

[Announcer:](#) Bulletproof Radio, a state of high performance.

[Dave:](#) You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day is that gratitude changes patterns of activity in your brain. In the last 15 years, researchers have really just exploded in the amount of effort that they're putting into the science of gratitude. We now know that when you focus on gratitude, it activates your brainstem region that produces dopamine and can also boost your serotonin levels. They've also found that gratitude can have a profound and long-term neural effect, like a study at Indiana University of Bloomington, that focused on people with anxiety or depression, participants had a gratitude exercise of writing letters of thanks to people in their lives, and three months later underwent brain scans.

[Dave:](#) During those scans, all the subjects participated in another gratitude task where they could choose between keeping money for themselves or giving it away. Those who choose to give money away exhibited a specific pattern activity in their brains. Even months later, they still showed more gratitude related brain activity under a scanner. The team of researchers described this as a profound and long-term neural effect simply from focusing on feelings of being grateful. That is awesome, and as you may have predicted, we will be talking about gratitude with a world leading expert as you've come to expect.

[Dave:](#) First, I'm going to propose something for you. If you'd like your own personal gratitude exercise like the one just described, find three books that have absolutely changed your life, go to Amazon and leave a review, and thank the author for what they've done for you. If any of my books are on the list, great, and if they're not that's okay, go out there and just say thanks to people who do that kind of work. Or just write a letter to your mom. Whatever it is, do that right now, and the world will be a better place and your brain may be better neurologically.

[Dave:](#) Now, today's guest is a returning guest of Bulletproof Radio. He is a distinguished university scientist, surprisingly, at Indiana University Bloomington, where he's the founding director of the Traumatic Stress Research Consortium at the Kinsey Institute. He's also the guy who created the Polyvagal Theory of how the vagal nerve works. If you missed that episode, it was episode number 264. It was one of my favorite episodes of Bulletproof Radio. Stephen Porges is very well known in medical circles for his deep and profound understanding of how our nervous system works and how gratitude works as well. Stephen, welcome to the show.

[Stephen:](#) Thank you David, and thank you for having me here a second time, so we can explore other issues.

[Dave:](#) Back when I was still in university, you proposed this idea of Polyvagal Theory to link our autonomic nervous system to our social behaviors. You looked at the physiological states in what would happen, and people had behavioral problems, or even just who are little bit on the psychiatric spectrum. It's now been, that was 1994, so it's been a good 20 ... a lot of years later. I guess I'm getting old when I think about that, geez. Anyway, what made you get into this in the first place, Stephen? Why the vagal nerve?

[Stephen:](#) Okay. I started with different levels of questions. I was very curious about what was going on in people's minds when they were interacting with me or with others. It was this curiosity that people would say certain things and you knew that they meant something totally different. I would start looking at cues or facial cues, the intonation of voice, posture and gesture. I became in a sense, a good observer of the intentionality of what people really wanted in their retraction.

[Stephen:](#) When I started, there really wasn't a science of this, and I got very interested in this new science, when we went off to graduate school in the ... actually I went to graduate school, I started in 1966, so we're talking about ... a long time ago. There was this new branch of science called psychophysiology. It was really the part of science that was really investigating mind-body issues, or mind-body sciences. Of course, that's coming of age now, but it really wasn't of age in the '60s.

[Stephen:](#) The part of it that was really interesting is that people were there trying to measure physiological responses. Whether it was brain wave activity or heart rate changes or sweat gland activity, they were trying to measure these as they were parallels, or sub-straight, of cognitive functioning and emotional functioning. I was just extraordinarily intrigued with this.

[Stephen:](#) I started to work on measures of intentionality, which we called attention at that time, attending to something. Start to observe on a physiograph, on a machine that measures physiologic responses, that there were changes in the patterning of heart rate. Thus, I saw changes in heart rate variability. That was before anyone else had quantified heart rate variability, which is another common variable that lots of people measure.

[Dave:](#) For listeners who haven't heard the term heart rate variability, can you just define that for them?

[Stephen:](#) Sure. Our heart does not beat at the constant rate, even though you go to a physician's office, they tell you what your heart rate is, that's just an average of many, many different heart rates over a period of time. The heart is in a sense, just waiting there, sitting there beating at a constant level. It's being affected by our nervous system, and that neural influence provides beat-to-beat changes in rate. It creates the rate changes, are actually created pattern. When the pattern chose nice sinusoidal, nice rhythmic changes it tends to show good neural control, good neural feedback from our brainstem to those target organs, in this case, the heart.

[Stephen:](#) When I started, people were making certain assumptions, and one of the assumptions was that the heart was just beating. When you start to put electrodes to measure the ECG and measure beat-to-beat changes, there were unique patterns of how people's heart rate pattern, heart rate changes looked. What I started to find out, there were two important aspects of this initial research. One, that when people got focused, attended, their heart rate patterns became much more stable. Meaning, the variations of heart rate were greatly reduced. I started to operationalize that changes in heart rate variability were index of attention.

[Stephen:](#) Then, the research became much more intriguing, because the base levels, when people weren't attending, you could make predictions of what their heart rate responses would look like and whether they were good on attention demanding tasks like reaction time. If they had a lot of systematic heart rate variability, they were the ones that suppressed or reduced the variability the most, and they were the ones that had the fastest reaction times.

[Stephen:](#) I got interested in that and that's where it started.

[Dave:](#) If you can raise your heart rate variability, it could raise your reaction time and make you less ADD?

