



Transcript of “Stephen Porges: The Polyvagal Theory & The Vagal Nerve – #264”

Bulletproof Radio podcast #264



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Dave: Hey, it's Dave Asprey. Before we get started with today's show let's talk about Casper Mattresses. The start up guide to Casper are winning design awards, getting props for reinventing the humble mattress and turning the industry upside down. They started with a simple mission, to create a perfectly engineered mattress that you could try in the comfort of your own home. Casper ships the mattress to you for free and gives you 100 nights to try it, again risk free. They'll come pick it up if you don't love it and refund you everything no questions asked. Upgrading your sleep is one of the more important things you can do to increase your overall performance and Casper has created an inexpensive way to hack your restless nights. Here's what else I like about Casper Mattresses. All of the foams used in Casper have environmental certifications that ensure they're healthy to be around. Their materials are Serta Pure certified meaning they're made without ozone depleters or PVDE flame retardants.

They're made without mercury, lead, and other heavy metals. There's no formaldehyde or thalates and they're regulated by the Consumer Product Safety Commission as low VOC. Take them up on their 100 night risk free trial like I did. Upgrade to a Casper with free shipping at casper.com. Use my personal referral code BULLETPROOF to get \$50 off your mattress. That's code BULLETPROOF for \$50 off your mattress at casper.com. Terms and conditions apply.

Audio: Bulletproof radio, a state of high performance.

Dave: Hey, it's Dave Asprey with Bulletproof radio. Today's cool fact of the day is that if you don't like the sound of people breathing or chewing you're not alone. You may actually have a disorder called misophonia which is when you have an extreme negative emotional response to auditory stimuli. We don't really know whether that's because of dysfunctional signals in the neurons of the anterior singulet cortex and insular cortex. Those are related to Tourette's syndrome, or whether it's from something else but some people really, really don't like it when you pop your gum so if you're doing that maybe you should just not chew the gum because it's bad for your trigeminal nerve anyway.

It's time to talk about something that I've been waiting for all summer long and that is that we have the new chocolate fuel bars that have come out. Now that it's cool enough for me to ship you chocolate we've enriched this stuff with brain octane oil, zero sugar chocolate. The chocolate's lab tested for mold toxins as you would expect and this is the best chocolate formula we've come up with yet. Each year we tweak and twist and you are going to be amazed at the new chocolate fuel bars. Check them out if you haven't had a chance to give it a try. Today's guest is someone I'm really excited to have on the show. He's a distinguished university scientist at Indiana University where he runs the trauma research center in the Kenzie Institute. His name is Dr. Steven Porges. He's a professor of psychiatry at the University of North Carolina, a professor emeritus at the University of Illinois at Chicago, and there he ran the brain body center and the department of psychiatry, and he chaired the department of human development and directed the institute for child study.

In other words, this guy's been studying things that make us go at very, very fine levels of detail for pretty much his whole career and he's had a very, very distinguished one. Steven, welcome to the show.

Steven: Thank you, David.

Dave: I only read like 10% of the cool stuff you've done here but you were president of the psychophysiological research and actually I'm not even going to read all that stuff, a huge body of 20,000 behavioral scientists and you're the president of that as well. For people that don't know you're sort of like one of the known people in your field you could say.

Steven: Actually, that's in the past so I don't do that today but yes, my work basically crosses many disciplines, not merely the behavioral sciences but also many of the neurobiological sciences.

Dave: The reason I wanted to talk to you today was that you are the original guy who proposed something called polyvagal theory which linked sort of how our automatic nervous system, or autonomic nervous system ties to social behaviors and I just would love for everyone listening to

hear what is polyvagal theory and why should they care about it? That's probably a great way to start the interview.

Steven: Well, it's probably a good way but it could take the whole interview so let me just kind of, it's a question that I'm always asked and surprisingly I never know how I'm going to answer it. Let's basically break it down to something quite simple. What can we learn from the evolution of our species? What can we learn from how other animals, other vertebrates that preceded us behaved and functioned? Especially from their autonomic nervous system. What can we learn? What we learned really is that neurocircuits were used by more primitive vertebrates to basically shut down, to make themselves appear inanimate. It became a defense system and then as vertebrates evolved they developed systems to mobilize and we know this in terms of our own words as fight or flight. Then what happened with mammals is that they had a neuroautonomic nervous system that functionally got linked to the nerves that regulate their face and their voice.

Basically they wear their heart in their voice and on their face and they communicate those queues to others. Once we start understanding about these changes in the autonomic nervous system we start understanding what literally are neuro platforms are for behavior and I just want to basically give the main punchline here and that is what we are, we actually are a product of evolution and through evolution we didn't throw out everything. We repurposed it and we used it for different purposes and we changed it slightly. We have in our body circuits that can be used for defense and circuits that can be used for social interactional behaviors. Those circuits for defense unfortunately have been misunderstood by most of behavioral scientists, most of the clinical scientists as well because we literally have 2 circuits of defense.

