

## ***The human condition: we are all on a quest for safety***

### **Notes from Polyvagal Theory Training**

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According to Dr Stephen Porges, “we have a culture that keeps us mobilised. If we weren’t mobilised, we’d be more generous, creative and benevolent.” In his view, religion dictates that “our relationship to Deity is more important than connectedness to other people. We have a need to be supportive of humanity. This is our spiritual calling.”

Dr Porges’s comments, which were made during a training on polyvagal theory in Cork in September 2019, have particular resonance at this precise moment in time. We are living through the Corona Virus pandemic with many countries across the globe operating in lockdown and economic implosion looming. We are collectively in survival mode. Individuals are struggling to stay safe, well and socially connected by using technology such as Zoom, Facetime and Whatsapp, cooperating for the greater good by maintaining a physical distance from others, so that we can flatten the curve, not overwhelm hospitals and reduce the death toll.

Polyvagal theory is a science of connection, trust and safety.<sup>1</sup> Yet we live in a world replete with trauma. We are a traumatised species and would benefit from acknowledging this reality. There is little public, political or legal discussion about what our bodies need to feel safe. The social, cultural and legal definitions and expectations of safety and risk often have little to do with the unspoken and largely misunderstood needs of our nervous system.

The features of the environment need to be supportive of the human body’s need for safety. American society is rife with guns, but “guns don’t make us feel safe.” In the US the default response is simply deny the prevalence of trauma. In Europe, however, trauma - caused by the fall-out of various wars - simmers close to the surface. In Pablo Picasso’s *Guernica* “no mammal and no human are making eye-contact”, symbolising the demise of safety and the breakdown of social behaviour.



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<sup>1</sup> S. Porges, “The polyvagal theory: new insights into adaptive reactions of the autonomic nervous system” (2009) 76 *Cleve Clin J Med* S86–S90; S. Porges, *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, and Self-Regulation* (New York: Norton, 2011); S. Porges, *The Polyvagal Theory: The New Science of Safety and Trauma*, available at <https://www.youtube.com/watch?v=br8-qebjlg>; J. Mulcahy, Law and Justice interview with Dr Stephen Porges: The Science of Safety, available at <https://soundcloud.com/jane-mulcahy/law-and-justice-interview-with-dr-stephen-porges-the-science-of-safety>

### *Social behaviour: part of our biological imperative to survive*

We live in a world where social behaviour is viewed as frivolous. In fact, it is a neural exercise supportive of mental and physical health. Our behaviour as human beings is part of our biological imperative to survive. Behaviour makes sense only in terms of evolution.

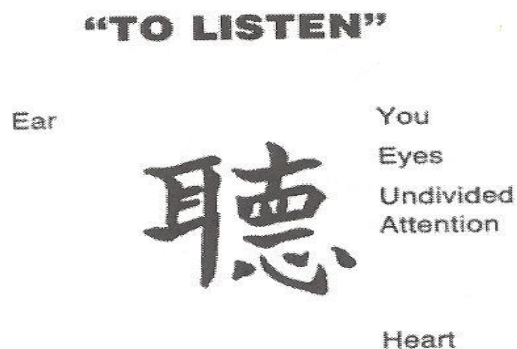
Mammals need “conspecifics” – others of the same species. Humans need other humans. Our evolutionary success as a species stems from our biological imperative to cooperate and connect with others. Connectedness is a biological imperative. The regulators of physiology are embedded in relationships. Social behaviours are neural exercises. Social behaviours are not, however, *learned* but dependent on our neural state. As will become clear below, our neural state is the “intervening variable” for individual health and relational ability, as well as wider social functioning.

### *A brief introduction to the vagus nerve*

In terms of neuroanatomy, the vagus nerve is the 10<sup>th</sup> cranial nerve and the only such nerve that leaves the neck and head, reaching “into the thoracic and abdominal cavities, providing parasympathetic supply to visceral organs”<sup>2</sup> including the heart and intestines.