[Stephen:](#) Yes. Let me give you the full ... The issue is, if you can control your heart rate variability, you will probably become less ADD.

[Dave:](#) I did learn to control my heart rate variability. In 2008, I started becoming an adviser to the Heart Math Institute. Just for people listening who don't know the full Bulletproof story, it was one of the things that really made a difference, is that I didn't realize that you felt different, but there is a connection there, and it's a learnable skill, is why I'm offering that.

[Stephen:](#) Let's go through really what we're talking about.

[Stephen:](#) Basically the brainstem is the pivot point between higher brain structures in our bodily organs. What we are always looking for, this is what I would say is my mission in life or mission in science, was in search of what I call the intervening variable. Now, coming from a psychology perspective, people would talk about stimulus response, and in basic science, people would talk about input and output. I was actually seeking what goes in between. That in-between variable in scientific models, especially in psychological models, is called a measure of organismic state.

[Stephen:](#) What I really was discovering was that, if you measure this neural regulation of autonomic state, you could make very strong predictions between stimulus and response. Now coming back to your question, if a person has great difficulty in inhibiting or regulating their behavior, most likely that intervening variable can be detected by measuring heart rate variability and their regulation of it.

[Dave:](#) That makes a lot of sense. When I spend more time coaching people individually, I would just tell them, you've got to learn how to do your heart rate variability. It's \$100 or something for a little sensor to do that. The feedback from people, whether they were engineers or bankers or anything else was, it was nothing short of amazing, because these people already performing really well, would say things like, "Everything got easier."

[Stephen:](#) They didn't have to fight their body, but there're certain, in a sense, background events occurring in that process of trying to learn how to control heart rate variability. One is that you tend to change how you breathe. You tend to use more diaphragmatic

abdominal breathing and you tend to extend the duration of exhalations. You breathe out for longer periods of time and you breathe in for shorter, relatively shorter periods of time.

[Stephen:](#) Now, when you start thinking about that, you get at the mechanisms of what heart rate variability is. Those mechanisms are regulating the heart through vagal pathways. The vagus is this big cranial nerve that goes from our brainstem, and goes to many organs, especially the heart. It goes right to our heart's pacemaker. When you have a lot of vagal control coming through that nerve to the heart, it inhibits the pacemaker, it basically slows the heart rate up. Then when you change your breathing pattern, meaning when you start to inhale, it takes that inhibitory vagal break, off the sinoatrial node, off the pacemaker, and then the heart rate starts to go faster. The heart rate goes slower when we exhale slowly and goes faster when we inhale.

[Dave:](#) That is related to the things the military does with a box breath, where they teach people to calm themselves. That's something that, breath work is something I've talked about quite a bit on the show. It's directly affecting your heart which is directly affecting the vagal nerve, the order of operations they're in.

[Stephen:](#) Right, but if we think a little differently and we say, we don't use the term affecting the vagal nerve, but affecting the regulation of our autonomic nervous system through the vagal nerve.

[Dave:](#) There you go.

[Stephen:](#) We don't want to give intelligence where intelligence is not necessarily there. It's the brainstem that's traveling, send signals that travel through that nerve. When we shift our breathing, as people do when they chant or when they do breathing exercises, it shifts the neural regulation of the autonomic nervous system. These, in my metaphors, become neural exercises. Singing, breathing exercises, chanting, and even playing wind instruments, become a neural exercise then enhances the regulation of those physiological states.

[Dave:](#) Is this one of those reasons that people who play the didgeridoo are always weird?

[Stephen:](#) We could go there, but I'm not sure we want to. We could say that, actually, where I would give you an idea to think about for someone else's episode, is that if you utilize a wind instrument, then for your ability to regulate state, then maybe you are not interacting and regulating with another, or let's say a significant other enough.

[Dave:](#) Oh, interesting.

[Stephen:](#) This gets at your weirdness. What Polyvagal Theory also uncovered was the whole aspect of our evolution, which was to signal a conspecifics, those of our species, that we were safe enough to come close to, so that we could regulate each other's physiological state. Meaning, making individuals feel safe. Now, if someone is playing a didgeri, I can't even pronounce it, so help me out on that.

[Dave:](#) Didgeridoo.

[Stephen:](#) Didgeridoo, They're regulating their state without another individual.

[Dave:](#) Interesting. There could be relationship things. I actually do have a didgeridoo and I'm not that good at circular breathing, but you look at these very long slow exhales, that was the instrument that came to mind that had the most things. Frankly, most people I know who are really good at playing the didge are people I really like, but they're also people who are probably not average.

[Stephen:](#) Even playing a wind instrument, even without circular breathing, using deep abdominal ... When I was trained as a clarinetist, there was no real inhalation, it was an active dropping of the diaphragm. It was all passive.

[Dave:](#) Interesting.

[Stephen:](#) That enabled me to play, I could hold my breath or exhale slowly for well over a minute playing music.

[Dave:](#) One of the things that I learned to do over the last just 20 years of learning to better manage my own biology, was breathing control, sorts of things like that. I got to the point where I could do one breath per minute, between inhale and the exhale. I could do that for minutes at a time, which was strange, but you're just really slowly breathing in, holding for ... I was really slowly breathing out. I didn't do it by playing the wind instrument very well.

[Dave:](#) All right, I have a question for you though. It goes beyond that. You created a music-based intervention called Safe and Sound Protocol, which 1200 therapists use to improve spontaneous social engagement, reduce hearing sensitivities, improve language processing, and even just people's ability to regulate their states. Tell me about what that is, because that sounds too good to be true, even though I know it's real.