We have the very popular one, fight and flight, but we also have a more ancient one which is a shut down immobilization, become inanimate, death feigning and this is the one that is triggered in individuals who are restrained and have no option to get out. These become responses to life threat and what the polyvagal theory does, it explains a lot of these behaviors and physiological consequences which are an amazing number of physical health ailments which we will discuss that co-occur

with shifting into these different physiological states. Polyvagal theory informs us to understand our native biological reactions to safety cues and to danger cues and I'm going to categorize another one, life threatening cues.

Dave: All right, this is exciting. Anyone who's listened to the show for a while knows I talk a lot about autonomic nervous system activation, heart rate variability training, essentially turning off the fight or flight when it's not serving you. What you're teaching us and what you proposed a little bit more than 20 years ago now is that there's 2 systems, right? Can you go a little bit deeper on the second system that doesn't help you run away from tigers?

Steven: The second system is what you see in pet stores if you look at reptiles. They immobilize. They just don't move. They in a sense are trying to become inanimate and reptiles have this capacity and they will defecate and they will stop breathing and they can do this for long periods of time because their metabolic demands are very low and they don't need much oxygen. The problem is when mammals do this our metabolic demands are great. We need lots of oxygen and this can be potentially lethal so the metaphor or the urban myth that the person died out of fear is that the person's heart stopped with this mechanism which is through a vagal pathway. What I didn't quite explain was that basically the polyvagal theory got its name because there were 2 different vagal pathways and the different vagal pathways had different functional adaptive capacities.

The one that you're really asking me is immobilization as a defense but it's not immobilization with voluntary I'm going to sit still so I won't be eaten by the tiger. My body goes there. I don't tell it to go there and I don't want it to go there often and this is really the consequences of people who have suffered very severe trauma experiences or abuse experiences. Their body just shuts down and psychologically the part that remains with them for decades is dissociation. They go someplace else.

Dave: How common is that phenomena in the general population?

Steven: Well as I start to use in a sense the theory to decode the behaviors of people I am totally shocked at the number of people who functionally have lived a good portion of their lives in dissociative states and have been unaware of it. Of course they're unaware because they're dissociated. The issue is part of our society has to deal with telling people not to feel their body, to "get over it," "live with it," "proceed with it," and also a lot of the medical treatment models are really models of dampening the feedback loops from our autonomic nervous system that support our health, growth, and restoration because sometimes those signals are telling us there's bad stuff going on.

I think it's quite common and what I often say in my talks, I say what if Dakar was misinterpreted? What if he didn't really say "je pense donc je suis". Now you're going to hear my horrible French accent but you're in Canada, you probably articulate it better, but he says I think therefore I am. What if he had said "Je me sens donc je suis"? I feel my body, I feel myself therefore I am. If you know French I selected the reflexive verb which is not to feel to touch but to feel one's self and that is even missing from our language in English. We don't have a different work for feeling object versus feeling ourselves so we get confused with our use of words.

What if he had said I feel myself, therefore I am. Now ask anyone who has suffered from severe trauma experiences or abuse, they don't feel their bodies. That is what goes.

Dave: I'm going to ask you to do an armchair diagnosis which you ever get at every cocktail party, but not really an armchair diagnosis but I'll just relay a personal anecdote that I think supports this but just tell me if it does. I did a personal growth seminar a long time ago, more than 15 years ago, and I was working with a very talented transpersonal kind of psychologist and I was feeling really, really uncomfortable about the whole thing. Basically she said you have to be feeling something and I said yeah, I'm feeling pretty angry about this whole thing so I'm feeling just fine thank you very much. She said then why do you want to leave the room, why are you uncomfortable? I said I don't really know but it's just because I'm pissed off. After a day of this kind of arguing with me

finally she said is there some other feeling in your body? I said yeah, my stomach feels a little weird.

She looks at me and she goes yeah, that feeling? That's called fear. I'm like really? Because I had internalized that while there is no reason to be afraid therefore I'm not afraid therefore I'll just ignore all that stuff. Since then I've learned not to ignore those things because there's actually value in the signal. Is this what we're talking about or is that something else?

Steven: Well, it's part of it. In my modeling there's a concept that I call neuroception and that's the detection of risk or danger in the environment. This is not perception. Perception is a cognition and that's what you were involved in. You weren't cognitively perceiving anything but your body was responding so that's neuroception in my terminology. Your nervousness made you evaluate risk and said okay, something not good is happening so you have these bodily feelings. The word I'm tending to use now is that these are now implicit feelings and now you're stuck in the world of how do you deal with implicit feelings? Well you try to get explicit language and activity. In a sense that becomes the whole theme of all trauma therapies that are successful and that is having people learn to understand their implicit feelings and to contain them and to kind of regulate them with explicit or voluntary behavior. We'll see this in other types of therapies which I'm sure you'll ask me but what you had, somewhere in that room your body was picking up cues, your nervous system.

Not necessarily your conscious awareness and it's not even kinky because a very small part of our sensory reactions are actually dealing with conscious awareness. Our brain is a big organ and it's processing information even at high levels. Through evolution we evaluated risk not through an internal decision of is that dangerous or is it not dangerous? Should I get into that car? Should I not get into the car? Those decisions were made very rapidly with a biological response that we then acted with. What happened to you is you got a biological response and you wanted to act with it or not act with it. You got into that dialogue.

