



Chapter 6

The Autonomic Nervous System

A true revolution is unfolding in health care with the rise of a more accurate understanding of the autonomic nervous system (ANS) and comprehension of its significance. The ANS was under-appreciated in psychology's early history.¹⁵⁴ Now we can say with certainty that most health problems, including psychological conditions, arise from ANS functions. Understanding the ANS is crucial to clinical effectiveness because the ANS and its "survival imperative" form the substrate for most behaviors and responses, including the immune system. According to Franklyn Sills,

The autonomic nervous system is pivotal in the regulation of survival functions. Its importance cannot be overstated. The entire field of post-traumatic stress disorder certainly falls in its scope, along with most degenerative diseases, all stress-related situations, autoimmune diseases, and many others.¹⁵⁵

Randolph Stone anticipated the revolution, describing the difference between voluntary and involuntary function and giving specific, effective methods for ANS support.

¹⁵⁴ Roy Porter, ed., *Medicine: A History of Healing*. Ivy Press, 1997. Chapter 6, "Healing and the Mind," gives a concise history of psychology, and the autonomic nervous system is never mentioned.

¹⁵⁵ Franklyn Sills, *Foundations of Craniosacral Biodynamics*, Vol. 2. North Atlantic, 2012. p. 527.

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No relaxation of the voluntary nervous system and muscles can take place as long as the involuntary ones are locked and tense... Merely telling the patient to relax is useless. Tension usually goes much deeper than the voluntary muscular control.¹⁵⁶

The ANS controls most of the body's involuntary activity, including the essential survival functions including circulation, respiration, digestion, metabolism, daytime alertness and mobilization, nighttime sleep and regeneration, and more. In addition, the ANS operates our stress responses, such as "fight-or-flight" as well as "freeze." The ANS has the goal of assuring survival, achieved through constant adaptation to changing conditions. This biological imperative is too important to be left to chance or voluntary control; the ANS is the hard-wired, fail-safe mechanism to avoid disaster.

Most health care professionals will answer the question, "What is the ANS?" by saying it is the reciprocal action of

Summary: Old & New Views of the ANS

| Aspect | Old View | New View |
|--|---|---|
| Importance | Under-appreciated | Supreme Importance |
| How many parts? | Two (Sym-, Parasymp-) | Three (Social, Sym-, Parasymp-) |
| Action | Reciprocal (Sym- and Parasymp- are seesaw, on/off) | Sequential based on phylogeny (evolutionarily newer vs. older) |
| ANS Categorization of Vagus Nerve | All Parasympathetic | Mixed (Ventral branch of Vagus is not Parasympathetic) |
| Therapy goal | Parasympathetic relaxation | Re-establish newer branches |
| Babies | Feel no pain and have no memory | ANS is hyper-sensitive & records experiences, particularly betrayals |
| Popular characterization | Parasympathetic "Rest & Rebuild" Sympathetic "Fight-or-Flight" | Differentiate "normal functions" from "stress responses" |

¹⁵⁶ R. Stone, *Polarity Therapy*, Vol. 1. CRCS, 1986. p. 85.

Dancing with Yin and Yang

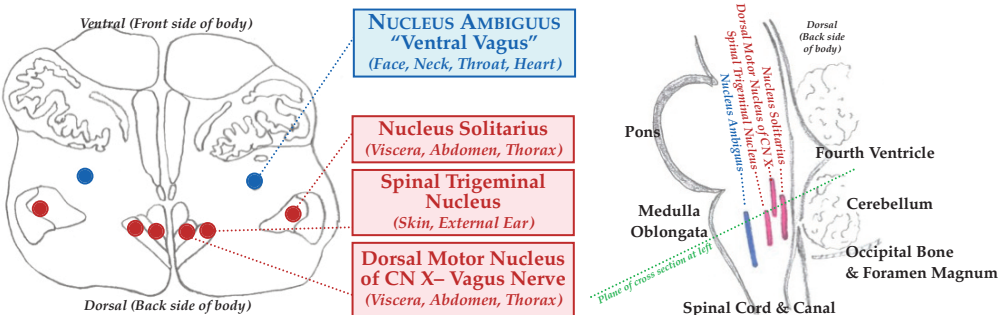
sympathetic and parasympathetic branches, particularly fight/flight for the sympathetic nervous system and rest/rebuild for the parasympathetic nervous system. They may also add that a goal of therapy is to reestablish a parasympathetic state and reduce the over-expression of a sympathetic state, which is corrosive for the body if sustained for too long. This description has been around so long that it is accepted without question and recycled in textbooks and classrooms. However new information shows that the familiar explanation is only partly true.

