervous system's evaluation of fear and risk. The system is evaluating the risk in the environment, but outside the realm of conscious awareness. This creates a lot of problems for people in our world.

If I were to say, "Maggie, that wasn't a good behavior. You coughed while I was speaking," it's not fair of me to scold you, because it really wasn't a voluntary behavior. It was at a different level. Your nervous system detected something, and the behavior came out.

Maggie: Right.

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Stephen: Immobilization, shutting down, and dissociation happen at that same level—involuntary.

Maggie: What you're saying is very important. I just want to underline something right away, which is that you're right: Many people believe that the fight-flight response is voluntary, that we choose to be angry and irritable and to fight back, and that we choose to avoid or retreat or even to freeze. What you're saying is: No, both of those circuits are *involuntary*?

Stephen: Yes.

Maggie: At what point does awareness come in to help with that?

Stephen: Well, *voluntary* is an ambiguous term. If I get on a treadmill and get my heart rate up to 140 beats per minute, my physiological state changes. Then if you ask me some personal and emotional question, I might have a very short fuse. That's because I did a voluntary behavior to change my physiological state, and in that physiological state I was more vulnerable to be reactive. In terms of mobilization, there is a preliminary or a voluntary component.

Many clients are anxious-type people. A lot of their behaviors support that anxiety, including the way they breathe: They take short breaths. They don't speak in long sentences. They do nothing to slow their body down, because as long as they're in that cranked-up state, they're mobilized, and they cannot be shut down. The issue is that even mobilization as a defensive behavior has adaptive features well beyond fighting and fleeing. One of them is that mobilization keeps the person out of the vulnerability of physiologically shutting down. If someone has been held down and abused, and you see them being hyper-aroused, hyper-reactive, very anxious, they're doing that for an adaptive reason; if they were to slow down, their body historically would be vulnerable to being attacked and hurt.

Backing up: What are the features of the Polyvagal Theory? The Polyvagal Theory basically articulates not only that there are two defense systems, but how to uncover the two defense systems.

It uncovers them by studying the evolutionary changes in the vertebrate autonomic nervous system: The oldest autonomic nervous system component was a metabolic conservative one that supported this role or function. The second one that came on was a spinal sympathetic mobilization system. The third one was linked to our face. As part of the parasympathetic nervous system, it enabled a vagal regulation of the sympathetics, via an ancient vagal circuit that went to primarily the organs inside our viscera subdiaphragmatically. Once that newer circuit worked, with people who have good smiles, good faces, and good vocalizations, then the sympathetic and the parasympathetic could be supportive to great health.

What are the symptoms of our clients? They have all the subdiaphragmatic disorders: Bowel problems, pain from the system.

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Maggie: Digestion is common. Digestive issues, yes.

Stephen: This is old: This is the very old dorsal vagal system, which in reptiles is a primary defense system. In mammals, it's a system only used as a last resort.

Maggie: That's important to note, too: When you have a client sitting in front of you and they're highly dissociated, and they have been for quite a while, it's really important to bring in the compassion about why they had to go to that extreme.

Stephen: I even push it even farther than that: I really see what their body did as heroic. It saved them. It's done marvelous things. They've been victimized, and they're angry at their body for putting them into those states, because the culture and the individual want to be gregarious, social, and interactive—but the body refuses. They're angry at the body, as opposed to being respectful.

Maggie: Right. That's so important. I just want to say one more little piece: It's not a question of just being adaptive. That's part of it—But you're actually saying it's triumphant!

Stephen: Yeah, it's survival!

I just finished writing a preface for the republication of Bob Garrett's first book.

Reading the book brought me into this whole issue of dissociation. He talks about it on a very autobiographical level. He talks about being trained as a physician and about medicine as being dissociative.

I took that to heart, and I went back and explored my own personal narrative. I described myself as a 19-year-old, going to Europe. I went through what had been a war zone only 20 years before, totally insensitive to and unaware of what pain transpired in the places and to the people there.

I was hitchhiking with a girl from Germany. She told me her father had been killed in the war. Suddenly, this is the first time I had ever met someone who had a loved one die on the other side. The 19-year-old just filed that information away and went on. I went to Israel later, and someone pulled up their sleeve, showed me the numbers from the concentration camps, and said to me, "Don't forget this." The 19-year-old said in his mind, "What are you upset about? You're alive."

In fact, this is what society does to the people who come back from combat with PTSD and with people who are raped and abused. Society says, "What are you upset about? You're alive." They don't understand the transformative influences of these bio-behavioral reactions to experiencing life threat.