[Stephen:](#) Let's simplify this and say that, what is this device or this process doing? It's functionally an acoustic vagal nerve stimulator. We have to go back down to that level, and what it's doing, it's modulating acoustic information that the nervous system is waiting for. It's cues of safety and trust. When a baby is crying and dysregulated, and the mother sings a lullaby, what happens to the baby's physiological state? It calms down. What happens if a father who's irritated by a crying baby tries to sing to the baby to stop crying, what does the baby do? Tends to cry more, because the father's voice will tend to be at lower frequencies and less melodic.

[Stephen:](#) If you have a puppy, and your puppy is uncomfortable, as puppies are, you talk to the puppy in a pet ease, or mother-like voice, and males do very well with talking with their puppies that well, less well talking to their children.

[Stephen:](#) The nervous system is basically prepared to extract signals of safety. What we have is a neural circuit, that when our body feels safe, it changes the neural tone to the muscles

of the face and head. Our voices change, we become less threatening when we talk to each other. The upper part of our face becomes more alive and engaged. When that occurs, the muscles, the nerves and the muscles in the middle ear, start to dampen out low frequency sounds, so that we can do better extracting human voice.

[Dave:](#) Wow.

[Stephen:](#) Now, that whole system, which I call the social engagement system, is linked to the vagal pathways that go to the heart. Also, vagal pathways that go to larynx and pharynx, that regulate voice. We can hear it in people's voices, their physiological state. This goes back to where I started. If we go back to the '60s, why I was interested in this whole area, why did people's voices tell me so much about who they were, more than what they were actually saying? Remember, we live in a culture that says, it's not how I say it, it's what I say. Our nervous system has it totally reversed. It's not what we are saying, it's how you say it, that our nervous system responds to.

[Dave:](#) You remind me of a famous guy named Erickson, I'm hoping I remember which of the famous psychiatrist, psychologist this was. A guy who as a child, was paralyzed in bed for a long period of time. It is Erickson, right? (Milton Erickson)

[Stephen:](#) I don't know.

[Dave:](#) Okay.

[Stephen:](#) That story, I don't know, but I'm a listener.

[Dave:](#) Okay, it was a childhood disease, and this guy just laid there. Basically, his sisters had to come in and feed him. He was so bored as a young man, that he started observing the social interactions, because he had nothing else to do. He realized that what people would do with their tone of voice, with their eye movements, with the way they shook their head in a subtle way, the way they would say yes or they would say no, that this was providing so much more information than what they were actually saying, that it led to the creation of a school of psychology. I bring this up because Robert Greene writes about this in the first rule in his most recent book. This is the guy who wrote 48 Laws of Power, and one of my favorite authors on the planet, who's about to come back on the show again.

[Dave:](#) The idea there is, when you observe all of the small details that no one else sees, you suddenly have this view, like Neo from the Matrix, who just sees zeros and ones. You're like a Neo in that, when you listen to someone speak and when you see them move, you have this complete superpower to understand what's going on. I'm trying to figure out, is this because you have 40 years of clinical experience? How did you get that?

[Stephen:](#) First of all, I am not a clinician. I was a scientist.

[Dave:](#) Okay, it wasn't clinical, all right.

[Stephen:](#) I was a scientist who then got invited into clinical environments. I love the way that people treat me. They say I'm a scientist with a heart of a clinician, and I welcome that. How did I get there? I got there through observation and from theory development. Most people who just observe don't go to the next step, which is to try to make it into a theoretical system, so you can figure it out. With the theory, you can find things that you haven't seen. You can actually do the research to identify more things.

[Stephen:](#) There's one point, when we talk about being able to extract that information, there's another part of the whole story, is that, when you extract it, what do you do as a human being? You become available to that other person because you know what that other person really wants. You become accessible, meaning that your voice doesn't go into high frequencies and then start screaming at people. You try not to argue, which is not very easy, especially for an academic, from the east coast on top of that.

[Stephen:](#) All these features, we realized, when you start looking at the dimensions, you realize that you can't win an argument. There are no arguments that you can win, because there's a motive underlying part of an argument. You have to understand that you have to be physiologically safe to have a really good discussion, which might be intellectual debate. You have to be physiologically safe. What happens in most interactions, someone loses it? What does that mean from my perspective? They're no longer safe.

[Dave:](#) Now, I'll get a little bit personal here. I was born with the umbilical cord wrapped around my neck. I didn't lose oxygen to the brain or get brain damage or anything like that. I had no idea this had anything to do with my psychology or anything in my life until I was 30 and really started digging deep. To this day, even with all the work I've done, if you run one of those psychological profiles where you look at someone's face and you have to identify just as a photo, are they happy or are they angry. I'll see angry face three times faster than I see happy face. I'm still wired that way.

[Stephen:](#) You're not wired that way, let's start really picking at your operational definitions.

[Dave:](#) I love it.

[Stephen:](#) You're in a state that has a negative bias.

[Dave:](#) There you go.

[Stephen:](#) Okay, now, if we shifted your state, your bias might, and should, spontaneously change. See, your problem, and this is a well-known phenomenon, is that, I coined the term that I call neuroception, which is our nervous system's ability to detect risk or evaluate risk of the environment without awareness.

[Dave:](#) Right.

