**The Polyvagal Theory and Trauma**

The map may not be the territory,

but it sure helps you to get around. (PAL)

In addressing the vital role played by the polyvagal theory (PVT), as it informs trauma- based therapies, I have chosen to take a somewhat personal and historical perspective. I begin by reflecting on a four decades relationship with the senior editor of this volume; a special filial friendship that developed around our shared interests and passion for “bottom-up” processes, emergent properties, self-regulation and playful laughter. Since our first meeting in 1978, Stephen Porges and I have remained kindred spirits and willing co-conspirators. His work on the PVT developed a key holistic concept he called “neuroception." This organismic perception was an emergent property of three distinct autonomic, visceral and somatic states signaling safety, danger and life threat. During the decades that Porges was evolving his visionary theory, I was developing my life’s work, called “Somatic Experiencing.” (SE)

For most of the previous centuries (with the notable exception of William James and Carl Lange at the turn of the 20th century), the autonomic nervous system (ANS) and visceral organs were believed to be unconscious; far outside the realm of awareness. However, it was becoming evident to me that this understanding of internal perception was limited, if not fundamentally incorrect. I learned, that not only were people able to become aware of their visceral states, but that cultivating this perception was essential to taming various traumatic and other difficult sensations and emotions; including fear, rage, grief and shame. Indeed, it became increasingly evident that these problematic affects were derivative of habitual muscular and visceral states. Crucially, in order to change our emotional states, it was first necessary to alter the underlying ANS, visceral, and kinesthetic sensations. For this transformation, it was essential to develop a reliable *interoceptive awareness*.[[1]](#footnote-1) So, while mine was a clinical body-awareness approach, it was clearly mirroring Porges’ Polyvagal theory, as this short article will, hopefully, elucidate.

This unfolding story traces back to an unexpected and pivotal event that occurred in 1969 as I was developing a Body/Mind stress treatment modality. At that time, I was in the midst of a doctoral program in the department of Medical and Biological Physics at UC Berkley. In this interdisciplinary program, I was free to study in my elected fields of neurophysiology, stress research, zoology, physics and math; as well as continuing with my clinical practice. Ed Jackson, a psychiatrist friend, knowing of my keen interest in stress and in mind/body healing, asked me to see a patient of his named “Nancy.” At the time, I had been experimenting with a series of body awareness exercises on a group of 15 people who had significantly elevated blood pressure (BP), indicative of chronic sympathetic arousal. I had found that teaching them how to relax certain muscles in their neck, jaw and shoulders often brought their high BP to a normal (120/70), sometimes in a matter of twenty minutes. This shift would infer that a dynamic balance between the sympathetic and parasympathetic branches of the autonomic nervous system was restored.

Nancy had been suffering from (what would now be called) fibromyalgia, chronic fatigue, irritable bowl (IBS), migraines, severe PMS, and urinary problems. She had also been plagued with debilitating panic attacks and agoraphobia --- to the extent that she was unable to leave her house without being accompanied by her husband. Even with this critical support, such an excursion was terrifying and exhausting. Her life had become a living hell! My psychiatrist friend thought that, perhaps, some of my relaxation exercises might, at least, help her with her severely limiting anxiety.

With the best of intentions, I began a relaxation session with Nancy. On arrival, her heart rate was pounding at about 120 beats per minute (BPM), indicating sympathetic arousal.[[2]](#footnote-2) Her head and eyes were cast downward, assiduously avoiding any eye contact with me. I cautiously taught her how to relax certain muscles in her neck and jaw and, to my self-aggrandizement, her heart rate slowly dropped to a more normal 75 BPM, indicating a balanced and reciprocal relationship between sympathetic and parasympathetic. I wasn’t only pleased with the efficacy of my techniques, but I was grateful for her comforting improvement. However, just as she seemed to be settling, her heart-rate abruptly skyrocketed to about 160 BPM (hyper-activation of the sympathetic system), followed by a gradual descent, much to my relief. However, my reprieve was short lived, as her heart rate rapidly plummeted to a frightful 50 BPM (seeming to indicate the onset of an unexpectedly powerful parasympathetic dominance). At this point, her face became deathly pale and her fingers turned icy cold. Her eyes desperately locked onto mine as she pleaded, “I’m dying, don’t let me die; help me…don’t let me die!” [[3]](#footnote-3) At that dark moment of peril, just as her pulse reached the slowest rate yet, I was able to guide her to *envision an effective motoric action* of escape. Out of the blue, a fleeting image of a tiger, readying to spring at its prey had appeared to me. Following my intuition, without fully understanding the significance, I engaged her in *mobilizing an active defensive response* by commanding: “Nancy, there’s a tiger chasing you! Run, run fast, climb those rocks and escape!” Later, when she described her experience in the session, Nancy reported how, at first, her legs couldn’t move; that they “felt like lead.” But then, she recalled how she began to sense her body “filling up with energy.” She noted that with my encouragement, she was able to stay with these challenging sensations; she could feel herself starting to move and then running, full-out, culminating in a triumphant escape. Nancy reported that after climbing the rocks, she turned and looked down, and instead of seeing the tiger, she saw herself at the age of four, held down by several doctors and nurses who were forcing an ether mask over her face for a tonsillectomy. Nancy had been completely terrified and overwhelmed at that time. Her body had, for twenty years, needed to mobilize an active escape. She finally did this, “retrospectively,” in response to the evocative image of the tiger, introduced at the critical moment of her collapse. Her successful escape was now embodied in the emergence of a new (*“reconsolidated*”) procedural memory engram; *one of power and agency, instead of helplessness and defeat.[[4]](#endnote-1)*