Stephen Porges and his Polyvagal Theory

The “Polyvagal Theory” is a new understanding of the ANS, arising from the research and writings of psychiatry professor Stephen Porges. He conducted research that changes the standard view, with huge implications for psychotherapies and health care in general. Based on Porges’ findings, the ANS has three branches, not two, and they are sequential, not purely reciprocal.

“Polyvagal” derives from Porges’ observation that one branch of the vagus nerve (Cranial Nerve X) does not fully conform to the expected standard classification as parasympathetic like the rest of the vagus. Porges sought an understanding of the true function of this branch, known as the “ventral vagus.” He found that it is still autonomic in that

“POLYVAGAL”– FOUR NUCLEI OF THE VAGUS NERVE IN THE BRAIN STEM



Note: All ANS diagrams in this chapter have been consolidated into one 18x24 full-color wall poster, available from www.energyschool.com.

it regulates involuntary survival functions, including a previously under-appreciated role in heart regulation, but that it has other functions as well.

Exploring further, he found that the ventral vagus branch was interconnected with involuntary facial gestures, listening, vocalizing and other faculties. Considered in combination with other involuntary nerves in the face, throat and neck (Cranial Nerves V, VII, IX, X and XI), the ventral vagus participates in a unified complex that has a critical but previously unrecognized survival function in mammals and especially in primates. Together these nerves provide mission-critical functions for infants (securing maternal bonding), and later for adults (enabling speech and social communication).

Primates need maternal bonding more than other animals because their much more complex cortex needs time to mature. A bird or fish newborn is relatively functional soon after birth, but mammals need more time and humans need literally years before their survival capabilities are fully available. The ventral vagus nerve group secures the mother's loyalty and nurturance to make sure that the vulnerable new baby is able to survive, and then throughout later life it enables communication functions that are key to our astounding biological success. New infants need no coaching to orient toward their mothers and engage in loving interchanges through voice, listening and facial gestures. Their mothers are just as involuntarily captivated and expressive.

A great chain of benefits ensues from our unique polyvagal anatomical design: maternal bonding enables the maturation of our large cortex and development of language. These facilitate the transfer of knowledge, which, in turn, enables the efficient development of social structures and

technology, leading to ever-increasing security ascending the ladder of needs to richer access to the purpose in life.

Embryological and anatomical evidence strongly supports the theory that the Social Nervous System is the ultimate development in regulatory design. A Social ANS function, communications (especially speech), has been convincingly discussed as being the supreme functional purpose of the numerous anatomical specializations that are uniquely human, bestowing major survival advantages such as transfer of knowledge.¹⁵⁷ The design works: humans are the ultimate biological success story, even to the point of threatening ourselves through overpopulation.¹⁵⁸ Our success is due to our brainpower, thanks significantly to this third branch of the ANS.

Phylogeny and the ANS

Porges' inquiry led to an examination of *phylogeny*. Phylogeny refers to the study of the development of functions across different life forms. For example, all animals have some form of digestion and circulation; even a single-celled organism floating in a liquid medium has some way to take in nourishment and discharge waste. As creatures progressed through evolutionary stages, these systems became more sophisticated, all in the service of enhanced survival. What is true for the digestion is also true for the nervous system; greatly increased complexity has led to enormous improvements in adaptability and biological success.

¹⁵⁷ Jos Verhulst, *Developmental Dynamics in Humans and Other Primates: Discovering Evolutionary Principles through Comparative Morphology*. Adonis, 2003. Page 348 contains an intriguing diagram showing that human morphology seems to have speech as its ultimate functional goal.

¹⁵⁸ The situation poses an unanswered question in the evolutionary story: can our expanded cortex capabilities, which brought us such success, solve the overpopulation problem?

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Phylogeny of Heart Regulation in Vertebrates

Stephen Porges, "The Polyvagal Theory: Phylogenic Substrates of a Social Nervous System," *Int'l Journal of Psychophysiology*. 42 (2001) 123-146, 2000.

Key:

Arrows indicate the presence of heart regulating functions. Up-arrow means faster heart rate, down-arrow means slower heart rate.

Asterisks indicate which autonomic branch is deployed: ***Social, **Sympathetic, *Parasympathetic.