[Stephen:](#) What happens is that, when you shift states, your perception, this is your cognitions, take on a bias. If you're in "mobilized state," which, we go back to the hyperactivity and

the little irritability in your nervous system, your bias would be very much towards negativity.

[Dave:](#) That has been the case throughout, at least the first half of my life. I'm really on top of that. I'm certain that I can rewire myself, and I have in lots of different ways, gratitude and things like that. I've changed the pattern in your language there.

[Stephen:](#) We don't want to use the term rewire, we want to have access to.

[Dave:](#) Oh, interesting.

[Stephen:](#) Thinking more in terms of portals. We're going to play with the word gratitude for a moment.

[Dave:](#) All right.

[Stephen:](#) We're going to say, have more gratitude for what you have, or what has come into the world with you. Don't be so negatively evaluative of who you are, that you need to rewire. Your body, in safe environments, will start to spontaneously optimize those circuits, so that we need to structure narratives that have a degree of positivity, so that our nervous system doesn't feel too scared to evaluate it.

[Dave:](#) I love the way you say the nervous system feeling too scared, because I went through this long ... a process where I would feel ... I wouldn't recognize that I was feeling unsafe, because I would think about it and say, there's no reason to be afraid right now, therefore I'm not afraid. Not recognizing that physiologically, my body was in that state, but that my brain wasn't. That mismatch really confused me for years. Now, I'm wired in, not in an un-flexible way, but I've connected to the ability to sense when my body's triggered, and I don't know why, but at least I can change my behavior.

[Stephen:](#) See, I would play with this. I would say, often changing the behavior is not the first goal. The first goal is literally self-compassionate and respect and witnessing your physiological state, and realizing the vulnerabilities of your physiology, and then, just like a beautiful suitcase, you take it to a place where it can be safer. You basically move your body into a place where it can function. For people with low threshold, people who're hyperactive, the environment can be very disruptive, can get their bodies very ... People use terms like wired, they don't feel present.

[Stephen:](#) What the body is telling them, because they're very aware of the body's change, they're not aware of the cues that are sending on that journey. As we learn, there are certain cues that do send it. There are cues of safety and there are cues of danger and there are cues of life threat. Once we've become aware of this, we take on a different responsibility. I've got to take care of my body, it doesn't do well in these situations. The irony of all this is, once you start taking care of it, it becomes much more resilient, and now you can intrude into these other places.

[Stephen:](#) The paradox becomes, our environment doesn't respect it, or let's say is ignorant of it. We say, people have to do this, they have to "learn to do this." The learning is not the strategy. It's the support of their body, and this is the strategy.

[Dave:](#) I love the way you said that, and it ties back into that core definition of biohacking, that is now a real word in the English language as of last year. The definition, that actually isn't the full one in the dictionary, but the one that I wrote when I was creating this field was, change the environment around you and inside of you so that you have control over your own biology, and that the body will listen to that, even if you don't want it to.

[Stephen:](#) Yes. Our first interview, it must be two years ago or so, we got into a discussion on biohacking. I said stop, there is something, that's not the strategy. I will also tell you what I'm working on. I'm actually finalizing a utility patent, which has a lot of these features of reading the body and changing the environment to support the body.

[Dave:](#) I am exceptionally excited to see that patent as soon as it's visible, or just whatever work you're doing based on it, because I think this is one of the keys to unlocking the innate kindness that's built into humans, is you have to feel safe, and you have to have enough energy, too. You can feel safe and just be too tired to do anything about it, but if you're energetic and you're not triggered, you'll probably going to help other people.

[Stephen:](#) Oh. Let's hold that for a second and let's talk really about the culture.

[Dave:](#) All right.

[Stephen:](#) The culture is a culture of danger and threat, and we're led to believe through all our institutions, education, the media, and everything, that our goal in life is to remove threat from our environment. Our nervous system tells us that's not enough. It says, you can remove all the threat, and it doesn't make you feel safe. Your nervous system wants something else. If we go back to what Safe and Sound Protocol™ is, it's trying to give the nervous system that something else. Then, you see what spontaneously emerges, and it's really quite spectacular in many individuals.

[Stephen:](#) Now, the issue is, it works extraordinarily well with kids on spectrum and children with language and learning delays. Now with people with severe trauma, it does something different. Many people who have heard me talk, they want to use it, if they had had trauma, and they even happen to be therapists. They'll go and order it and they'll do it by themselves, and they miss the first word of the protocol, which is "safe and sound." They put it on without the support, without the caring individual to help them regulate, because the sound of safety to a person with trauma is a trigger. It says, you can trust me, and of course a person who's been violated, if someone says trust me, what does their body say? Been fooled once, not going to be fooled again.

[Stephen:](#) Initially their body, they'll relax and do it, and suddenly they'll get very anxious, as the body retracts and tries to protect itself from those cues. Then an astute trauma-oriented therapist can now work with the client through those stages.

[Dave:](#) Now, you're listening to this going, what the heck. If you have had serious trauma, there's a substantial chance if it happened earlier in your life, you don't even know you did, which was the case for me.

[Stephen:](#) Yeah. We can talk about yours, and what that is ... The reason yours is important from, at least from Polyvagal Theory is that, with the cord around the neck, there's a high probability that there's a reduced level of oxygen even though your Apgars are probably okay, and even though your perinatal variables were. It doesn't mean that you didn't have a transitory shutting down, or the body got this fit of lack of oxygen, and then the body recovered. It's like the first hit that creates the vulnerability. It's like a traumatized individual who says, my body, it looks fine, but now someone becomes ... tries to engage me, and now it feels like I'm being seduced by a predator, because I don't want to be vulnerable.