According to polyvagal theory, there are three evolutionary stages. Stage 1 involves the primitive, unmyelinated vagus nerve (there is no fatty coating on around the nerve) which is linked to immobilisation (fainting, shutdown, dissociation). Stage 2 involves the sympathetic nervous system (SNS) governing fight/flight behaviour. In Stage 3 the myelinated mammalian vagus - the ventral vagus complex – develops, supporting homeostasis and the “social engagement system”.

The nervous system is not preserved in fossils. What we know is that reptiles have a different autonomic nervous system to mammals. The unmyelinated dorsal vagal complex is the reptilian vagus. The myelinated mammalian branch vagus nerve is linked to the face, head and vocalisation. “The face-heart connection” is at the core of the social engagement system in humans. Interestingly, the Chinese symbol of “to listen” includes the ear, eyes and the heart, requiring the listener to be 100% present, to hear and to engage the heart. Listening is a polyvagal-informed activity that regulates neural state.



<sup>2</sup> See <https://www.kenhub.com/en/library/anatomy/the-12-cranial-nerves>

Pre-term babies are born with a reptilian autonomic nervous system (ANS), while full-term babies have a mammalian nervous system to coordinate sucking, swallowing, breathing and vocalizations. This system primarily enables the full-term baby to entice the care-giver into loving connection.

One of the reptilian features is immobilisation or shut down, which commences with defecation. The human defence system includes defecation and bradycardia (slow, barely perceptible heart-rate). In terms of phylogenetic history, the jawless fish shut down when there was too little oxygen or food. “Death-feigning” is a reflex. It is involuntary response in which the body attempts to preserve life. In the hierarchy of our vagus system response, it is not a case of consciously deciding “I want to shut down”.

People with trauma histories do not have a mental image of someone coming to save them and their bodies are vulnerable as a result. The sub-diaphragmatic vagus is linked to the gastrointestinal tract and is activated in the case of life threat. The supra-diaphragmatic, myelinated vagus, i.e. the vagus nerve above the diaphragm, regulates the heart, face and head (“you take my breath away”). Posture, breathing and the blood pressure receptor are involved here.

Cortisol researchers did not understand why people shut down. Cortisol is a neuropeptide, a chemical that allows us to move our body more efficiently, without going into muscle fatigue. Cortisol maximises efficiency of the fight/flight mobilisation responses of the sympathetic nervous system. For mobilisation, you have to “take the vagal brake off”.

According to polyvagal theory three neural circuits form a phylogenetically ordered response hierarchy that regulate behavioural and physiological adaptation to safe, dangerous and life threatening environments. Porges describes our neural state as resembling a traffic light structure: green means regulated, yellow means danger fight/flight, red means shutdown due to life threat. In a dangerous situation, we can fight or flee. However, in the case of a life threat, we cannot escape. At first we use our new circuits – our “vengeful vagal circuits” when challenged, until we shut down. Forced immobilisation, i.e. restraint, is experienced by the nervous system as a life-threatening situation.

### *Neuroception and cues of safety*

It is the gut that tells people whether they are safe or unsafe. Neuroception is the neural process of evaluating risk without awareness. It is the unconscious way in which our nervous system detects threat in the environment.

Our bodies need to feel safe in the presence of other bodies. There is a continuum from accessibility to vulnerability. Along this continuum, there is a state of “being present” where we can mindfully experience how our behaviour impacts on others. However, we often feel vulnerable, which negatively impacts our accessibility. This physiological state does not allow for spontaneous social engagement.

Feeling safe is transformative. Our nervous system is on a quest for safety. “Safety turns off the defences of our autonomic nervous system.” The removal of existential threat is not sufficient to feeling safe. Removal of threat is good, but not sufficient. Safety means that we are not in a chronic state of evaluation, nor are we overwhelmed with feelings of shame, blame and not meeting expectation.

All humans need cues of safety. This need commences at birth and persists throughout our lives. The intonation of a mother's voice is a new-born baby's first cue of safety.