During the session Nancy experienced waves of shaking and trembling, cycles of heart rate changes, and changes in temperature—from cold, to hot, and finally to an even, warm skin tone. Each of these cycles was followed by deep spontaneous breaths. At the end of her session, she opened her eyes and looked towards me; this time without fear and grasping, but rather with the spontaneous delight of mutual connection. As we shared this soft gaze together, she reported that she felt, in her body, as though she was (in her words) “being held in waves of tingling warmth.”

We continued with a few more session. Afterwards, she reported that many of her physical symptoms had resolved or greatly improved, and she was able to resume her doctoral work (ironically in Physiology). Later at a two-year follow-up, she had not experienced any further panic attacks and was enjoying exploring the many interesting things that Berkeley had to offer. Needless to say, I began to try and understand her extreme physiological changes and the salubrious effect at the end of the session. In order to comprehend what had happened in the session, as well as her long term improvement, I was pulled in several directions.

First, I was finding pieces of the puzzle in the field of ethology, the study of wild animals in their natural environments, as well as my evolving understanding of the ANS. In 1969 (some months before my encounter with Nancy), I was participating in a weekly seminar on animal behavior in the Zoology department. One of the professors, Dr. Peter Marler (an ethologist), had mentioned an obscure biological phenomenon. He described how, when a wild animal was physically restrained (without a struggle), it entered a dramatic immobilized state called tonic immobility (TI), known by the colloquial phrase, as “playing possum.” During TI, the animal’s respiration is so faint that one can barely detect life. To the naked eye it looks dead. However, it is not just “playing dead,” instead the animal has entered a profound physiological state; one which is sometimes called “thanatosis,” because of its apparent death illusion. In this state, an animal’s heart rate typically drops to an extreme low ---- giving evidence of parasympathetic dominance. These same animals spontaneously recover from this paralytic state in a matter of seconds to minutes. However, if the animal is frightened before, or during the restraint, it remains locked in this death-like state for a *much longer time*. This, I reasoned, was what had happened to Nancy when she was held down – physically immobilized and terrified.

When visiting a physiology laboratory at the Federal Medical University of Brazil (where they were one of the few groups studying the neural substrates of immobility), I had the rare opportunity to observe guinea pigs who were first frightened and then physically restrained. As these terrified animals struggled to escape, their heart rates (like Nancy’s) were initially very high … just like you would expect from an animal activating a fight or flight response (i.e. sympathetic dominance). However, as their frantic struggle continued, their heart rate and respiration suddenly dropped, precipitously, to a very low level (ie. parasympathetic dominance). Unlike relaxation, which is typically associated with parasympathetic dominance, these animals’ condition (like Nancy) was hardly a relaxed one. They appeared terrified, frozen and/or collapsed. I was intrigued by the additional observation that the guinea pigs, who were repeatedly spooked every time they started to come out of TI, succumbed to immobility for an even more extended period of time. In one instance, this extended TI lasted well over 24 hours, rather than the seconds to minutes of the TI that I had first learned about in my zoology seminar. This induction into prolonged TI, known as *fear potentiated immobility*, was first elucidated by Gallup and Maser in their 1977 article.[[5]](#endnote-2) A fortuitous example, of the blending of clinical and experimental, occurred when a stranger appeared at the conclusion of a lecture I was giving at a psychiatric conference. With an impish grin, the man announced himself as Jack Maser, the very man I had just quoted in my speech and video demonstration. He expressed sheer delight that his academic research (from decades before) helped to support a clinical application for healing human trauma. Such synchronicities never cease to delight me.

But let my not digress, and return to his research and the Guinea pig experiments I had observed in Brazil. Together, they gave me a clearer understanding of the healing trajectory of clients like Nancy. Indeed, what kept them stuck and how did they finally resolve their traumas. What was the similarity between immobilized mammals and traumatized individuals? In particular, what is it that kept humans in this frozen/collapsed state, seemingly indefinitely? My epiphany came when I realized that my clients (like the spooked lab guinea pigs) were being repeatedly frightened. However, these traumatized humans were spooked by the very bodily sensations that would have arisen as their immobilized state began to proceed towards a natural resolution. However, the initial sensations, as the thaw began, was a re-encounter with the high sympathetic charge that was present prior to the onset of immobility. *Their fearful reactivity to their own internal sensations of release from the freeze state (and into high sympathetic charge) was sending them back into immobility, keeping them trapped indefinitely, like the (repeatedly frightened) guinea pigs who were locked in terror*. This was the difference between immobilized animals in the wild (who are not frightened and re-frightened), and who quickly return to homeostasis when the threat is passed, and traumatized humans who *continue to re-frighten themselves, and thus can stay stuck in trauma for a lifetime.* In the words of the 1960’s band, Dan Hicks and his Hot Licks: “It’s only me I’m afraid of; I won’t scare myself.”