[Stephen:](#) Your body, in fact, I've had a many decade-long quest, I'll use that word, to study individuals who had babies who survived delivery, who had meconium, which is fetal feces coming out, but then had normal Apgars, because you get the feces coming out due to a hypoxic episode, a lack of oxygen, is part of that ancient reptilian diving reflex, which is part in Polyvagal Theory, of the shutdown response. It's part of what many survivors or trauma describe, the immobilization, the passing out, the dissociation. The defecation is part of that same physiology.

[Dave:](#) It's fascinating you bring that up, because I just interviewed Lieutenant Colonel Grossman, who wrote the books "On Combat" and "On Killing," who described that exact same response in first responders and SWAT team members. Even well-trained ones. A fire fight happens, and if there's some little extra feces, it's probably going to be in your pants. It's wired in at a very low level, that reptilian level, you're saying.

[Stephen:](#) Oh, it's survival, and also nausea. The coupling of defecation and nausea is adapted for a reptile that has to go underwater, holds its breath for several hours, because you get rid of metabolic demands of digestion.

[Dave:](#) Wow.

[Stephen:](#) [inaudible 00:32:20] diarrhea and nausea, have adaptive function when you get triggered into these ancient circuits.

[Dave:](#) The body is an amazing, resilient survival machine, in ways that are beautiful but kind of gross.

[Stephen:](#) To loop it all back, is that when we understand what the body is trying to do for our survival, there's a type of, we use the word gratitude. That gratitude, for those events in our lives, give us a different story, a different narrative. Now, if you soiled your pants, it's no longer shame and embarrassment, it's like, wow, look what my body was trying to do for me. Those are the narratives that we need to have, as opposed to humiliating people.

[Dave:](#) It's really awesome the way you just set that up, be grateful that your body's doing all these things. Even if they aren't necessarily what you wanted, there was probably a reason. Seems like the intelligence of that system isn't that good. It's reactive, it's fast, but it doesn't have context, right?

[Stephen:](#) Oh, it has context, and it is good, because its survival is its highest priority. For us, we have other priorities, how people look at us, how they think about us. It makes the decision extraordinarily rapidly. Our body shifts state quickly. We can feel the body state shift, and we can perceive that. We can't detect the features always that trigger our body, those things.

[Dave:](#) You're one of the game changers who made it into *Game Changers*, the book. You were in Law #44, about gratitude. You showed a really cool way to use gratitude towards physiological responses that you might not like, but that are there for a good reason.

[Dave:](#) The law in the book is, it states, "Overcoming fear that doesn't serve you as necessary to access your greatness. Courage works, but it takes a lot of energy. Save courage for when your life is on the line. The rest of the time, use gratitude to turn off fear at the cellular level. Freedom from fear leads to happiness and happiness makes you perform best at whatever you chose to do."

[Stephen:](#) Yeah.

[Dave:](#) How would you recommend that people listening to this show bring this gratitude online, on a frequent or even constant basis? How do you do it?

[Stephen:](#) How do ... That's personal.

[Dave:](#) Okay, fine. How do people do it then, then I want to know how you do it.

[Stephen:](#) Okay. I go back to Polyvagal Theory. We've been talking about low levels of defense or shutting down, which is this ancient dorsal vagal, an old vagal circuit that, when we are safe, that same vagal circuit enables us to explain or enjoy stillness, enables us to have moments of intimacy. The shutting down the moments of intimacy, are where our bodies conform with others, who we feel safe, and it's a physiological state that now, supports health growth and restoration, and not passing out, defecating, and potentially dying.

[Stephen:](#) The same circuit, but something's been added to it. The part that's been added to it is a very special mammalian circuit, that is our circuit that identifies whether we're safe. When this system comes on, it coordinates the older circuits. The new system is the social engagement system, with the muscles of the face and the voice, and that's linked to the myelinating vagal control of the heart. When that comes on board, it allows these other circuits, and there's a second one, our fight-flight system that everyone talks about, is stress and fight-flight.

[Stephen:](#) Few people talk about the mixture of movement, or mobilization, which is fight-flight, but putting it together with social engagement. That's play. That's interact with play. That's dancing, that's team sports, that's movement and maintaining some level of social interaction.

[Stephen:](#) As we evolve, we got this wonderful circuit that took the old defense circuits, and basically restructured them. Restructured how they would work in our society, and in how we live, to have lots of attributes of pleasure.

[Dave:](#) You're saying, to experience more gratitude, play more?

[Stephen:](#) I'm saying that gratitude comes out when we feel safe. Because if you're fearful or under great threat, you're not going to have experiences of gratitude. It's just not going to happen. The experiences of feeling safe are the use of this new mammalian circuit, which in a sense choreographs these older circuits. Keeps them under containment or keeps them in a functional level.

[Stephen:](#) A way of thinking about this, is that we have tools in our body, that we inherited from very, very primitive organisms. It is only when we use our mammalian structures, can we then take those tools and repurpose them for play, and for intimacy. However, if we're in environments, and where threat is the constant feature of the environment, we can't turn off our defenses because the social component is there to turnoff defenses, because our nervous system evolved to be a good fighter, to be good defensive, not going to be hit by cars or to fall down staircases or elevator shafts.