Polyvagal theory is hierarchical. If phase 1 of co-regulation is not available, then phase II is not available. At birth the suck, swallow, vocalise, breath and ingestion reflexes are the basics of our social engagement system. Co-regulation is the ability to mutually - synchronously and reciprocally - regulate the physiological and behavioural state of another. When a mother's voice is prosodic and melodic, with variations in tone and rhythm, her baby's heart rate slows down after an episode of discomfort or distress. When her voice is lacking in prosody, the baby's heart rate stays up. "Intonation is powerful".

A "good enough" mother<sup>3</sup> - who is sufficiently attuned to her infant's needs - co-regulates with them. If a mother has a "fussy baby" there are a cascade of effects, not just on the baby but for the whole family, due to heightened stress levels. Mothers co-regulate with their infants to give memories of safety, so that a child can later self-regulate (self-soothe). Violation of the face-to-face interaction hurts our bodies. It is a rupture in the expectation of the social engagement system. When a mother is unavailable, children get frustrated and angry.

In infancy, if social behaviour is not co-regulating, it can give rise to ingesting behaviours. Eating disorders are common where there is a history of lack of support and trust. Acute disconnectedness on the part of a mother, for example due to post-natal depression, disrupts opportunities to co-regulate. Ed Tronick's "Still Face" experiment (in which mothers flattened their facial expression for a short period)<sup>4</sup> demonstrates the intense distress caused to a baby by a mother's failure to respond to their social smiles and coos.

The lower part of our face is part of our aggressive system. It is the spontaneous upper part of the face that is key to our social engagement system. According to Porges, the orbicularis oculi facial muscle and the crinkles we develop around our eyes - otherwise known as "crow's feet" - give vitally important social cues. Where a primary carer is, for example, constantly preoccupied with their phone, resulting in inadequate eye contact and social interaction with their baby, the latter may self-regulate through sucking because co-regulating is not possible.

Our biological heritage has little to do with language. Porges stated that "language is a gift we have when we are not in a state of defence". Simply using words in an attempt to reason with a distressed person rarely works. Intonation, or what Porges terms "prosody" is the true signal, not the words. If those top-down words worked, we would not have widespread depression.

In describing the frequency band of communication, Porges referred to Darwin's *The Expression of the Emotions of Man and Animals*.<sup>5</sup> Detached middle ear bones are a defining feature of mammals. When monkeys see a snake they shriek. This is because snakes cannot hear these higher frequencies. The facial nerve is linked to voice, hearing and the heart. The eustachian tube in the ears is linked to the brainstem. Humans tune into higher pitch prosodic vocalisations. In order to hear and respond to speech for a thriving social engagement system, we pull out the human voice at the expense of threat sounds. The ability to process human speech, therefore, requires safety.

Traumatised people and those with autism are, according to Porges, very good at hearing low frequency predatory sounds but they cannot easily pull out the human voice. Their social

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<sup>3</sup> D. Winnicott, *Playing and Reality* (London: Tavistock/Routledge, 1971) 7.

<sup>4</sup> See Still Face Experiment: Dr Edward Tronick, available at <https://www.youtube.com/watch?v=apzXGEbZht0>

<sup>5</sup> See [https://pure.mpg.de/rest/items/item\\_2309885/component/file\\_2309884/content](https://pure.mpg.de/rest/items/item_2309885/component/file_2309884/content)

engagement system is dormant. As the tympanic membrane of the eardrum gets stiff and tighter, it lets in higher frequency sounds and the louder, low frequency background sounds bounce off and do enter the ear for processing. Hyperacusis, or sound sensitivity leads to downregulation of the social engagement system. People with a trauma history are locked into anticipation of predators, hypersensitive to the low frequency, background sounds of predation.

By contrast, people with autism *cannot* extract voice from background sound and they are treated “as if they do not want to”. In an effort to enliven the social engagement system of people with autism, Porges developed the Safe and Sound Protocol (SSP), which functions as if it were an acoustic vagal nerve stimulation using music. SSP was designed to mimic the soothing quality of a mother singing to her baby.<sup>6</sup> Music can be viewed as “exaggerated vocal prosody” which evolved to support our biology of connectedness and our capacity to co-regulate.