After this epiphany, my life’s work was reoriented to a relentless pursuit for an effective, gentle and precise method to guide clients into (and then out of) the sensations of immobility, so that they could befriend these restorative sensations; these “charges and discharges.” (see figure\_\_) In this way, they could gradually restore homeostatic equilibrium and inner balance. My passion for refining this process redirected my pursuits from an academic career to that of a clinician and “gentleman scientist.” It is here that Stephen and my roles diverged, but our interests, nonetheless converged.

There were several lessons that I took from the chance event with Nancy, and the animal observations that followed. One of my first unsettling realizations was how close I had come to retraumatizing Nancy. By exposing her to the most frightening part of a traumatic experience, I had inadvertently risked returning her right back to that original state of overwhelm, freeze and collapse (similar to the guinea pigs in Brazil who were spooked and re-spooked). I could have essentially abandoned her to even greater depths of helplessness and despair.[[6]](#footnote-4)

Another strong influence, at this time of my life, was the disastrous human toll taken on the returning veterans from the Vietnam War. As a healer and clinician, I was addressing, both the “invisible” injuries of this war, as well as the sequelae to the trauma “cure du jour” called exposure therapy, which was being liberally applied to the traumatized vets. In this “sledge hammer” approach to treatment, these vets were instructed to relive the worst, most horrific, parts of a traumatic episode, over and over, until the “swamp” was somehow drained. However, based on my observations of their continuing “shell shock,”[[7]](#footnote-5) I felt that this kind of “flooding” bore an unnecessary risk of re-traumatization. Therefore, as I continued to develop Somatic Experiencing (SE), I incorporated a fundamental principle which I called titration. This intentional slow-down of dynamic processing involves working with the types of physiological and emotional responses that I had observed with Nancy. However, with the use of titration, these responses are engaged in a much milder, softer form. *Gradually,* the person is guided to experience only small parts of a traumatic imprint, cushioned between orienting and settling phases. The subtle interoceptive awareness that is evoked allows them to minimize the very real and dangerous risk of flooding, and instead offers them the opportunity to successfully digest and integrate (i.e. “renegotiate”) these pieces, one small element at a time. [[8]](#endnote-3)

One of the biggest mysteries of my session with Nancy concerned the abruptness (and directions) of her heart rate changes. These reflected discontinuous (and paradoxical) shifts in autonomic activity. What perplexed me about her heart rate was that it went from a very high activation level (indicating sympathetic preparation for flight) to a *much lower* heart rate, seeming to portend death. At the time, it was believed that there was a reciprocal (a linear, inverse) relationship between the sympathetic and parasympathetic nervous systems. In meeting stress or threat, there was a charging of sympathetic activation, followed by a sympathetic “discharge”, along with parasympathetic rebound and deep relaxation (see figure\_\_). Let us utilize the following analogy to convey this flexible reciprocity. Imagine a finely tuned car where one gradually accelerates (foot gently on the gas), and then removes the foot from the accelerator and lightly transfers your foot to the brake, steadily increasing the pressure until the car is gently brought to rest.

However, in the case of Nancy, a very dissimilar chain of events had her HR swinging wildly between a very high sympathetic state and an even higher “parasympathetic” state. A parasympathetic dominance, which appeared to override the high sympathetic activation, caused her heart rate to plummet precipitously to the death-like state. If her parasympathetic system was asserting itself properly, then she should have felt relaxed. Instead, she went into total paralyzing terror. This just didn’t make sense. Clearly, her nervous system was not functioning in a balanced way, but why?

In the car analogy, it was as though the accelerator and the (vagal) brake were both full-on, until the brake overrode the accelerator, bringing the car to a grinding halt. It was apparent that the parasympathetic system had overridden the effect of the sympathetic, even while Nancy’s sympathetic system remained fully engaged! It was as though, in the car analogy, the (sympathetic) accelerator and the (vagal) brake were both full-on, simultaneously. The car was immobilized, until the brake was released, at which point the car would abruptly lurch forward. Likewise, Nancy’s response seemed to indicate a concurrent sympathetic/parasympathetic response, where a (dorsal) vagal brake had her immobilized, but with an underlying high sympathetic charge (i.e. she was frozen in terror). The image of the tiger seemed to help the sympathetic system break through the override (the freeze), and organized that charge into a coherent active escape response, thus completing a meaningful course of action; escape. This allowed her to come back into the balanced sympathetic (S) and parasympathetic PS linear reciprocal range where she could experience profound relaxation. (see figure\_\_) WWWWWWWWWW (hypo/hyper figure).

Though the image of the tiger rescued Nancy (and myself) from the disastrous likelihood of re-traumatization, it was at this point merely an intuition drawn, in part, from my zoological and physiological studies. The puzzle continued to plague me. I still needed a clear map of the internal autonomic states of my clients to know precisely what kind of intervention would be appropriate; when, where and how. This understanding was particularly important, as I had begun to teach my nascent method to a small group of students in Berkeley in 1972.