[Stephen:](#) To be aware of our context, but our nervous system also evolved to know when it's safe. When it's safe, it can then repurpose these other systems and circuits. Just as I'm looking at you, you're in a relatively confined environment. You don't have to be hypervigilant of people walking behind you, or people intruding on you, or hurting you. You can now engage me, because I'm-

[Dave:](#) Because you're in my studio, and you're the only one here.

[Stephen:](#) Right. What we're defining, we're defining what structures do for us, physical structures, enable our nervous system not to be hypervigilant, so that we can be socially engaged.

[Dave:](#) Now if you're in a cubicle that has walls, so you can't see who's coming towards you, and it has an opening, and your back is to the opening, and you're under some nice fluorescent lights with a lot of background noise, what does that do?

[Stephen:](#) I would assume that you know what it does, or you wouldn't ask me. Of course, the noise, the vulnerability, the lack of privacy, it's going to shift physiological state. Certainly, it's not a place where I would want to spend any time. Even if I were, let's say, much younger and had much more resilience, I wouldn't really want to be there.

[Dave:](#) It makes for a less pleasant working environment. If you could wave a magic wand and re-envision the typical office worker environment, to one that would increase human performance and make people feel safe, what would it look like at a high level?

[Stephen:](#) First, okay. I'm going to do a 90 degree ... No, a 45-degree shift and tell you that I tried to ... Not tried, I designed a school for autism, I designed the physical plan for a school for autism.

[Dave:](#) Wow.

[Stephen:](#) I think some of the features would be very good, for what you're talking about, a highest level corporate. I use, let's start with lighting. I didn't use direct lights, I washed the light on the white walls and on the ceiling. It just reflected off of it.

[Dave:](#) I want to aim my camera at the ceiling right now, my whole office is set up that way.

[Stephen:](#) Okay. You understand that part. I also had lots of windows, but the windows were over six feet above the floor level. They gave lots of-

[Dave:](#) So they don't have glare in your eyes.

[Stephen:](#) No. It was distractors. It was that you could see the trees, you could see light, but you didn't see roads and you didn't see distractors.

[Dave:](#) Okay.

[Stephen:](#) The most important part that I did was sound attenuation. This was a very interesting task, because the architects didn't even understand what I was talking about. I was talking about reducing low frequency sounds in frequency bands, that they didn't even think about looking in.

[Dave:](#) Like fans and vibrations?

[Stephen:](#) Vibrations, the low end, because they're using decibel meters that are using the scale called DBA, which is an A-biasing, which all it means is that, it's as if ... It's not really measuring sound pressure level, it's measuring what sounds would sound like and the intensity, if you had an optimal ear.

[Stephen:](#) When you're dealing with autistic kids who have auditory hypersensitivities, by definition, they don't have optimal ears. I was trying to get all those low frequencies out.

[Dave:](#) Something that I determined just in the course of quantifying the nervous system and being a professional biohacker, was that I had frequency bands where I wouldn't hear well in different ears. Just 50 hertz missing here and there, in the middle of it. I was having a hard time with auditory discrimination. I had to work harder to pick out the sound of the human voice than the average person. I was able to train that up, so it

became much less of an issue for me, using some custom-made soundtracks and things like that.

[Dave:](#) Even since then, I've always noticed if I'm in a part of the building that has the low frequency vibrations, stuff you feel more than you hear, it does, it just makes you feel uncomfortable. It's a subtle background thing. Sometimes just a corner of an office building, that space has ... It's almost not even a sound, it's more of a feeling, but it's vibratory, it's not just oh, there's bad energy in the corner.

[Stephen:](#) There is bad energy.

[Dave:](#) Yes. It's acoustic energy, right?

[Stephen:](#) Yeah.

[Dave:](#) Is there a standard for this? Are there people who focus on this? If you were building a skyscraper, and I have friends who are building skyscrapers right now, who are interested in healthier buildings, how would you go about hacking that problem?

[Stephen:](#) I think it's relatively easy. However, it's not where the state of the art is. Even if we start talking about intensive care units in neonatal intensive care units, the background sounds in the isolettes, the little chambers for the preterm babies are, and the noise on the ward, it's extraordinarily high, of a nervous system that is ill-prepared to deal with these challenges, especially since it is preterm, and during the last trimester, the whole neural regulation of the striated muscles of the face and head, starts coming in, including the middle ear muscles.

[Stephen:](#) The middle ear muscles function as filters to dampen low frequency sound. If they don't dampen those low frequency sounds, they will mask human voice. You start finding in children who have auditory hypersensitivities, they are also the same children who have language delays. They're not hearing the frequencies associated with discriminating different words.

[Dave:](#) Anat Baniel came on the show a while back, who does work with autistic kids, and she described it as, they're trying to look through mud, or they're inside a blender, and every now and then, their face gets pressed against the glass, and they can see out, but then the rest of the time, it's muddy. It seems like a similar descriptor to what you're saying there, where the amount of noise is much higher, and your ability to filter it out isn't there. It would be hard to learn of course.

[Stephen:](#) Right. We have different types of metaphors about how these processes work. One of the metaphors is that the noise and the filtering's all on a cortical level. Another one, which is the one that I adhere to, is that some of it's on a cortical level, but a lot of it is on the neural regulation of peripheral structures, like the middle ear muscles. They basically changed, is what we would call, the transfer function. What sounds get into the ear, is really what that middle, the middle parts of the ear are doing.