- Dave: The working theory for what happened is that I was actually born with the umbilical cord around my neck and I was posterior so I had substantial birth trauma and what was going on in the room was other people in the workshop were dealing with their own birth stuff and it made my nervous system anyway feel really uncomfortable because there was a survival level threat, at least it thought that. I knew there wasn't but the fact you know it and you feel it, they didn't match.
- Steven: Okay, you gave me enough information for me to deconstruct it. Rather than say birth trauma because that carries with it all kinds of psychoanalytic discussions, let's say you had a hypoxic response. Now, the body's response to hypoxia is life threat. It's shutting down. Phylogenetically and also developmentally how do we deal if our body starts to shut down? There's only one thing we can do. We mobilize because if we mobilize since the autonomic nervous system is hierarchically organized, and we'll get back to that, as long as we mobilize our nervous system can't shut down. You find out that people who have trauma experiences are often doing risk taking behaviors and high activity behaviors. It's because their body knows that if they sit still they're now vulnerable to shutting down.
- Dave: Wow.
- Steven: Okay, you got it a little because you are a mobilizer.
- Dave: Just a little bit.
- Steven: The issue is, in fact if you start asking questions about people based upon the trauma history there are terms you can see even in their body, and these are words that you'll probably come up with from other people, tightly wrapped in terms of the muscles are tight and you might say oh that's an anxious type person, or you'd hear in their voice. They would be taking very few slow exhalations and the reason they wouldn't be exhaling air slowly is that that would put them in a more of this vagal calm state and they're scared of that.
- Dave: Let's talk about the vagal nerve and the vagal response because I think a lot of people listening, most people are either at work or driving their

cars right now. They might not understand what is the vagal nerve, what is the vagal tones. Can you walk through that, where it comes from?

Steven: Sure, okay. The vagus is a cranial nerve. What that means is a nerve that comes out of the brain. Now there is a whole important history here because it goes out of the brain but it regulates many, many organs in our body. It is actually conveying information from the brain to your heart, to your bronchi, to your gut and so these physiological responses you are often getting are often driven by brain signals. This is very important to understand because most medicine basically treats organs as the area of the disease and not neuroregulation of the organ as at least the antecedent for the disease because in medical school people are not trained much about neuroregulation of organs. In fact, this is one question I always ask physicians who are in my workshops, I say how much time did you spend studying the sensory pathways of the vagus?

The answer is they may have heard about it but they certainly didn't study in. Now the vagus is this big cranial nerve that leaves the brain, comes out of the back of our head and it has 80% of its fibers are sensory and they're basically running a surveillance team of our internal organs. They're sending this information up to our brain stem. Our brain stem is doing a little bit of interpretation and the sending signals upward to higher brain structure saying it's okay to attend, you don't have to be hypervigilant, you don't have to run to the bathroom, you don't have to eat. It's telling you can I interact or do I have to protect myself? The signals are being interpreted and then they're creating portals to allow cognitive and affective systems to work.

Now what the polyvagal theory does, and I'm actually going to go back to your earlier question because it's very important here and I'm going to link it back to you as a baby. I have done work in obstetrics and pediatrics. I did about 20 years of research in that area measuring the heart rate patterns of babies and fetuses because the heart rate patterns of the baby and the fetus was conveying information about vagal function. You could actually start assaying literally with a physiological marker how much vagal activity was occurring. I really felt I knew what I was doing, and this goes back into the early 1990s and I was very

pleased with having developed new methods to extract from heart rate variability an extraordinarily reliable index of the vagal influence. I have to tell you, this is probably the one point you probably don't know and that is I'm the first person to ever quantify heart rate variability.

Dave: Really? I do it all the time with clients. I'm an advisor to the heart math institute. Oh, my goodness. I did not know that. Congratulations!

Steven: Well, that's another story and that went back into the 1960s and it was a period of time that when I was talking about heart rate variability people would say you have heart rate variability in your subjects, Steve, because you're just a bad scientist. If you were a good scientist the heart would just be beating constantly waiting for a stimulus and then it would respond. People were so naïve about neurofunction and I was trying to explain that even in the early 1900s they were identifying vagal fibers that were cardioinhibitory whether or not they had a respiratory rhythm. This whole focus on respiratory science arrhythmia as a functional index of the new myelinated vagus, which I'll get to, is very important.

Back to the baby work. In I guess it would be the 1970s, 80s, and up to early 90s I was studying babies. I felt that heart rate variability and respiratory science arrhythmia was this wonderful index of how healthy the baby was. I published a paper in a major journal called Pediatrics showing that pre-term babies had less respiratory science arrhythmia which I called vagal tone, than full term babies. This was really what was going on. I got a letter, and this is of course before the time of email, and I got a letter and it was from a neonatologist and the neonatologist said I really like your paper, however when I was in medical school I was taught that the vagus can kill you. Perhaps too much of a good thing is bad. I had that letter and I was really perplexed because I knew too much of a good thing wasn't bad. That was the wrong understanding.

I also knew that babies who had the ... I have to backtrack for a moment. I have to tell you first I morphed into his perspective because never argue with people unless you understand their perspective and his perspective was that as a neonatologist apneas and bradycardias, the

sensation of breathing and the slowing of heart rate were clinical indicators or bad stuff, high risk, and they were vagal.