The missing pieces finally came together in 1995. Stephen Porges addressed this autonomic paradox when he published his landmark work positing the existence of a second (unique) parasympathetic system controlled by the 10th cranial nerve from the dorsal motor nucleus of the mid-brainstem. This primitive (unmyelinated) vagus. system[[9]](#endnote-4) appeared to be able to operate in parallel (and somewhat independently) of the sympathetic one. The pieces of this confounding enigma were finally coming together. However, let me return to the chronology of our historical perspective; once again revisiting the 1970’s where I was confronting the conundrum in my doctoral research.[[10]](#endnote-5)

It was during the middle part of that decade that I had noticed an interesting relationship between breath and variations in heart rate. In healthy individuals, there was a smooth relationship between inhalation and an increase in heart rate; and then, on exhalation, there was a decrease in heart rate. This seemed to be associated with the reciprocal sympathetic/parasympathetic balance. However, as an individual’s stress and anxiety levels increased, there was little or no change in their HR in response inhalation/exhalation. The change in the heart rate was essentially flat. And then, with the chronically stressed and traumatized people that I was working with, there was often a paradoxical and opposite response. The heart rate actually decreased on inhalation and increased on exhalation. This observed reversal, I reasoned, was associated with individuals demonstrating concurrent sympathetic and parasympathetic activation (see reference to “spillover” in figure \_\_\_). This relationship between breath and heart rate was called respiratory sinus arrhythmia (or RSA). What was most intriguing was, that as my clients resolved their traumas, and inner autonomic balance was restored, their RSA also demonstrated parallel positive changes. However, as much as I tried, I couldn’t find a precise way to quantify the RSA so that I could track the degree of clinical improvement as manifest by the change from dysfunction to restoration of healthy autonomic balance. It was at that time I received a copy of an obscure article on ADHD by Stephen Porges.[[11]](#endnote-6) In this article, Porges described mathematical measures he called, “vagal tone.” This measure reflected the amplitude of RSA and “weighted coherence,” indicative of the “phase locking” between the spontaneous oscillations in respiration and heart rate. This indication of coherence was precisely the type of measure that I had been searching for.

I immediately sought out the young Dr. Porges, Then I (the once young Peter Levine), hurriedly described some of my clinical observations, and sent him my doctoral dissertation on accumulated stress (ref). One week (and several long distance-landline phone calls) later, Stephen and I met at UCLA, where he was beginning a sabbatical. We hit things off immediately and have remained colluding subversives over the following decades. However, allow me to indulge you with some selected details of this quixotic “meet-up” and connection.

For this part of our shared story, I must defer primarily to Stephen’s recollection of this amusing tale. When he offered to pick me up at the LA airport, I told him that I would wear a red carnation prominently displayed in the lapel of my white sports jacket so that he could easily recognize me. With that in mind, he was surprised to see this eccentric hippie accosted by a young damsel dispensing the Hare Krishna version of the Bhagavad Gita while loudly proclaiming: “God loves you, and I love you.” To this impassioned declaration, I apparently swept her up and planted a hearty kiss on her cheek, with the rejoinder, “I love you, too!” She reversed direction and fled in apparent distress. Steve watched this strange occurrence from a distance before tentatively approaching me. With a bit of uncertainty and curiosity, we made our introductions before heading off to the UCLA campus, thus beginning our forty years of brotherly collaboration.

The day of our first meeting was spent in a nearly hypomanic excitement. When I showed Stephen some of my clinical and theoretical data regarding these strange autonomic effects (particularly those of parasympathetic “spillover”), he echoed myprevious thoughts that, “it just wasn’t possible; it didn’t make any sense.” But this is what I had clearly observed. Perhaps, for both of us, a seed was planted. In any case, Stephen Porges first proposed his “Polyvagal Theory” ”[[12]](#endnote-7) about 20 years later. This unifying theory would forever change the landscape of clinical and theoretical work in trauma.[[13]](#endnote-8) [[14]](#endnote-9) It would also contribute to a number of medical, social and educational fields. Most importantly, for me, it provided the remaining piece of the puzzle. It is for this work that I am honored to present my perspective on his immense and unique contribution.

The PVT offers us a clear map of the basic physiological states that drive specific perceptions, particularly those regarding safety, opportunity, danger, and life-threat. It demonstrates how *Neuroception* is an emergent property of certain core (autonomic) neurobiological systems. Just as maps are useful in finding particular parts of a city, maps of the human organism are important in navigating the landscape of trauma and informing its healing. It is here that Porges’ groundbreaking work provides an eloquent, well-reasoned, and broadly supported “treasure map” of the psychophysiological systems that, implicitly, govern traumatic states. These same systems also mediate core feelings of safety, goodness and belonging. In this regard, the PVT[[15]](#endnote-10) illuminates the pathways for integration, recovery, and transformation. In addition, his model clarifies why certain common approaches to trauma therapy frequently fail.

Briefly, Porges’ theory states that *three basic neural energy subsystems* underpin the overall state of the autonomic nervous system (ANS) and their emergent, behaviors, emotions, and perceptions. {see figure\_\_\_} The most primitive of these three systems, *the dorsal-vagal system* stems from about 600 million years ago and finds its origin in early (pre-vertebral) fish species. The function of this primitive system is *immobilization*, metabolic conservation, and overall “shutdown.”Its target is the internal, visceral organs. The next stage, in evolutionary development, is the *sympathetic nervous system*. This global arousal system has evolved from the reptilian period of about 400 million years ago. *Its function is mobilization and enhanced action* *(as in fight or flight); its target in the body are the limbs.* Finally, the third, and phylogenetically most recent system (deriving from about 200 million years ago) exists *only* in mammals; and particularly in the later social mammals (from about 100 million). {see figure} This neural subsystem shows its greatest refinement in the primates, where it mediates *complex social and attachment behaviors*. It utilizes the ventral branch of the parasympathetic nervous system, the so-called mammalian, or “smart” vagus nerve. These nerve fibers are myelinated for better speed and precision. This ventral system is linked, neuroanatomically, to the cranial nerves that mediate acoustic tuning, vocalization and facial expression. Porges has aptly referred to this integrated function as the “*social engagement” system*. (See figure ). This mammalian system came online, as evidenced when Nancy initiated the soft mutual gaze at the end of her session.