SSP has proven to be a highly effective neural exercise that enhances sociality by removing the vibrations/predator cues and using prosodic cues based on a loving mother’s lullaby. SSP is a listening therapy that can lead to demonstrable changes in ears, face and voice of people with autism. This “portal to social engagement” works by stealth, in that the person merely listens to music and sensory processing improves without their conscious awareness.

According to Porges, improvements in social behaviour are not due to “neural plasticity”, but rather due to state changes. By giving the person with autism auditory cues of safety, they may become “a huggable person”. SSP has the capacity to improve quality of life, helping an entire family become more co-regulated.

Some children can hear low frequency sounds, but not the high frequency sounds of language. Children with speech and language delays are often living in dangerous environments, primed to detect predator sounds, rather than high frequency prosodic human voices.

Porges mentioned that humans tend to become uncomfortable when other people’s voices go too low and deep, describing a situation where a woman with an abuse history became activated by his low pitch. This was because the vocal cues signified danger to her nervous system due to past negative experiences.

#### *Understanding trauma as a physical response, not an event*

Porges states that trauma is not an event, but rather a *response*. If we view trauma as an event, we are likely to blame people for the body’s involuntary response. We do not know what our nervous system will do if it encounters a life-threatening situation. Sometimes our body has its own history of which we have no conscious memory. This may be due to immobilisation/dissociation, or an amnesiac episode from early, preverbal childhood.

Dissociation is where the body shuts down without shutting down. In states of dissociation the body says “enough, I’m out of here.” The body can make adjustments in life-threatening situations so that the person is not harmed, i.e. they are mentally disconnected. The body has a script as to how it responds to life threat, such as when a gun is pointed at the head, or indeed where it is subjected to an unwanted, but necessary medical procedure.

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<sup>6</sup> <https://integratedlistening.com/ssp-safe-sound-protocol/>

In a Guardian interview in June 2019, Porges states that mainstream society has no real understanding of the fact that there is immobilisation with fear.<sup>7</sup> As a result, we do not treat rape survivors the way they need to be treated. Traumatized people are often victimized further by telling their stories. Many of those who have been immobilized in fear are re-victimized by society and by therapists – “why didn’t you fight?”

As humans are so motivated to want to fix things that we do not actually hear people. Listening and hearing is an opportunity for co-regulation. “To witness another” is a popular phrase in the trauma field. The challenge is to be respectful of people’s stories without mimicking their feelings. The difference between empathy and compassion is that with empathy a person’s trauma sticks, whereas with compassion the listener witnesses it without it sticking.

### *Trauma and health problems*

Trauma creates a platform for disease to occur. Trauma impacts the brain, invading the body and muscle tone: “you become a different person”. Polyvagal syndrome may involve oscillation from aggression to being a victim. Polyvagal syndrome is a way of diagnosing various symptoms, including lack of prosody, poor face-to-face gaze, flat affect (facial expressivity), sound hypersensitivity, inappropriate posture and defensive strategies of rage and anger.

There is no distinction between mental and physical health because the ANS involves neural platforms that lead to health or disease. There is no health without mental health, and vice versa. Cues of danger recruit neural systems that disrupt health. Many clients of psychotherapists and repeat visitors to GP clinics display indicators of “compromised vagal regulation”, such as state regulation issues (i.e. emotional and behaviour dysregulation), digestion difficulties and middle ear problems.

People who have mental health and gut problems have a nervous system in a chronic state of defence. Those who enter a shutdown physiological state due to trauma frequently experience illness in organs below the diaphragm. The SNS is associated with hypertension, gut problems, anxiety, drug abuse, hyperarousal, hypervigilance, social withdrawal, self-medication, while the unmyelinated vagus is linked with vasovagal syncope, hypotension, fainting, fibromyalgia, migraine, immobilisation, behavioural state, dissociative state, risk of suicide.