Maggie: Right. That's very true.

Stephen: I ended part of this preface with a statement: We have to move beyond the views of a 19-year-old. We have to be in our institutions, and we have to be informed by the wisdom of our own life experiences. We have to change.

Maggie: That reminds me of a question I wanted to ask you. For a long time we only knew about the fight-flight defense system. How did that influence our way of treating trauma?

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Stephen: It resulted in creating a second traumatic event for the clients. We assumed it was a stress-like response, the mobilization. Really, it was about other people's theories trying to take a diagnosis called PTSD (post-traumatic stress disorder) and make it fit with the glucocorticoid research on stress—as opposed to understanding the phylogenetic adaptive features of mammalian and vertebrate physiology, or: how an organism reacts to life threat.

"Life threat": I use that word specifically. Reacting to life threat is not the same as reacting to a dangerous situation. Many people like the excitement of so-called dangers, but our bodies do not like to be in life threat. Roller coasters are fun, as long as you're buckled in.

Maggie: Yeah. You're saying that danger is a very different state than life threat?

Stephen: Not only that, but our nervous system evolved with an exquisite ability to move from danger into safety—to know what is dangerous, and then to know what is safe. But it didn't evolve with the skill set, the toolkit, to easily move out of life threat.

Okay. When a person is mobilized, and just mobilized, often putting the person in a quieter place, around people who are talking slowly, with more intonation, no background noises, a place with warmth and support, the person will calm down. When people talk to us on the phone and we know they're anxious, what do we say? "Take a deep breath. Exhale slowly." What are they doing? They're increasing the vagal regulation of the neural mammalian vagus that's linked with the striated muscle of the face, calming the sympathetics, and enabling the sympathetics to work in a homeostatic way with that old vagus.

Maggie: That is just a brilliant lead-in to one of our next questions. You talked about the evolution from the reptilian to the mammalian—which, in a way, is a shift from a two-defense system to a system with three components—adding a social engagement system. Is that all there is, or are there other distinctions that you make?

Stephen: It's a marvelous thing… We need to start by understanding the neural biology of social behavior. We have to understand the autonomic—the evolutionary transition from reptiles to mammals. We have to really understand: What are the differences between that turtle ancestor and a mammal?

The first thing has to do with the young. Mammals don't raise themselves. They don't crack out of the shell and walk to the water on their own. They have to be in a safe environment, and they have to be nurtured. Many mammals form pair bonds for life. Many other species of mammals create cohorts, tribal or family structures.

The mammal sleeps because of its cortex. The mammal also needs privacy for ingestion of food; in general, privacy for defecation; privacy in safety, and in using any of the structures regulated by the subdiaphragmatic vagus and organs. Digestion, defecation, and reproduction are all involved in safety. Once we take that safety away, those systems don't work… We can see this the clinical

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symptoms of the clients.

Maggie: Yes…

Stephen: To most individuals, the symptoms don't make any sense; they don't seem to be related to these events. In fact, they're rational and derivative—if we understand what's happened.

Maggie: Yes. When appropriate, I share as much as I can with my clients about the Polyvagal Theory, and they're hugely relieved. They can accept what's going on so much better.

Stephen: I'm going to share. I got an e-mail from a woman from Australia. This woman was 69. When she was 18, she was strangled and raped. She was telling this to her daughter, and her daughter just didn't understand why she froze and didn't do anything. Then she said, "I've read about your Polyvagal Theory. I'm crying now, because I feel so vindicated." It does this to me...

Maggie: I've got tears in my eyes, too.

Stephen: By understanding what her body did, it helped her feel good about herself.

Maggie: That's right.

Stephen: This is missing in the treatment models of many individuals who've been traumatized.

Maggie: That's exactly right: the missing piece of self-empathy, self-compassion, what you're feeling right now.

Stephen: We have to be informed by our own bodies, and we have to respect that information.

You see, it was very difficult for me in the beginning, because I really am a laboratory scientist. I develop my ideas and test them (we'll get into intervention models later). I'm not a clinician. It's very nice talking to clinicians—They're kind of fun! I'll have a good time. I was unexpectedly… I can't even come up with the right word… It was a thrill. I was flattered. I'm not sure what.

When the trauma people found the Polyvagal Theory so appealing to their treatment models and to understanding the clinical conditions they were seeing, it filled in gaps for them, and it made me more understanding. It thus created a different model for me.