**In the consulting Room**

About a decade after my encounter with Nancy, (in 1980), the definition of PTSD was entombed in the nomenclature of the DSM (the diagnostic manual for mental illness) as a psychiatric disorder. Here, the listed symptoms were largely about hyper-activation of the sympathetic branch of the ANS. These included hyperarousal, hypervigilance, exaggerated startle, flashbacks, sleep disorders, and intrusive thoughts. However, my clinical observations in the 1970’s and 1980’s made it absolutely clear that many of my clients also suffered from symptoms of “shutdown,” involving (as it is now known) the unmyelinated dorsal-vagal parasympathetic system. These individuals, rather, presented as being depressed, apathetic, lethargic, dissociated, and lacking vitality. They also suffered from various physical (functional) complaints similar to Nancy’s, including unexplained chronic pain, gastrointestinal disorders, cardiac arrhythmias and various urinary tract symptoms.

Around this time, a few of my Berkeley students asked me to observe how they worked with their trauma patients. One thing that stood out to me was that they were all directly facing their clients and looking, compassionately, towards them. This empathy, however, was to no avail as their clients looked away and downward, seeming to purposefully avoid any kind of benevolent eye contact; almost as if they feared that they were going to be being *shamed* by their therapist.

Dogma had it that trauma was created by “a betrayal of trust,” a rupture within the context of a relationship; and by someone who was supposed to care and protect them. Hence, it was assumed that empathy, and the building of a caring relationship with the therapist, was necessary and sufficient to repair the trauma. This caring and emotional holding was expressed through eye contact, reassuring vocal prosody, and the compassionate facial expressions of the therapist. However, in my observations of the dyadic body language between my students and their clients, this clearly wasn’t helping. Rather, the client seemed to become even more withdrawn and “stuck” when such eye contact and kindness was offered.

In a recent article, Ruth Lanius, one of the most original neuroscientists studying trauma, (along with her colleagues), conducted the following “simple” experiment.[[16]](#endnote-11) They showed the picture of a kind friendly face to a non-traumatized control group of subjects while they were positioned in a high-powered brain scanner. Not surprisingly, the prefrontal cortex increased its activity, while the activity in the amygdala was decreased. This was an expected example of a compassionate face having a calming effect on an individual. In stark contrast, however, when Lanius showed *the same* photograph to a group of chronically traumatized individuals, that area of the pre-frontal cortex actually decreased its activity, while an area in the brain stem, the periaqueductal gray, significantly increased in activity. This is the very area of the brain responsible for immobility, shutdown, and terror. Indeed, the kind empathic face, with its invitation to eye contact, seemed only to make the traumatized subjects feel worse, probably much worse!

This experiment, though conducted decades later, clarified what I had previously observed with many of my clients, and then taught to my students. It explained why the clients would look down and away from my face, or; if they did look at me, it was as though they were looking *through* me, as though they were looking behind or past me. Because of this problematic interface, I had learned to position my chair at ninety degrees to the client’s. I showed my students how this gave the client the *choice* to easily look away, to look interoceptively, inside of themselves or, if *they* wished, to initiate eye contact.

It was here that my intuition was confirmed by the PVT and the aforementioned work of Ruth Lanius. The avoidance of eye contact, I reasoned, was because when people are in a state of vagal shutdown (hypoarousal), they will perceive nearly everything in their external environment as life-threat and they will continue to perceive this overwhelming threat until their internal state changes. The avoidance of eye contact by prey, in the face of a lethal predator, is seen throughout the animal kingdom. Direct eye contact by a prey is very likely to incite lethal attack. Indeed, us Colorado hikers are instructed by the local fish and game wardens that, if we should encounter a bear, to look away and down; and then to slowly back away.

In addition, shutdown (hypoaroused) individuals frequently experience pervasive shame. This corrosive and debilitating emotion is also locked in the shutdown ANS and, in a particular collapsed somatic posture. Indeed, until this pattern is altered (deconstructed and renegotiated), it is difficult if not impossible to exit debilitating shame states. Hence, for these reasons, the therapist should not, initially, try to engage eye contact or make too many compassionate, contact-full, reflective statements. However, after clients have shifted from states of hypoarousal and shutdown, into states of *hyper*arousal and hypervigilance, it is possible to engage them with a limited degree of eye contact and prosody. This can be useful to help guide them through these difficult energetic sensations, and then to support them as they settle, from sympathetic hyperarousal, into relaxation and restored equilibrium. After this cycle of activation and discharge, clients will often, and spontaneously, seek out and sustain soft eye contact; and/or will orient around the room --- as though they are seeing it for the first time.