Porges states that “when the blinders are taken off and we see that abuse is a relatively common phenomenon.” Moreover, “medically unexplained symptoms” such as Irritable Bowel Syndrome (IBS) and fibromyalgia are often linked to histories of trauma and chronic abuse. Medicine, and “the data” of science, is grounded in a cause and effect model. It is, however, rare that doctors conduct a routine inquiry about traumatic experiences.

According to Porges, the education of the medical profession needs to change so that all medics have a neuro-biological understanding of co-morbidities. People with particular medical problems go to experts with a specialism in the end organ. These experts are organ specialists, not neural specialists. The medical community, and particularly organ specialists need to learn “how to be more welcoming to people needing surgery.”

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<sup>7</sup> <https://www.theguardian.com/society/2019/jun/02/stephen-porges-interview-survivors-are-blamed-polyvagal-theory-fight-flight-psychiatry-ace>

*The intervening variable is physiological/neural/autonomic state*

The individual's nervous system must be engaged in their healing process. "We can re-tune what we have, not regain what we have lost." Our physiological state - the intervening variable - influences our responses to cues of safety in nature. Porges argues that we must find "portals of regulation". If we can become safe in the arms of another, we are well-positioned to enjoy "health, growth and restoration".

To optimise health and reciprocal relationships, our bodies have to be welcoming. We need an internalised feeling of safety to be capable of lying comfortably in arms of another mammal. "Immobilisation without fear", otherwise known as intimacy, is a challenge for mammals because it requires safety. Ultimately, intimacy is about having a "felt sense" of safety in the arms of another.<sup>8</sup> In terms of healing from life threat and trauma, the question is "how can we give the cues to the nervous system that 'you're safe now'?" Trans-species relationships are common in the lives people with trauma histories. Some people can only feel safe with a dog, or a horse. Dogs are great companions. Therapy dogs are increasingly becoming an important part of rehabilitation.

Regarding "the flat face and marginalisation", blank, expressionless faces reflect an autonomic state of defence, where there is no reassuring hand to hold. Foster children often do not have any positive memories of relationships to draw on when they feel unsafe or distressed. According to Porges, the hearing ability of individuals with flat faces is exquisitely tuned into low tone predator sounds in order to detect threat. Background sounds are predator sounds, such as earthquakes. We love to see "wide open eye-lids", because spontaneity in the upper part of the face, especially the eyes, indicates that the person feels safe, is receptive to human connection and is capable of cooperating with others.

For those who have had a violation of trust, social engagement is intrusive. With chronic abuse, the nervous system becomes retuned and individuals do not feel safe even when they objectively are. People with a trauma history, typically possess a "faulty neuroception". Dr Porges quoted a person with autism as describing their nervous system as being perpetually "ready to fight off a lion, when there was no lion."

Trauma optimises visceral responses of defence. How can we optimise the system of the human so they can feel safe with another human? When we give someone a hug and feel stiffness, we may feel rejected. However, sometimes our bodies "react without our intention". Trauma often robs people of their ability to feel safe in the arms of another. They lose the capacity to trust. Optimism is switched off.

"Trauma is an archer where the arrow goes right through our will and purpose to live." People turn to illegal drugs in an effort to regulate their physiological state.<sup>9</sup> Addicted humans need to learn how to regulate their neural state through interactions with others.

In pondering the problem of prisons, Porges argues that everyone working there feels physiologically unsafe. Most prisons are environments that are un conducive to a neuroception of safety, amplifying sensory discomfort and defensive responses, since they are filled with predator sounds such as noisy metal doors slamming. Moreover, in the American penal system where there is over-use of solitary confinement to punish disruptive behaviour, the human need for co-regulation is disrupted due to

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<sup>8</sup> P. Levine with A. Frederick, *Waking the Tiger: Healing Trauma* (Berkeley, CA: North Atlantic Books, 1997) 69.