[Stephen:](#) They are very effective in dampening low frequency sounds to 20- to 30-decibel attenuation. If that's not occurring, the energy that's coming through the ear at the low frequencies, you just can't hear voice, it's just not there. Doesn't matter how hard you try or how hard you try to train a person, discriminating the signal to noise ratio is so poor.

[Dave:](#) That is so fascinating. Is there data on what percentage of people have a little bit of this going on and just don't know about it?

[Stephen:](#) No.

[Dave:](#) If you were to guess without data, just based on what you've seen in your life?

[Stephen:](#) I would guess to begin with, that there's an age phenomenon, because as people ... You can just tell who goes into loud environments like bars. You can ask again, observing where do people sit in restaurants, with their back to the wall or in other areas. We're very adaptive. What we realize is that, the environment changes for us. The environment may be constant, but it's different in our perspective or perception of it.

[Stephen:](#) The examples I love to use as a visual is, when a parent has an adolescent male child, and they're in the car and they turn the car on, they play with the car radio, and the first thing they do is they turn the bass up, and the volume. First of all, the parents say, they turn the volume up. That's not always true. They'll turn the bass up. Then you ask the question, what's going on here?

[Stephen:](#) The answer is, young people can have good middle ear structures, and if they're listening to a vocal track, they're not going to hear the bass. Their nervous system's going to attenuate the bass or low frequencies through that very efficient neural regulation in the middle ear structures.

[Stephen:](#) It becomes literally a psychophysical, psychophysics, of a perception of sound. Where you can see the parent, who are already stressed with the kids in the car, the retraction of that neural control, and the kids not having that deficit. You can see it in real time, in real life. We all have experienced it, if we're parents with children.

[Stephen:](#) You asked me the question about percent. The first thing is that, many individuals who are aging, are going to have that, because there's a neural degeneration. It doesn't mean that you can't optimize it by exercising it, but it is going to start degrading. The other one is, you have these other population of all these developmental disabilities, they're going to have these sensitivities. As you get older, people with mental health disorders, virtually all mental health disorders have sensory processing issues, and those may not be at the highest level of the brain. It could be brainstem regulation of the nerves regulating middle ear muscles, the facial muscles.

[Dave:](#) 20%?

[Stephen:](#) You want a number. What age? I'm going to throw it back at you.

[Dave:](#) I guess you'd have to look at the age distribution of the population. My data shows 48% of people under age 40 have early onset mitochondrial dysfunction, and I believe mitochondria, the very lowest foundation of your sensing system. I could be wrong there.

[Dave:](#) I would say okay, whatever percentage of people under age 40, but over age 40, everyone has some of it. What I don't know is, what percentage of that goes into the sensory issues that we're talking about there. I guess I'm thinking, if I was listening to the show going, I don't know if this is me or not, what are the odds if I'm just a normal human being, and you're saying the odds are worse if you're older, it could be something like this.

[Stephen:](#) Yeah.

[Dave:](#) If you're an average person, what ...

[Stephen:](#) I think you see, labels are always dangerous. We want to just be careful there. We could say, if you have trouble being in a shopping mall, if you feel that when you go to a restaurant, you can't hear what people are saying, that you have difficulty talking on the cellphone in public, these become symptoms or hints that you have problems in this area. The numbers could be very, very high. I'm not going to disagree with you on any of the estimates. They can be very high.

[Stephen:](#) I will say that, having these features is not destiny, that these systems are quite flexible, and they can be rehabilitated, and they are part of a state-related adaptive response, so that when we have auditory hypersensitivities and difficulty processing language, we're very prepared for predator sounds. We can hear people behind us, we can react to it, we can hear the car coming back. We're prepared to survive. This leads us into different cultural situations. If you live in dangerous areas, your nervous system is tuned for the predator, for danger. If you live in upper class, a middle-class suburb, now we're going to have to say upper middle class, because of the population shifts, you don't know what I'm talking about. You're in environments that are physically safe.

[Dave:](#) Got it. It is going to be environment-based as well. You're definitely inspiring me to do something to my brain, so that I'll be able to differentiate the sounds of French, which has always sounded like someone chewing on marbles to me. My wife speaks French fluently. I'm in Canada, where there's apparently some French speakers in another part of the country. I'll be darned if I can understand a word of that language.

[Dave:](#) Maybe I'll hack my brain to the point that I can discriminate all that sound.

[Stephen:](#) There's always a possibility.

[Dave:](#) Now, if someone wanted to strengthen this part of their nervous system, what's the lowest hanging fruit, the most likely to make a difference for them?

[Stephen:](#) Okay. That was where I developed the Safe and Sound Protocol™.

[Dave:](#) It is the Safe and Sound Protocol™.

[Stephen:](#) Yeah. That was five, one-hour sessions, that were basically exercises of the system. [inaudible...] I'm going to use the term, even though it appears when you listen to it, nothing's going on, they're really quite robust. People immediately say nothing going on. It's like, what we're doing is modulating the acoustic frequencies. When people haven't used those neural systems, they get extremely exhausted from just listening.

[Stephen:](#) I developed a new intervention, which is not released yet, it's called, its codename is SSP Lite. What it does, is in the modulation of frequencies, it preserves some that were taken out in the original model, so that people can feel, they don't feel like the safety of the human voice is being lost. When I was doing a lot of aggressive filtering with sounds, human voice starts to disappear.

[Stephen:](#) Now, for me, when I hear a song, the voice disappears, you feel it moving away. When it starts coming back, you just have this big smile on your face.