I started with trying to treat autism, which we'll discuss later. Many if not most psychiatric disorders suffer from a dysfunction of feeling safe. Feeling safe involves the ability to regulate bodily states in the presence of others; to utilize the facial muscles, the intonation of voice and breath. Those are all windows to how that vagal system is working to regulate our state. We see in many disorders that the upper part of the face is not working.

Maggie: Yeah. Just frozen…

Stephen: … Just hanging there. Then with autism, it hangs there, and the cheeks are used

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for expression. Lower jaw is not the cue for safety, because: What is lower jaw in mammals?

Maggie: That's the fight.

Stephen: It's aggressive. Yes. The upper part of the face is the giveaway. The upper part of the face tells us, in fact, whether or not people can process the words we say. If the orbital muscle of the eye, which we'll see in videos… if the orbicularis oculi is working, then the middle ear muscles are contracting, and the person can hear human voice. When it's not working, they are not hearing. They're not able to hear human voice well. They hear the background noise of a predator.

It's this balance: When do you want to turn off your predator scanners and be socially engaging? When do you want to watch out for a predator? That is this whole transition. We go back to your original question: The ability to detect safety determines when we turn off the defenses.

Maggie: That's right. How we detect safety, and How we can create that?

Stephen: We need to understand how the nervous system is "vulnerable" to detecting that, and then to feed the nervous system those cues.

Maggie: Right.

Stephen: So, to start with, we make places quieter.

I'll give you an example. I was giving a talk to a psychiatric institute. In the afternoon they were doing videos, and I was deconstructing them. One of the videos took place in the psychiatrist's office. He started off by saying, "I have to apologize for the poor quality of the video," because they were remodeling the building. The air hammer was going while he was talking to his client. Of course, when a traumatized person's neurology encounters the low-frequency components of air hammers and ventilation systems, the body detects danger. When it's in those states of vulnerability, it detects that there's a predator. It makes it impossible for the person to relax and to process.

Maggie: Yup. I was talking about that to one of my clients who has a severe trauma history. What happens to her is this: She develops pseudo-seizures in those situations. If she's in an airport and she has any issue going through the security… If they choose to pat her down, that can be a huge trigger, and she'll just have a seizure. What you're talking about is hugely important.

Stephen: Yeah. I can imagine—being touched by strangers.

Maggie: Oh, my goodness.

Stephen: Noise, confinement, everything. It just doesn't work.

Maggie: Right. The next question I have is something you already alluded to, but I would like you to go deeper into it. Can you please say more about the face-heart connection that manifests in our ventral vagal social engagement system?

Stephen: Yeah. The important link. The face-heart connection ends up with the notion that we are wearing our heart on our face. You know that poets, lovers, and other

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people have always known this—but we never thought of it as a true neurobiology until now. Through evolution, the vagal controlled the heart, the part that is linked with being calm. The part that's linked with shutting us down, the ventral vagal part, is in the brain stem, linked to the areas that regulate the striated muscles in the face and head.

Now, what does this mean? It means that the vagal regulation of the heart that calms us is manifested in the prosodic features of our voice, the intonation. Let's start there. We'll move around the face, but we start there.

We can ask: Is this getting to a little dialog? As a therapist, you know when a person is hyper-aroused by their vocalizations. The prosodic features are going to be narrower, to have less intonation, and the pitch is going to be higher. That's exactly what happens when the vagal regulation of the heart is removed from the laryngeal pharyngeal muscles. It changes.

Maggie: Wow.

Stephen: Now, coupled with that is the ability to hear human voice. The acoustic environment that we live in is really broad, but the wavelengths of human vocalization is very narrow.

All mammals evolve a certain frequency band in which they can perceive sounds of socialization with great advantage. It's all based upon the physics of their middle ear structures. It means that when the middle ear muscles contract and pulls those itty-bitty bones in the middle ear, it's like pulling a rubber band, or tightening a Timpani drum. It means the low-frequency sounds bouncing into the ear bounce out. If they're higher frequencies, they go in.

Maggie: The person doesn't even register the lower ones?

Stephen: No. That's when you see the eyes roll up...

Maggie: Yeah.

Stephen: They're not even hearing it. The problem is: If you bring these people into a speech and hearing clinic and do an audiometric examination, they're fine, because the audiometric examination usually only uses pure tones. They can hear those pure tones in the silent environment, but in the complex environment that we live in, they can't. When they're testing them in those sound chambers, all the background sound is gone.