Dave: Got it.

Steven: I was talking about these rhythmicities in heart rate supporting homeostatic function which were also vagal.

Dave: What we're saying there is that there's these 2 different things that the vagus nerve can do.

Steven: Well the nerve can do but that doesn't make any sense, does it? I basically said okay, this is a vagal paradox. Now I have to figure this out. I figured it out by basically studying everything I could find about the vagus. That didn't help me until I went into studying comparative neuroanatomy and that told me about the evolutionary transitions. What you find out is you may have one vagal nerve but it's a conduit with different fibers so the conceptualization was wrong. You had to think that there are different fibers and they come from different parts of the brain. The so-called good vagal fibers, which by the way represent only 3% of the entire vagal fibers in the vagus, are myelinated, come from the area in the brain stem called nucleus ambiguus and interact in the brain stem with the area that controls your facial muscles, your laryngeal muscles. They control vocalizations, facial expressivity, and even the muscles in your middle ear that control listening.

Dave: For people who don't know myelination, myelination is what happens when the body insulates nerves with a layer of fat and that allows the nerves to carry electricity faster and with less resistance than normal nerves. What you're saying is that the part of the vagus nerve that allows us to basically move our face and hear and do some other key communications is better or faster than the rest of the nerve. Am I saying that right?

Steven: Well close. Let's separate and let's conceptualize. In the brain stem you have a column and a column of fibers or a column of cells that are the source origin for all the striated muscles of the face and head. That includes middle ear muscles, muscles of ingestion, muscles of facial

expressivity, muscles of the larynx and those are striated muscles and they communicate in the brain stem with the area that controls that myelinated vagus. They're not vagal but they're part of a vagal complex.

Dave: Got it, so they work together.

Steven: They work together and now let me give you a little side view on that. If you think about the evolution of mammalian species I was going to ask you this question because you like factoids and so the question is if you found a fossil how would you know it was a mammal?

Dave: That's an interesting question. I think we look at bone structure for the most part but I don't know, I'm not a fossilologist.

Steven: The critical feature is whether the middle ear bones have broken off the jaw bone.

Dave: Really? I didn't know that.

Steven: Yes. Okay, now that's what mammals have, middle ear bones break off the jaw bone. They become the ossicle chain that enables us to hear low volume, higher frequency voices in background noises only if we have neural tone to those middle ear structures. If we don't have neural tone to those middle ear structures we become hypersensitive to low frequency sounds because low frequency sounds go through bone conduction and they signal predator.

Dave: Oh.

Steven: Okay? What you start seeing is if this myelinated vagus and the facial muscles aren't working people tend to have auditory hypersensitivities and have difficulty understanding human voice in background settings.

Dave: What do you do about that?

Steven: Well you can rehabilitate it. That's actually kind of what I've been working on and I have a couple clinical trials on that but the cues, what you have to do is basically use the principles of neuroception which are that cues of safety have to trigger an inhibition of defense. What are

cues of safety? I'll tell you, they're not having teachers carrying guns. Those are not cues of safety. Cues of safety are intonation of voice, prosodic voices, mother-ese. If you have a dog or cat you know how to talk to them. You use a prosodic intonation of voice. Our neuroception, our nervous system detects that as a cue of safety and inhibits those limbic reactive structures. Talking doesn't always calm people down but talking in a prosodic way and listening will.

Dave: Interesting so just speaking in that way and listening and being spoken to in that way can affect your very core nervous system. Wow.

Steven: Absolutely. One of the let's say field experiments that I run when I travel is to watch toddlers with their parents and the kids are always screaming when the father has the toddler and then the toddler's put over to the mother and the mother looks, reaches, and says a word and the toddler's fine.

Dave: Right, and it's the tone of voice?

Steven: Tone of voice, the gesture. It's the complex set of cues, while the father's voice is lower, especially when they get irritated in the airport. It gets louder and lower, more monotone and that in the body is a trigger of defense. It will trigger defense. The issue is why did this occur through evolution? It occurred, so there's a big set of questions. People say well if you're an evolutionary psychologist you basically focus on selection on behavior but if you're an evolutionary biologist you don't care about behavior. The issue is as the cerebrum, as the cortex in the brain got larger it put pressure on the jaw bone and middle ear bones broke off.

Dave: Wow.

Steven: Now what did that do in terms of adaptive function? It enabled mammals to have an acoustic frequency band to interact that would not be detected by the predators which were reptiles.

Dave: Wow, okay.

Steven: Second, it enabled them to detect in their con specific of their own species whether they were safe to come close to or were they going to

have a fight? Now we know this so when people talk to us we know whether they're friendly or not. You have enough, look you make a living interviewing people on spectrum.

Dave: It's really funny, my kids are in a Waldorf school. They're 6 and 8 and the teachers walk around talking like this and it drives me insane. In fact I think it drives every normal parent insane but you just explained why. They say well it makes the kids calm. This is what works for kids. These things are enhancing the kid's vagal tone by using those voices.

Steven: Yeah, they're enabling the vagal tone to come back on board and that will support resilience because that vagal tone, the vagal tone of the myelinated vagus enables your sympathetic nervous system and the other vagal circuit, which is going below your diaphragm, not to be recruited for defense. The agenda in creating a healthy world or life is to enable your autonomic nervous system to support health, growth, and restoration and not to recruit it for defense.