<sup>9</sup> J. Mulcahy, Law and Justice interview with Dr Stephen Porges: The Science of Safety, available at <https://soundcloud.com/jane-mulcahy/law-and-justice-interview-with-dr-stephen-porges-the-science-of-safety>

isolation. Cues of safety that promote co-regulation, i.e. intersubjective regulation are lacking in many penal institutions. In terms of the prison routines, however, the nervous system reads predictability as safety. Order feels safe in a world in which people generally do not feel safe. For trauma survivors familiarity, regularity and reliability are very important.

In adult trauma survivors, the body does not really welcome safety. Having a trauma history retunes the body to expect engagement with another person as threatening. According to Porges, people who are abused do not necessarily want *justice*, as in a criminal justice response. They just want to *be*, to feel at ease in their bodies. However, the ANS of many survivors does not support safety, or health. For hypervigilant individuals who are primed for threat, their nervous system is in a chronic state of surveillance. In many cases, those who experienced shutdown don't want to ever go back there. How can they safely experience stillness? They don't want to go there. "Time slowed up".

Physiological/autonomic state - the intervening variable - influences our responses to cues of safety and danger. Porges invites us to "imagine a world with state regulation disorders". Health requires our bodies to feel safe. Feeling safe is dependent on autonomic state. Trauma disrupts safety and shifts autonomic state leading to mental and physical illness. We need to bring this to cultural consciousness.

#### *Polyvagal-informed activities that change neural state*

Regarding the potential clinical impact of polyvagal theory, the theory transforms the client's narrative from a documentary emphasising events and objects to a pragmatic quest for safety, with an implicit bodily drive to survive, emphasising feelings.

In terms of polyvagal-informed therapies for trauma survivors, Porges states that autonomic state provides a window and target for intervention. Changing neural state is the intervening variable. While mainstream psychiatry and psychology believe that behaviour is mediated through the mind, in reality it sits on the platform of the autonomic nervous system. Social engagement is a portal of co-regulation and therapy. Clinical treatment should strive to harness a neuroception of safety.

People are always looking for face-to-face interaction and when we search for it and are met with a flat face, this causes us distress. According to Porges, "master therapists" excel at witnessing their clients' shifts in state. In essence, the type of therapy being delivered is not the decisive factor, but whether the therapist can help people regulate their physiological state. Therapists can do this by maintaining "the support, the witnessing, the co-regulation, the reciprocity, the cues of safety and state regulation".

Our immediate physical environment can work against us. The therapeutic setting needs to feel like a safe space. This means possessing a soothing sensory environment, i.e. it should not have intrusive, noisy low frequency sounds. Playing a melodic Mozart composition in the background may help modulate autonomic arousal. Once people are given appropriate environmental cues to prompt a neuroception of safety, shifts in physiological state may occur via the ventral vagal complex, activating the social engagement system. The outcome will be increased resilience.

Non-therapy related polyvagal-informed activities include singing and chanting, whereby the muscles in the face change the body's visceral state. In the brainstem there are five cranial nerves linked to special visceral functions. Long before he formulated polyvagal theory Porges studied the clarinet, which involves all five nerves. Porges, therefore, unknowingly engaged in vagal nerve



stimulation every time he played his instrument. Wind instruments alter neural state because the musician has to exhale slowly.

“Magical gifts of the social engagement system” that connect the brain and body include breathing exercises, pranayama yoga, mindfulness, posture shifts, listening, synchronous and reciprocal behaviours, playing and team sports all reconnect the body with the brain through neural exercises. For small children, play is a polyvagal activity that “activates the vagal brake”.

In referring to Cartesian dualism and mind/body disconnection which lies at the heart of many unhelpful assumptions about the human condition, Porges wondered what the world would be like if Descartes had been polyvagal-informed. This would have meant that instead of Descartes asking “Je pense, donc je suis (I think therefore I am)”, he instead pronounced “Je me sens, donc je suis (I feel myself, therefore I am)”. If Descartes had said that “to feel is to be human”, society would look at individuals, health, wellbeing, interpersonal connectedness, coping strategies, social behaviour, mind/body unity and the biobehavioural dimensions of safety with different eyes.