Definition of Phylogeny

(American Heritage Dictionary)

1. The evolutionary development and history of a species or higher taxonomic grouping of organisms.

| Mechanisms of Heart Regulation | | | | | |
|--|------------------------|--|----------------------------------|---|--|
| | Chromatin Tissue (CHR) | * DMX Dorsal Motor Nucleus of CN X (Vagus) | ** Sympathetic Nervous System | ** Adrenal Medulla (Produces Catecholamines) | *** Nucleus Ambiguus Ventral Motor Nucleus of CN X (Vagus) |
| Cyclostomes- Jawless Fish (Lampreys) | ↑ | | | | |
| Elasmobranchs- Cartilaginous Fish (Sharks) | ↑ | ↓ | | | |
| Teleosts- Bony Fish | ↑ | ↓ | ↑ | | |
| Amphibians | ↑ | ↓ | ↑ | | |
| Reptiles | ↑ | ↓ | ↑ | ↑ | |
| Mammals | ↑ | ↓ | ↑ | ↑ | ↓ |

Cyclostomes- Jawless Fish (Lampreys)
 Elasmobranchs- Cartilaginous Fish (Sharks)
 Teleosts- Bony Fish
 Amphibians
 Reptiles
 Mammals

More Modern

CHR- Chromatin is non-neural tissue that stimulates the heart by releasing noradrenergic amines directly into blood in the heart.

Porges found that the phylogeny of heart regulation in vertebrates showed this kind of increasingly sophisticated progression, and that the ventral vagus appeared only in the most recent creatures in the evolutionary chain: mammals, primates and especially humans. The resulting picture of heart regulation, shown above, shows alternating mechanisms for increasing and decreasing heart rate, each new layer adding greater resiliency and range of motion.

Three Branches of the ANS

The **parasympathetic** system is the oldest part of the ANS, reflecting the survival needs of a primitive passive feeder. It innervates essential baseline metabolic functions, delivering nutrient-rich, oxygenated blood to the system, particularly the brain, and its components regulate heart, lungs and viscera. Normal parasympathetic functions are relatively limited, such as waiting for food and opportunities to mate. Parasympathetic stress responses are limited to

adjusting the metabolic rate within a fairly narrow range, such as in “death feigning” survival tactics. In mammals the parasympathetic stress response appears as “playing possum” behaviors; in extreme cases it is known as parasympathetic shock.

The **sympathetic** nervous system is a later development of the ANS, adding mobilization and a wider range of possible responses. More sophisticated animals gained more survival options in essential feeding, protective and mating behaviors. With a sympathetic ANS branch, creatures can pursue food and mates, evade predators and adjust to environmental conditions with greater adaptation and success. The capacity for movement and increased sensory awareness developed, and muscular/structural tissues became more sophisticated. The sympathetic system acts as a controller on the primitive parasympathetic to give a wider range of metabolic responses, a faster heart rate for higher exertion, and the ability to shift resources to muscular, visceral or other systems as needed in response to survival challenges.

“**Social** nervous system” is a prospective term for the third branch of the ANS. This most modern branch confers supreme survival advantages. The social nervous system is a controller over the sympathetic to greatly expand the functions of the more crude “fight/flight” responses and fulfill the purposes described above.

Hierarchical Interactions of the Social Nervous System

The anatomy of the social nervous system consists of mechanisms that create the all-important protective bond between newborns and their mothers. These include vocalization, hearing, visual contact and facial expression, which are each capable of triggering hormones inducing pleasurable sensations in both infant and caregiver. These are hardwired, involuntary, precognitive functions that exist in

The New ANS Anatomy

“Three neural circuits form a phylogenically ordered response hierarchy that regulates behavioral and physiological adaptation to safe, dangerous and life-threatening environments.”