Dave: Let's say that a good portion of people listening to this have some problem, some degree of problem with their vagal tone. I'm certainly one of them given just my birth history and just all the stuff that I've dealt with. I used to weigh 300 pounds and had all kinds of other like problems that I've hacked. What would you advise someone to do if they said all right, I want a better vagal response. I'd like to be healthier, I want to be more resilient. How do I do that as an adult?

Steven: Okay, but you're basically giving me lots of information that I can work with before I go to that. If your vagal regulation isn't working right you will gravitate to try to regulate vagal tone through different mechanisms and one of them is ingestion. Ingestion utilizes the same features or same nerves that social behavior uses, but it doesn't have vocalizations with it and doesn't have touch, it doesn't have gesture but it's an attempt like sucking or chewing gum are attempts for the body to try to recruit this, integrate it. I call it integrated social engagement system which includes that vagal activity. Now, if you want to deal with this from a more proactive way aspects like singing, playing wind instruments which force you to exhale slowly and the vagal efferent action of this newer myelinated vagus happens during exhalation so

now you understand the neuromechanisms underlying pranayama yoga.

Dave: Something that's helped me and something I recommend for a lot of people.

Steven: Because during exhalation the vagal efferent's work but more than that when you push the diaphragm down the sensory part of the vagus is stimulated, potentially it's those vagal motor fibers working better. When you do breathing and part of pranayama has to do with stimulation of the face and that's where sensory afference of the facial muscles, of actually it's cranial nerve 7 which is the facial nerve and cranial nerve 5 which is trigeminal which deals with when you go to the dentist you know about trigeminal, the sensory part of that goes into the area of the brain stem that regulates the myelinated vagus. We're always trying to get that system to work because that system down regulates the defense modes, it down regulates sympathetic activity and it protects that subdiaphragmatic other vagus from going into defense. It enables it to support health, growth, and restoration and in your world facilitate digestion.

Dave: One of the other things that I first learned about almost 10 years ago was sticking your face in ice water for a minute or so as a way to basically calm the vagal nerve. What's your take on that?

Steven: Okay, so you're recruiting an ancient dive reflex but there's a problem with that because part of the dive reflex recruits the unmyelinated vagus.

Dave: Oh, interesting.

Steven: It's because in certain animals, it has to do with the slope of the bradycardia. How fast does the heart rate go down? Some people who have been drowning victims who haven't really drowned, they've been resuscitated after being in cold water for more than 20 minutes, it's because the body went into that state. It went into this death feigning state so the issue is maybe, maybe not with your ice water. It might be helpful to monitor your heart rate to see how much it drops. If it drops

down into 40 beats per minute I'd be a little bit concerned. If you get it down to the low 60s ... You work out so what's your basal heart rate?

Dave: It's around 70.

Steven: When you wake up in the morning do you measure it then? Before you stand up.

Dave: It's usually around 63.

Steven: Yeah, so and when you were heavy what was it?

Dave: I didn't measure it back then.

Steven: Yeah, but you can start seeing the shifts, especially early morning. It will drop down and one concern is doing the ice water early morning, like 5 or 6 in the morning, might be a little dangerous because there are circadian rhythms and vulnerability for heart attacks which again are misunderstood because some of the heart attacks may be sudden death which is potentially a vagal phenomenon and not an arrhythmia.

Dave: Wow. What could we do to reduce the incidence of sudden death with this knowledge? People listening are all like okay what can I do for me and some of them have vagal issues they don't know about, others don't, but how do we hack that?

Steven: The hacking of this and actually it's a reasonable word is to understand what are the cues that our nervous system craves, really craves. Our nervous system craves certain features of safety and they happen to be away from low frequency background noises because that triggers predator. We like to hear prosodic voices. That's why the 60s were wonderful in terms of folk music because they were social and people would sing songs about the most horrible things occurring in the world and everyone would be smiling because of the articulation, the prosodic features of the voice because we would feel good. It was empowerment of being social. This is different than music that uses military marches and patriotic activities which are mobilizing with affiliation and they are energetic, but folk music without bass has the frequency bands of a female and that triggers us to feel comfortable and safe.

Acoustic properties are extremely important and if you want to go back to the concept of schools, schools tend to be very noisy because of ventilation systems, highways, and a variety of other issues. We are not creating the contextual environment that will enable the autonomic nervous system to feel safe enough to down regulate the defense systems. I mention defense systems. One of the fight/flight, the other one is just shutting down. I want to emphasize one point. Since you had that history of hypoxia the threshold for you shutting down might have been lower for you than other people and so the strategies that your nervous system implicitly tried to implement may have been strategies of more mobilization to keep you out of that.

Dave: It would make sense. Now this is going to be maybe an inflammatory question and I apologize in advance but what are we doing with Cesarean section when that becomes the most common surgery performed on women, which it is today?

Steven: I think you probably need to invite my wife on your show. My wife is Sue Carter and she is the scientist who discovered the relationship between oxytocin and social behavior.

Dave: Okay, introduce us, please. I would love to talk with her.