[Dave:](#) Wow.

[Stephen:](#) If you have a trauma history, if someone's going away, what happens? You're not there long enough, in present in your body, to experience it coming back. I didn't understand that, because when I developed this, I was developing it from my own body. I didn't have the experiences. I really got really enlightened about two years ago, when I was playing six minutes of it during a workshop in London. This, to me ...

[Stephen:](#) As an American, we think of London as this sophisticated cultural center. We forgot one important thing about London. Everyone at your workshops will have a trauma history. Either-

[Dave:](#) World War II.

[Stephen:](#) Right, either a re-enactment of their families, or their immigrants going to London to get away from something else. I'll just say everyone, but most of them, so that you have now, in this room, this is a room with 300 people, people, most of them have something in their background that is not a positive visualization.

[Stephen:](#) I'm playing this music, having a good time with my attitudes, and usually, I play a few minutes, people will say, oh, it was a really, I had a wonderful experience, I was going someplace interesting mentally. Another person will say, their ears were itching, and then I get really excited, because it's the bones in the middle ear structures. I say, that's really good. Some people say they felt nothing.

[Stephen:](#) In this room, people were getting highly anxious, people were getting out of control, people, they had to have all the support staff of the ... This was a clinical workshop, so they had some, the sponsors had clinicians to help. The people were coming in to help support the people who were having these reactions.

[Stephen:](#) I had a little bit of dialogue. I had to stop the dialogue after 45 minutes.

[Dave:](#) Whoa.

[Stephen:](#) It was a full day, it was actually a two-day workshop. Forty-five minutes about people having to express how they were feeling. The feelings were ranging from irritability and anxiety, and to those who were feeling, they were falling into an abyss, which is a trauma reaction. Disappearing. It was amazing. It was amazing, and it taught me so much about other people, and so much about how to respect the vulnerabilities, the accessibility of other people, and it also made me start to figure out how you can use this powerful tool that was doing this triggering, in a therapeutic model.

[Stephen:](#) Because in therapies, you always are using triggers. You're allowing those triggers to resolve. I was going to say, this is the beauty of this type of trigger, is that it's not associated with a person. If you have a therapist who triggers you, you now are angry at the therapist, because your nervous system starts detecting the therapist as an aggressor. Your narrative says, why are you doing this to me?

[Stephen:](#) When you hear two minutes or three minutes of music and your body gets this way, you don't get angry at something, you say, wow, how is this happening? Then-

[Dave:](#) You become aware that there's something going on in there you didn't know about.

[Stephen:](#) You didn't know about. With good therapists, they support and allow you to now resolve it. The therapies resolve these problems when top-down, meets bottom-up. Basically, your bodily reactions now have a top-down narrative, that keeps it contained. Says, wow, my body's reacting. Why?

[Dave:](#) You've encouraged me, I think I was intrigued after our first interview, to do the Safe and Sound Protocol™, but I never found someone near me to do it. You've encouraged me to go actually do that and to do that, I guess I go to the website and find a practitioner. Do you have a directory on there?

[Stephen:](#) There's a directory ... Fortunately, it's not my company.

[Dave:](#) Yeah, that was something you invented.

[Stephen:](#) Yeah. Which is the beauty of being able to hand off. The person, there's an education research director, just call her, or send me an email, and she will identify a person for you.

[Dave:](#) Okay. I'm thinking that listeners, a good number of them, will probably want to do that as well. Just, I'm going to put a little warning out there for people, I've done sensory integration work. Maybe I have an unusual nervous system, the odds are pretty high based on the data that I have. When I did reprogramming of my visual system, I did fix my vision and had all sorts of improvements, and it kicked my ass. I was tired. Every

Saturday morning, I would do this, and my brain was redoing something. I would just need to sleep.

[Dave:](#) It's not something to be oh, I'll just do it right in the middle of my day. You're probably going to need a little bit of recovery time afterwards. My question for you Stephen is, assuming the auditory stuff is pretty similar? It's [crosstalk 00:58:33]

[Stephen:](#) It's very similar, in fact. One of the key symptoms or features that when someone's going to get improvements, is how exhausted they are from the intervention. The company that distributes it, and they have a webpage, is Integrated Listening Systems.

[Dave:](#) All right. Just to be really clear, Stephen is not selling that, he invented the tech, doesn't run the company or anything like that. I have no deal here, I'm just interested in this stuff. Integrated Listening Systems. All right, cool. I will put that in the show notes for you. If you're driving, you don't want to pull over and write that down.

[Dave:](#) Stephen, I really, really appreciate your work. There's my gratitude for the day. You have this keen observation ability, that's allowed you to pull these things out of patterns that've been invisible to most people for most of human history, as far as I can tell. Keep doing what you're doing. Thanks for being a guest on the show. Thanks for being in *Game Changers*, with your work around gratitude. It's profound stuff.

[Stephen:](#) Thank you, David. Enjoyed our conversation. Look forward to having another in the future. Thank you, David.

[Dave:](#) If you liked today's show, you know what to do. Go out there and do something to be grateful. That's your homework for today. You can be grateful by saying thanks to the person who makes your coffee in the morning. You can be grateful by saying thanks to someone who made a difference. Send a text message to someone you haven't talked to. Anything like that.

[Dave:](#) It actually really does something cool for your brain, and just watch what happens when you do it. It feels good. Yes, gratitude's a selfish act, it's okay.