–Stephen Porges, Polyvagal Theory (Norton, 2011)

Parasympathetic (most ancient)

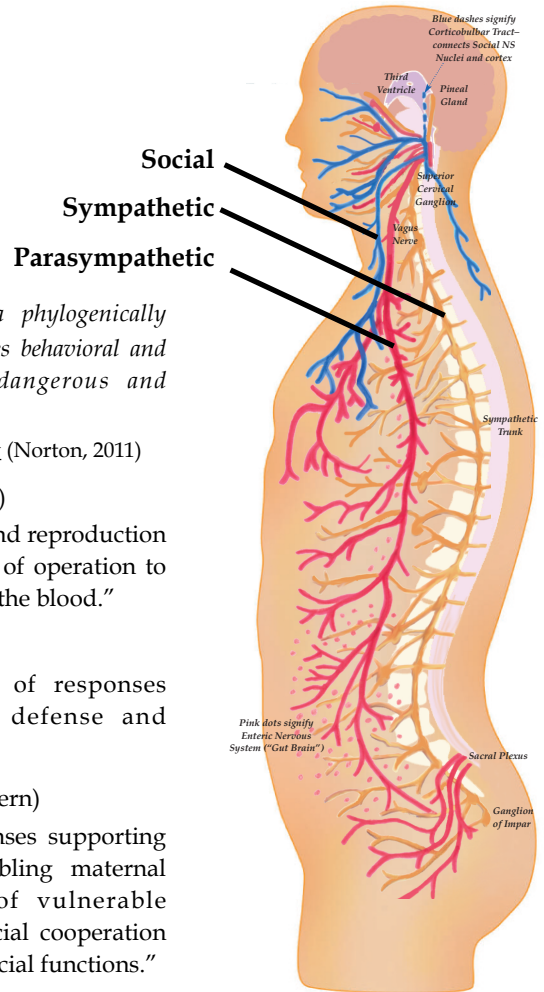
“A primitive passive feeding and reproduction system creating a metabolic baseline of operation to manage oxygen and nourishment via the blood.”

Sympathetic (newer)

“A more sophisticated set of responses enabling mobility for feeding, defense and reproduction via limbs & muscles.”

Social Engagement (most modern)

“A sophisticated set of responses supporting massive cortical development, enabling maternal bonding (extended protection of vulnerable immature cortex processors) and social cooperation (language and social structures) via facial functions.”



newborns and have a compelling power to engender biochemical changes that create emotional bonding during the vulnerable period. Healthy babies exhibit these capabilities instantly at the time of birth. Infants experience compromise or failure of these strategies (such as betrayal by or alienation from the caregiver) as life threatening, and justifiably so.

Drawing on the “Theory of Dissolution” (developed by British neurology pioneer John Hughlings Jackson, ca. 1910), Porges also explains a sequence of operation. Under stress, we involuntarily try our newest, most sophisticated and efficient equipment first. If that doesn’t work, older strategies are attempted, and if they don’t work, the oldest resources are employed. Therefore, under stress, humans first use our social/relational tactics, then fight/flight, then immobility, as survival strategies. Each of these stages has characteristic indicators for accurate identification.

The sequence bears repeating and elaboration because it is so important in therapy. The hierarchical scheme is undermined by traumatic experiences. If social engagement did not work in the past, we are less likely to try it again in the present. Instead, we go to the next, older strategy, sympathetic’s fight/flight neurochemistry and anatomy. Furthermore, if these did not work earlier in life, we may skip the sympathetic stage and simply go to the last ANS level, parasympathetic. Parasympathetic stress responses (freeze, immobilize, dissociate) are the final functioning points in the model. If these kinds of responses are also overwhelmed, the situation can be fatal, as in parasympathetic shock. Averting parasympathetic shock is justifiably well known as a top priority for emergency response personnel, because shock can be fatal.

Robert Scaer, neurologist and trauma expert, has identified dissociative, depressed states as the fullest expression of post-traumatic stress disorder and the proper primary target of PTSD therapies.¹⁵⁹ Among many studies described by Scaer, two stand out:

¹⁵⁹ Robert Scaer, *8 Keys to Brain-Body Balance*. Norton, 2012. Scaer’s books describe all these parasympathetic research items.

- The phenomenon of “voodoo death,” in which a tribe member would receive a curse from a shaman and just lie down and die, was investigated by physiologist Walter Cannon in the 1930s. Cannon, who coined the phrase “fight or flight,” wondered what could be the mechanism of such a sequence; the hierarchical arrangement of the ANS explains the mystery. At the low end of the sequence, there is no further ANS option and the system shuts down.

- In autonomic experiments, lab rats put in a deep basin of water swam indefinitely because they knew the routine of being subjected to experimentation during the day and cared for at night; in contrast, wild rats swam once around the edge to determine that there was no escape, and simply gave up and sank to the bottom. They had no expectation of a survival alternative.