Steven: She is also director of the Kinsie Institute and that's why I'm here at Kinsie, Indiana University. Basically the Cesareans are disrupting the normal birth process and the issues are really in terms ... Not that there isn't a place for Cesareans but the issue of having them be in a sense elective or voluntary or scheduling your delivery, it becomes a serious question about how we view early development. As a scientist what I have learned, and again it's a couple decades since I studied the literature in this, was that if delivery was started, if there were contractions already starting to occur and the process of delivery was starting then Cesarean was less disruptive to normal developmental processes.

What Sue is most interested in is not merely the Cesarean but the use of supplemental drugs, artificial oxytocin called Pitocin that increased uterine contractility without softening the cervix. These are drugs that

are being used and the consequence on development aren't really understood and actually that's what she studies. She's studying the epigenetic effects of administering oxytocin to an animal model.

Dave: Wow, that would be a fascinating interview. My first book was written with my wife who's a care givers trained physician, her name's Dr. Lana, and it was about what do you do before and during pregnancy to have healthier kids and looking at the quality of the birth as a factor in the resilience and even the IQ of your kids. There's studies on that so it's not that you shouldn't have a Cesarean it's that you shouldn't voluntarily have one unless there's a medical reason to it. If there isn't a medical reason don't do it.

Steven: Yeah, well it all depends on what your outcome variables are. If your outcome variable is mortality then people build the reasonable argument. If the outcome variable is the development of trajectory then we have a lot of other issues to discuss. These same things occur and this is even a more delicate question to discuss and that is about pre-term babies, how pre-term is survival because they're doing extraordinarily well with very small babies in terms of cognitive function and development. They're not doing so well with those same kinds in terms of social, emotional regulation.

Dave: You think that's all or at least mostly vagal nerve related?

Steven: I think so because when I meet the parents and they are often professionals and they start telling me the symptomatology it sounds very similarly. Auditory hypersensitivities which is part of the social engagement system, flat facial affect often ingestive problems earlier in life, difficulty coordinating sucking, swallowing, and breathing. These are all the parts that are linked to stimulating that myelinated vagus to soothe and calm us. It's not like they're independent but the information is out there. Since your wife is from Sweden, in the Scandinavian countries they have wonderful databases. A lot of these issues can be studied there. In this country we don't have these large national registries so we can't really evaluate what they can do. I know in the UK and in Denmark I know they do this as well.

Dave: It's one of the benefits of having a national registry of what's going on, that's for sure. Speaking of what's going on, we've got things like PTSD, autism, depression, anxiety that are all at record levels and you've tied all these back to kind of an unknown variation in the vagal nerve. What are the implications of this for society?

Steven: The implications are that there are core dysfunctions that reside or get expressed in many types of disorders and it doesn't mean that dealing with those core dysfunctions will in a sense cure the disorder. It means that we can work on them to optimize the quality of life. Virtually any type of mental disorder, any type of severe health disorder gets manifested in depressed vagal activity but it also gets manifested in depressed regulation of those striate muscles of the face and head because these are brain stem structures and what's on top of the brain stem is this massive array of neurocircuits that get manifested in many different functions and pathologies. If we look at autism or you look at schizophrenia and even if you look at HIV, HIV has a neural toxicity on the facial nerve and actually they have lower vagal tone and their faces don't work as well and this results in the consequence that caregivers to HIV feel that their patients, their loved ones don't love them because their faces are not expressive and they feel exploited.

This is the same thing if you talk to many parents who have autistic children. They say I love my child but my child doesn't love me. What they're saying is the child isn't asking about them, not expressive, not showing empathy because the face is not working. These are lower brain stem structures that potentially can be optimized through providing what I call cues of safety but they can be exercised through things like singing, breath control, learning how to breathe, playing wind instruments. If we think again what happened to our school systems all these things were pulled out of it, the opportunities for singing and even play. Play becomes this reciprocity and one thing I didn't discuss is that when we have this wonderful social engagement system with a myelinated vagus then our sympathetic nervous system does go into fight/flight and we can use it for play.

Dave: Wow.

- Steven: We can mobilize but then we look at a person and we say hey, that's a friend and you calm down. If you play ball or anything and you accidentally hit someone, throw an elbow and they fall on the ground, if you turn to pick up the person they say its part of the game, I'm fine. If you walk away the repair didn't occur, the facial interaction wasn't there to turn off that sympathetic defense.
- Dave: That's pretty incredible stuff. Given that the vagal nerve is, at least 3% of it, is so fundamentally important to human resilience which is at its core what I mean when I talk about bulletproof, the same high performance, I can take whatever the world is going to bring to me and I can handle it, do what I want to do. How do I exercise this aside from singing and playing a wind instrument? Can I run electricity over it? Can I shine lasers on it?
- Steven: I got prepared, yesterday I listened to you talking to the person who was doing TMS and so you have magnets at home. The beauty of this circuit is it's not done that way.
- Dave: Darn.
- Steven: Because you can trigger it that way but to maintain it you have to maintain it with social interaction.
- Dave: More Facebook then.
- Steven: Less Facebook.
- Dave: I'm just kidding.
- Steven: It's bad enough of Skype but yeah, what our body requires the presence of another. That's who we are, that's who mammals are. Even though talking on the phone is helpful, Skype is helpful; Facebook is probably helpful it's not a total replacement for the knowledge that that person is there to touch and to care for. Again the principle we have to always emphasize is that we as mammals did not evolve to take care of ourselves, we evolved with the help of others and we continue to need the help of others to maintain our life. Even though culture says take care of yourself, do all these things, that's not really what our body says.