In my efforts to “explain” how to navigate these inner states to my students, the PVT framework provided a clear map of the client’s (autonomic) nervous system mode, indicating just where an individual was operating. This way the therapist could identify and time their interventions appropriately and guide the client appropriately and effectively. For example, hyperarousal is manifested by more active indicators of ANS state, such as increased heart rate, rapid (and high) chest breathing (which sometimes borders on hyperventilation), furtive glances, fidgeting, dilated pupils, “wide eyes,”, edginess, often described as “jumping out of one’s skin,” as well as other intense body sensations. On the other hand, some of the basic signs of *hypo*arousal (dorsal-vagal) are appearing “spaced-out, dissociated, lacking in vitality, exhibiting” facial pallor, and manifesting a slowed heart rate (though this can be unstable – i.e. switching abruptly between fast and slow). In addition, the client’s chronic symptoms often give an indication of dorso-vagal shutdown. These include: chronic fatigue, gastro-intestinal and urinary problems, cardiac arrhythmias, episodes of dizziness and some types of asthma, as well as certain autoimmune disorders.

During SE trauma therapy, when the client is *hyper*aroused, the therapist can support down-regulation of this sympathetic charge using the principle of *pendulation*[[17]](#footnote-6)*[[18]](#endnote-12)*. This dynamic principle embodies the ever familiar, but often ignored, axiom of “what goes up, will come down.” (see figure). What hyperaroused clients usually do, however, is brace against the contraction, associated with increased arousal. This prevents an expansion which would reduce the hyperarousal. Another strategy to facilitate pendulation is to bring the client’s attention to their extremities (for example their hands and/or feet). This awareness will often provide some sense of containment and internal safety, thus enhancing ventral vagal activity which, according to PVT, reduces sympathetic hyperactivation according to the PVT. Prosody, along with some eye contact, and the gentle reassurance from the therapist (a “joining”) helps the client to open to these intense hyperarousal sensations, and settle through pendulation. For such joining to be coherent and authentic, it is essential for the therapist to also feel their own sensations and regulate their own sensations and emotions. This “somatic resonance” is a basic principle of Body Psychotherapies and facilitates the benefits of pendulation. In terms of the PVT, the therapist is able to use her calm centered social engagement capacity to track and guide the client from the hyperaroused (sympathetic state), towards, internal regulation, and the *Neuroception of safety.*

To summarize, pendulation infers that every contraction (fearful sensation) will be followed by an expansion (a sense of pleasure and release). However, this can also be frightening or unsettling, but in a different way. This is because this release is, initially, so unfamiliar to the person. This restoration of the ventral vagal parasympathetic relaxation response reestablishes autonomic balance. During this settling phase, the therapist (and client) may notice easier, spontaneous breathing, an even coloring of the face and hands, and a stable heart rate of approximately 74 BPM with some discernable heart rate variability. The therapist will also become aware of the client’s desire to seek soft eye contact, and will respond appropriately to meet that need. Another clear indication of ventral vagal restoration is that the client begins looking around and “taking in” their (now) safe environment. With these signs and behaviors, we can be confident that the social engagement system has come online.

Now that we have some basic guidelines of how to work with hyperarousal, we can examine some strategies to employ with individuals when they are in the shutdown state. The ability of these clients to become aware of internal sensations is severely limited. Trying to guide a hypo-aroused client to settle via tracking their internal sensations is usually counterproductive, and could potentially exacerbate the shutdown. Instead, the therapist must first guide the client out of shutdown, and into a small and manageable, hyperaroused state. In the car analogy, it is like taking the pressure of the brake just enough to smoothly move forward; and doing this a few times until there is a stable settling. I call this “developing a contained (safe) sympathetic charge.” The goal here is to produce, and draw awareness to, the physical sensations of a small, self-generated, sense of excitement and power. In working with shutdown, I use a variety of special techniques and tools to develop this safe charge, including movements and exercises that are adapted from Qigong, and other movement and martial arts. One of my favorite simple tools for shifting out of the (dorsal) vagal shutdown, and which can be utilized in the seated position (more common setting in psychotherapy), is the Voooo sound/breath.

Along with multitudes of other people, I have experienced various chanting and ancient “sounding” practices that facilitate healing and help open the “doors of perception.” Singing and chanting are used in religious and spiritual ceremonies among every culture for “lightening the load” of earthly existence. When you allow yourself to chant or sing in deep, resonant lower belly tones, you pleasurably stimulate the many serpentine branches of the vagus nerve, including the gut, heart, lungs, chest, mouth and throat.

In his research, Porges confirmed early neuro-anatomical findings that over 80% of the vagus nerve was afferent; that is to say, conveying sensory information from the various organs to the brain. It is essential to use these afferent feedback circuits to interrupt the shutdown signals of extreme distress, and thus help move the client out of a self-reinforcing immobility. Certain Tibetan chants have been used successfully for thousands of years. In my practice, I use a sound, similar to some of these chants. One of these sounds, in particular helps open, expand and vibrates the viscera and diaphragm in a way that provides new sensory signals to a shut-down or overstimulated nervous system. The practice is quite simple: take and easy full breath and then make an extended “Voooo…” (soft *o,* like *ou* in *you*) sound on the exhalation, focusing on the vibrations stimulated in the belly as you complete a full expiration of breath.