People who can't process language because their middle ear structures are not dynamically adjusting appropriately for social communication, are accused of not paying attention.

Maggie: That's right. They get a negative …?

Stephen: It's confused with being evaluative, because it's always … What I'm going to say is from the 19-year-old's perspective. It's not informed by an understanding of how systems change and how physiological state can change. The ability to listen, the prosodic features in the voice, and the expressivity of the upper part of the face, and even head gestures, are a package. When you look at your

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clients and listen to their voice, and when you look at the upper part of their face and whether their heads move when you talk, you know when you're getting somewhere, because the gestures are engaging.

Let's cast that in another way. Let's cast that process as a neural exercise like rehabilitation, where a system hasn't been used for decades or years, and now you're recruiting that system and exercising it. When you exercise that system of neural regulation in the face and take into account its impact on the heart, you're exercising a system of resilience. You're actually getting the neural circuit to do what it evolved to do.

Maggie: Maybe this is one place we can drop in a little bit of understanding of the ventral vagal system and how it relates to the other two circuits—how it helps us find safety.

Stephen: The ventral vagals… First, let's understand that having three circuits is fine, but that they have to work together. The old view was that we had a sympathetic nervous system, which was basically fight-and-flight. Then the sympathetic became the enemy, and the parasympathetic nervous system supported growth, health and restoration—that's lovingkindness. However, we now know that the parasympathetic nervous system can kill you, and the sympathetic nervous system is necessary, because if you turn it off, there's not much of us left.

Maggie: It does good things for us.

Stephen: It does good things. We need to reconceptualize the autonomic nervous system as a hierarchical system. Once you see it as hierarchical, everything makes sense.

What's been missing is the understanding that there is a newer mammalian vagus that sits above everything. It sits above the sympathetics.

Once it inhibited the sympathetics from reacting defensively, it enabled the sympathetics and the old vagus to be homeostatic, to support health, growth, and restoration. It was the hierarchical picture that changed the way that we view our autonomic nervous system response. Even though in many clinical modes we think of the autonomic nervous system as housing defense structures, it's really
a system that supports our health, our growth, and our movement.

Maggie: I want to ask you more about *neuroception.* I'm really fascinated by that term. I understand that that's one of your big contributions. How can you explain the way that *neuroception* works to either identify threat or register safety?

Stephen: Your question is a great question, but the answers are not simple, nor are they truly known. I'm being pushed to try to expand this…

Maggie: I bet!

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Stephen: I focused initially on visual and auditory cues, not why and how I think they work. Then people were asking me about olfactory and tactile issues.

What *neuroception* starts off with a concept or a construct that had a topography in the cortex, in the areas of the cortex that we're not conscious of. There are areas in the temporal cortex associated with the ability to detect the intentionality of biological movement. Interestingly, those areas in the temporal cortex detect familiar faces, familiar voices, hand movements, and gestures. I saw that as the place that encompasses neuroception and that creates a pathway that regulates more limbic and amygdala-type reactions, to enable safety and social behavior to occur.

It's not the same thing as sensation. Sensation is really an very low level. It's some higher level where there's interpretation occurring based upon a pattern recognition of the features—That's what I am calling neuroception. Many things were clear in building the model, especially the stimuli that emerged from the face. These were powerful: vocalizations, facial gestures, and even hand movements, which are not near the face but in areas of the temporal cortex, very close to where the face areas are.

The healthy organism needs to have the hierarchy of these different autonomic circuits working. On top of the hierarchy is the social engagement system and the ventral vagus, because the ventral vagus is uniquely mammalian. It's myelinated, meaning that it works very efficiently and quickly. It goes directly to reside in our heart, the pacemaker of our heart. It down-regulates mobilization. It's soothing, calming. It defines resilience. Most important for us, it's linked to the face, creating that heart-to-face linkage.

We know that if we can engage that circuit, we can enable the other autonomic components to get out of defensive realms. If they're out of defensive realms, they can support health, growth, and restoration. Many symptoms that your clients will have, ranging from fibromyalgia, to gut problems, to chronic irritable bowel syndrome, to tachycardia… all the things you know as autonomic. In neural dysregulation, the autonomic system isn't working right.

The treatment of trauma has a goal. The goal, in my mind, is not to understand the trauma. It's not to talk it out. It's to be able to have the autonomic nervous system behave in an organized, hierarchical way, so that any discussion of it doesn't disrupt that hierarchy.

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