Our body says find good friends, have a good community, have good support because that's what our body's really asking for.

Dave: The old line we get by with a little help from our friends is pretty accurate.

Steven: True, yeah, yeah.

Dave: All right, so more social engagement is pretty important ...

Steven: Let me interrupt. Social engagement if you want it. Forced social engagement is threat so the issue is you have to invite it and with that I want to change terms. We use words like caregiver implies that it's a unidirectional event and caregiver's burn out when it is unidirectional. That was the example with the HIV or with the autism because caregiving is bidirectional. We give and we love it when people can be good recipients. It creates a reciprocity that makes us feel good.

Dave: It's that reciprocal loop that sort of gets set up. What's the role of gratitude in all of this?

Steven: Again, we're dealing with words and I'm going to actually throw it back to you and I want you to tell me what you mean by gratitude?

Dave: My understanding of gratitude is that it's actually a felt state and it's one of the mechanisms that I use to turn off what I perceive is the fight or flight response. It may be turning off some lower level defense mechanisms but when you look at the world as I'm grateful for all this amazing stuff in it it tends to make you sleep better, it tends to make you happier, it tends to make you nicer.

Steven: You're in what I would call a ventral vagal state and so that's the myelinated vagus. I actually gave a talk for compassion care which is a group out at Stanford and it was on basically ancient practices as portals of vagal regulation.

Dave: Wow, I have to hear this talk. Is it on video somewhere?

Steven: Yeah, it's on YouTube.

Dave: Okay, we'll find that and we'll link to it in the shout outs.

Steven: Basically it says that through chant and prayer and even posture shifts we were recruiting this vagal system and that was in a sense giving people states of compassion or a state that buffered them from being defensive. Let me put a cap on this because we have to understand that the removal of threat is not the same as safety and we live in a society that says we're going to remove threat and you're going to be safe without providing what our body needs which are cues of safety. When you're in this state of gratitude you are bathed in a sense of the cues of safety. Whether you're generating it yourself or you're in an environment with others and when you're in that state you're not recruiting any of these defenses. You're not perceiving the world differently. You perceive the world differently based on your physiological state and when you're in a state that is being clearly protected from defense by this myelinated vagus then you won't recruit those defense signal systems.

Dave: A practice of recognizing and cultivating the sensation of gratitude can trigger the neurological experience that it's a safe world which then is going to keep you out of the sympathetic, the fight or flight and it's also going to enhance the myelination of your vagus nerve maybe?

Steven: Well it might but more important than that is potentially you may not need to myelinate any more. You just need to enable that circuit to work. The issue is how do you optimize what you have? I think that's part of your theme so it doesn't mean you have to rewire. It means that you may have to turn off defense. The model of polyvagal theory is it's a hierarchical model, and this really the real take home point, it's a hierarchical model that articulates 3 different circuits that occurred through evolution. One is this myelinated vagus that's linked to our social engagement system. The second is a sympathetic fight or flight system, mobilization system, and the third is a shutting down system. Those systems that I talked about for defense just now are not solely there for defense. Our sympathetic nervous system is what makes us feel good, energetic. Our subdiaphragmatic vagus is not a shut down system when we're safe. It enables digestion to occur efficiently. It enables our bowels to work well and the symptom of course of what you

know already is that all the features of modern society get manifested in our bowels.

What that is saying it gets manifested in immobilization with fear reaction. If we're immobilized we are constipated. If we're immobilized we just defecate inappropriately so the notion of maintaining these endogenous normal rhythms is the responsibility of this myelinated vagus that enables other parts of the autonomic nervous system to regulate our homeostasis.

Dave: Wow, that's some powerful stuff. I've seen in the book *On Combat*, which is a famous book studying first responders and people in war, where people at the World Trade Center, the firefighters, a good portion of them actually had that problem of just defecation without that and felt huge amounts of shame because very few people understand this even though it's not a conscious thing it's this response, right?

Steven: I link that to rape victims who also feel great shame because it's the same circuit that's going on, the subdiaphragmatic vagus is immobilizing them under restraint or rape and the physiological interpretation of that implicit feeling ends up being shame.

Dave: Wow.

Steven: Okay?

Dave: It's completely wired. It has nothing to do with our rational thinking at all yet we feel it and we try to rationalize it and it gets worse.

Steven: Yeah, this is what I talk about our big brain trying to make sense out of all this information. We have to be informed by our biology.

Dave: I've learned a lot in this interview. This is one of my favorite interviews ever but I'm still stuck on okay, what do I do with all this amazing knowledge? I'll keep doing pranayama or Art of Living or some sort of breathing exercise. I'm not sure I'm going to pick up the flute but who knows? Maybe. I can keep cultivating gratitude, what are the other things?