When I introduce the “Vooo” sound to my clients, I may additionally ask them to imagine a foghorn in a foggy bay as it resounds through the murk to alert ship captains that they are nearing the land, and thence guiding them (like the boats) *safely home*. This image works on different levels. First of all, the image of the fog represents the fog of numbness, dissociation and shutdown. The foghorn represents the beacon that guides the lost boat, or soul, back to safe harbor, to home --– in breath and belly. This image also inspires the client to take on the heroic role of protecting sailors and passengers from imminent danger, as well as giving him or her permission to be silly and thereby *play*. Most important are the image’s physiological effects. The sound vibrations of “Vooo” enlivens sensations from the viscera and diaphragm (as well as the throat), while the full, easy, expiration of the breath produces the optimal balance of oxygen and carbon dioxide.[[19]](#endnote-13)

Let me guide you through this brief Vooo… exercise:

Begin the exercise by finding a comfortable place to sit. Then slowly inhale, pause momentarily at the end of your full inhalation, and then, on the out breath, gently utter “Vooo…,” sustaining the sound throughout the entire exhalation. Vibrate the sound as though it were coming from your belly. At the end of the breath, pause briefly and *allow* the next breath to slowly fill your belly and then chest. When the in-breath feels complete, pause momentarily, and again make the “Vooo” sound on the exhalation until expiration feels complete. It is important to let sound and breath *expire fully,* and then to pause and *wait* for the next breath to enter *on its own* when *it* is ready. Repeat this exercise first once, allowing the sensations and feelings to settle, and then if you wish, do it a few more times before resting. Next, focus your attention on your body, primarily on your extremities and your abdomen.

This “sounding,” with its emphasis on both waiting and allowing, has multiple functions. First of all, directing the sound into the belly evokes a particular type of sensation while also keeping the observing ego “online.” People often report various qualities of vibration and tingling, as well as changes in temperature–generally from cold (or hot) to cool and warm. These sensations are generally pleasant, although this may initially seem a bit unpleasant (i.e. unfamiliar); for example *mild waves* of nausea and tingling are common. Most importantly, these new sensations *contradict* the twisted, agonizing, highly nauseating, deadening, numbing sensations associated with the fear potentiated immobility state. Oftentimes this exercises is followed by sounds of gurgling and burps. I validate and support these involuntary responses (which might otherwise be judged “uncouth”), as they signal that the client’s rhythm of digestion and assimilation is coming back online. This also allows access to a wide range of pleasurable sensations and gut instincts (the intuitive sense). This indicates that their body has successfully returned to a low stress state, with a more balanced equilibrium between the sympathetic and parasympathetic branches of the ANS.

Because the vagus nerve is primarily afferent; the predominant role of this enormous nerve is to relay information from the viscera to the brain. It seems likely that the change in the sensory messages (from organs to brain) along the (ascending) vagus nerve, powerfully influences the messages being sent, in turn, from brain back to the organs. As the organs report safety and pleasure, the brain sends commands to initiate normal regulatory, digestive, sensory, and social functions. Thus, balance is restored. Porges concurs on this key regulatory system: “The afferent feedback from the viscera (*sensed through interoception*) provides a major mediator of the accessibility of prosocial circuits associated with social engagement behaviors.”[[20]](#endnote-14)

**Beyond Psychosomatic Medicine;**

How the PVT informs Internal Medicine

As mentioned previously, many of the clients that I was seeing for prolonged stress and trauma also exhibited symptoms of chronic pain, chronic fatigue, digestive disorders and a variety of other respiratory and cardio-circulatory problems. These clients were often dismissed by the medical system, as their conditions had no clearly defined organic cause. Their seemingly endless array of unpredictable, labile and mutating symptoms confounded and frustrated their physicians who oftentimes branded them as “psychosomatic,” or attention seeking malingerers. Most surprising, however (as in the case of Nancy), was that these assorted “physical” symptoms and conditions improved as we continued to work with, what was generally seen as, their “psychological*”* trauma. This is where the mind-body dualism has deeply misled modern medicine.

Thanks to the contributions of Porges and the PVT, we now have a clear model that can provide a better system of assessment, diagnosis and treatment for these fluctuating presentations that have autonomic, somatic and emotional components. Although it is essential to investigate their possible organic origin, it is equally important to recognize that these perplexing symptoms (sometimes called Medically Unexplained Symptoms --- MUS) may have a common root as a stress-related disorder of regulation; i.e. they may constitute a *single underlying syndrome,* which can be effectively treated when properly identified.