- Steven: I can give you one basic metaphor and that is to feel safe in the arms of another.
- Dave: There you go. That is great advice, okay.
- Steven: Now I would modify that to say to feel safe in the arms of another appropriate mammal.
- Dave: Not a turtle, gotcha.
- Steven: Right and the reason is that some people really don't feel safe with people but they feel very safe with their dogs.
- Dave: Oh, this explains the dog and maybe the cat thing, although who really likes cats? I'm just kidding.
- Steven: I've had 2 phases. I was a cat person initially and now I'm a dog person. The dog part is actually linked to having real children because of their neediness and their reciprocity. They need the social feedback from you. Cats are extraordinarily independent.
- Dave: Very perceptive.
- Steven: Dogs, you change the tone of your voice and they're down on the ground basically saying why are you hurting me? The point is they're explaining to you in their behavior their neuroception of the vocalization cues that they're getting. They're teaching us so much and so when we can appreciate their vulnerability and love them and appreciate the vulnerability of our children and love them and appreciate the vulnerability of our spouses and friends and love them then we're safe. Then we're good.
- Dave: Wow, so it goes right down to being vulnerable and accepting vulnerability in others.
- Steven: Yeah.
- Dave: Wow, that's some profound stuff. Now, I suspect you might have answered one of these questions I'm about to ask, or one of the things

I'm going to ask you but given all the stuff you know, and this is a question I've asked on every episode of Bulletproof Radio, if someone came to you tomorrow and you didn't know anything about their background and they said look, I want to perform better at being a human. I want to kick ass at everything I decide I'm going to do. What are the 3 most important things I should know?

Steven: Okay, we'll try something on this. Who knows what I'm going to say? Well what I would start off by saying, the most important thing we have to understand is that our autonomic nervous system functions in a hierarchical way and what that means is that sometimes we have to understand how our body's been challenged in certain situations. What I would say is we have to become very aware of what our body is doing, our body's responses. Like your description of your gut responding in that room, if you had understood it from a polyvagal model, from the hierarchy of our autonomic nervous system and you start getting a subdiaphragmatic gut response and you really wanted to manage it you would then say maybe my body shouldn't be in this room or maybe I need to be near someone who makes me feel safe. Maybe my spouse, maybe someone else.

The most important thing I guess the words I would now use is you need to respect your body meaning that your body is reacting to situations and you need to understand that it's reacting it. This goes back to more of the attributes of neuroception. In neuroception we don't know the cues that our body is responding to but we know that our body has responded and if we respect the fact that our body has responded we can do good things for our body. We can honor our body. We can move it to a safer place because we know what cues are necessary so we need it to be a quieter place, need to be with supportive people.

Dave: Okay.

Steven: I have more I have to answer or was that all?

Dave: Was that 2 or was that 3?

- Steven: Who knows? Basically it's going to be this integration of understanding the hierarchy of our autonomic nervous system, realizing that under neuroception we are aware of our body's responses but not of the cues so it becomes more of a body scanning and the third one would be to kind of honor our body's responses and not to in a sense denigrate them and say it's not important, I'll get over it.
- Dave: Got it, that's a great summary. Wow. I can tell you I don't think any of those answers I've heard before and they're all very wise so thank you for sharing that. I was expecting something unusual and you definitely delivered it.
- Steven: Thank you.
- Dave: Steven, the father of polyvagal theory, thank you for being on the show. Where can people find out more about either your research or your practice? Is there a way people who are interested in learning more about this can find you?
- Steven: Well I have a webpage and it's stephenporges.com. It has a list of where my talks will be and it also has published interviews and a bibliography and there's also going to be a webpage at Kinzie. There is one now but it's not well developed with my materials on it.
- Dave: Awesome, we will link to both of those pages including the Kinzie one if you'd like so people can just come to the show notes or look for the email with this podcast.
- Steven: Okay, and actually there is quite a few talks on YouTube so people might if they like want more of this they can find it on YouTube.
- Dave: I suspect you'll find that there are a lot of people who listen to BulletProof Radio who are thinking wait, this either applies to me or it applies to someone in the world very close to me so just having an understanding of what our environment does to our nervous system is a very core thing to being a fully functioning human so I think that you'll find some people interested in your work because it's pretty interesting stuff.

Steven: Well thank you very much, David.

Dave: Thanks for being in Bulletproof Radio and I look forward to maybe meeting you someday in person.

Steven: I look forward to it. Thank you, David. Bye, bye.

Dave: I learned to cook in a way that most people don't. I started looking at every single meal, designing and engineering the meal not to make me lose weight or just to taste really good, although those were part of the plan, it was to give me a food high so that when I was done eating I would just feel amazing. Bulletproof is partly the art about how to cook food that makes you have more power. It's about having energy dense foods, nutrient dense foods that don't have things in them that make you weak. The Bulletproof road map tells you how to do this and Bulletproof the cookbook tells you how to make it taste amazing so you can learn how to do this cooking in your own home. There's 125 recipes that help you kick more ass every day. You'll feel the difference in your brain in your very first meal. Go to bulletproofcookbook.com and we'll give you a big discount and free shipping right now. Head on over to bulletproofcookbook.com to get all of this goodness and start doing it today. In fact, if you have a garden I'll even tell you how to use things straight out of the garden.

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