I have proposed to call this (seemingly) confounding collection of symptoms: *Autonomic Dysregulation Syndrome (*ADS*).* The crucial identifier, *dysregulation*, suggests that the opportunity for treatment lies in *interventions that* *reestablish organismic self-regulation through a reciprocal balance between the sympathetic and parasympathetic systems*. Notwithstanding the primary importance of the ANS in this disorder, it is crucial to note that, in addition to affecting multiple organ systems (through the ANS), this core disturbance also involves Hypothalamic--Pituitary—Adrenal (HPA) axis dysregulation[[21]](#endnote-15) as well as an imbalanced muscular (hyper or hypo) tonus.[[22]](#endnote-16) [[23]](#endnote-17)

It has been shown that up to *70-90% of all primary care visits* are driven by so called, “psychological factors.[[24]](#endnote-18) While this fluctuating presentation can be confounding to clinicians, these varying symptoms are acutely problematic, wildly expensive, and often deeply demoralizing to the patient. The symptoms of this frequently misdiagnosed autonomic dis-order can be readily understood from the PVT perspective.What is interesting, from a medical standpoint, is that these global reactions will be engaged, whether from encounters with inescapable threat coming from an external threat, from ongoing stress, or from an internal threat such as serious illness or injury. [[25]](#endnote-19) [[26]](#endnote-20)

During increased sympathetic arousal, our muscles tighten, and heart rate, blood pressure, and respiration increase. In the dorsal-vagal state, there is the marked *energy conservation* and lack of muscle tone (“shutdown”) associated with illness or injury. Such was noted by the pioneering stress researcher, Hans Selye, when he was a young medical student. Selye observed that while his professors would rattle off the many assorted symptoms of their patients’ different conditions, there was one striking feature they had in common: “*all of them simply looked sick*.”[[27]](#endnote-21) [[28]](#endnote-22) These non-specific signs of “shut down” include flat facial expression, pallor, bodies that appeared “collapsed,” and shuffling movements that were labored, and without energy.

To summarize, the survival based instinctual reactions (either mobilization or immobilization) are designed to be temporary, and to “turn-off” (“reset”) after the threat has passed or the illness or injury has been resolved. However, when these reactions do not resolve by restoring core autonomic homeostasis, in a timely manner, individuals are left with ongoing stress accumulating in the ANS.[[29]](#endnote-23) [[30]](#endnote-24) This “allostatic load” gives rise to the varied signs and symptoms of the Autonomic Dysregulation Syndromes and may help explain such “mysteries” as to why individuals sometimes develop Chronic Fatigue Syndrome (CFS) and Fibromyalgia in the aftermath of such seemingly diverse triggers as illness, trauma[[31]](#endnote-25) or prolonged stress.[[32]](#endnote-26) [[33]](#endnote-27)

Recall, that while the symptoms of sympathetic hyper-arousal include tension, pain[[34]](#endnote-28), fibromyalgia, vasoconstriction (cold hands-- i.e. Renaud’s syndrome), excessive sweating and racing heart (tachycardia), those of vagal hypo-arousal includes “shutdown,” numbness, chronic fatigue (CFS), irritable bowel syndrome (IBS), gastric reflux, low heart rate or blood pressure, syncope (POTS), light-headedness, migraines and certain cardiac arrhythmias.[[35]](#endnote-29) [[36]](#endnote-30)

Some syndromes appear to be manifestations of a sequential or concurrent interplay between sympathetic and parasympathetic (vagally mediated) symptoms. For example, migraines appear to have a sequential phase of vasoconstriction (increase sympathetic tone) followed by abrupt vasodilation (withdrawal of sympathetic tone). Some cardiac arrhythmias involve both tachycardia and bradycardia. Similarly, IBS may involve sympathetic contraction of the internal anal sphincter, concurrent with abnormally high levels of (vagally mediated) peristalsis of the (longitudinal) intestinal smooth muscles. These manifestations of ADS frequently lead to profound and debilitating distress.[[37]](#endnote-31) [[38]](#endnote-32)

When patients present with this myriad of mutating symptoms, they are frequently referred to multiple specialists who may order a wide array of expensive and invasive diagnostic tests. Alternatively, the clinician may suggest to the patient that their condition has psychological or psychosomatic origins. While it is true that these conditions do have emotional and developmental components, unfortunately, this is likely to seem dismissive to the patient, rendering him or her defensive and “resistant.” This adversarial positioning will indeed add tension to the already frustrated patient/doctor relationship. If, however, the underlying neurobehavioral stress response syndromes can be accurately identified through the PVT, and then treated appropriately, *so that the dynamic homeostatic function of “reset” can be accessed*, far more efficacious outcomes will be achieved.

**Epilogue**

Our dialogue, between the academic scientist and the trauma clinician, concludes for now. I hope that this collaboration has been fruitful with its playful tension, and will continue to be so, till one or both of us gives up the ghost. What began with hypomania in the 1970’s, between the Berkeley/Big Sur free-spirit and the academic rising-star has come together, again, here in this midlife tome. With the winds of change, Stephen has now contributed deeply (as recognized in this---and hundreds of other publications) to all sorts of innovative therapies and alternative healing approaches, world-wide; and ironically my creative endeavors have included contributions to academic journals. In one more turn of the continuous spiral of life, our circle of friendship and collaboration completes itself, for now at least!

In conclusion, I would like to believe that we have inspired each other in our parallel explorations and discoveries; and that these peregrinations will somehow contribute to the alleviation of suffering. But, without question, I submit that the dialogue between the PVT and clinical psychotherapeutic approaches to trauma, and to internal medicine, offers a rare opportunity to bridge the scientific with the clinical worlds. Most importantly, it leads to more precise and consistent clinical work. Further, this exchange represents a potential to advance both realms of inquiry; the academic and the healing/clinical ones. If this chapter contributes to that dialogue and synthesis, then my load will have been lightened and my goal will have been met.

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2. As seen by observing her carotid-artery pulse [↑](#footnote-ref-2)
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