The whole sequence is played out in a sub-optimum hospital birth. Newborn babies come out pre-programmed for maternal bonding including skin-to-skin contact and nursing. Instead they are often separated from their mothers (“infant quarantine”) and subjected to painful unnatural procedures, facilitated by medicine’s obsolete belief that babies are insentient. Since the social engagement system impulses are thwarted, babies then try the older strategy, the sympathetic ANS in the form of angry-sounding crying. When that doesn’t work, and it cannot work unless the adults are sensitive and discerning about such sounds, all they have left is the parasympathetic freeze/immobilization response. The misunderstanding caregivers may interpret this seemingly quiet state as being “good babies,” when actually they are seriously compromised. Potential long-term implications include reduced immune system, limited heart rate variability and loss of other ANS functions. Many research studies have confirmed the reality and value of a

Dancing with Yin and Yang

functional social engagement system: patients with strong and active social connections recover faster and live longer.¹⁶⁰

A beautiful case study was accidentally created by “The Rescuing Hug.”¹⁶¹ Twin newborn girls were in their hospital bassinets after a difficult birth, and one was not flourishing. A nurse intuitively had the insight to put them together in one bassinet instead of being separated. The stronger one flopped an arm over the weaker one in a heart-touching embrace. With the social engagement system stimulation stimulated by her sister’s touch, the weaker sister’s heart rate stabilized and her temperature returned to normal. These are remedial effects beyond the capability of modern medicine, a perfect example of a Yin approach being able to solve a situation that a Yang approach cannot. Seventeen years later, journalists tracked down the sisters and reported the story again with a fascinating video interview. Porges, with an expert eye for micro-cues given during the interview, readily identified which girl had been the weaker one at birth.

In another compelling example, the famous baby doctor Benjamin Spock (1903-1998) actually filmed a close-up view of the three-step sequence of ANS progressive degradation during a circumcision surgery.¹⁶² The steps are clearly visible exactly as described by Porges. In his late eighties at the time, Spock commented poignantly about its effects, expressing extreme remorse for some of his earlier beliefs about babies. At the time of the movie filming he did not have a context to really explain what was happening, but it is excruciatingly obvious after learning about Porges’ work. I am unable to show this video clip in class because the students become too

¹⁶⁰ Dean Ornish, *Love & Survival*. William Morrow, 1999. pp. 34-51.

¹⁶¹ To follow up, use *The Rescuing Hug* as internet search terms.

¹⁶² Benjamin Spock, *The Circumcision Question* (VHS). Wilbert Productions, 1994.

distressed for any further learning and we have to spend the rest of the day restoring their ANS range of motion.

Implications of the New ANS Understanding

The new ANS understanding firms up a field that was previously considered to be “soft science.” Science seeks precision, in the form of measurable results, isolated variables and double-blind methodology. Human behavior does not readily fit in with such constraints, due to having too many variables. As a result, the fields of psychology, sociology and related topics have suffered from second-class status in the science community. With a fuller understanding of the ANS, a door is opened for more measurement and credibility and perhaps real progress in changing destructive practices. The ANS is not hard to measure: even a saliva sample shows instant changes, and biofeedback methods for measuring ANS activity are being constantly improved.¹⁶³

Counselors have known for years that creating rapport and supporting safety were important for clients; now they gain credibility with a physiological explanation and a precise way to identify and measure the effects.

As new ANS theories are confirmed and applied, major changes can be expected. The first applications would be in health care, particularly with young children and post-trauma treatment, but further applications are also easily envisioned. Basically, there is now a compelling reason to treat babies with much more attention to maternal bonding and avoiding painful interactions, so that the “trump card” of the all-important ANS will thereby be preserved. This is a revelation in health care: it was not until 1998 that the

¹⁶³ Minimally invasive ANS measurement methods include heart rate variability (HRV), galvanic skin response (GSR), muscle activation (sEMG), body temperature, brain wave (EEG), cortisol levels in saliva and carbon dioxide measurement. Dark field microscopy of fresh blood samples is a more high-tech method.

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American Medical Association even agreed that babies could feel pain, and the medical profession is still not unified about such ANS-damaging practices as infant quarantine, umbilical cord cutting and circumcision.

In the future, a newborn baby could be tested for autonomic markers from the first moment (using a non-invasive saliva swab test), and biofeedback could give caregivers instant ANS status reports to guide optimum handling. Procedures would be applied more gently, and some procedures would be stopped altogether if the actual autonomic effects were made visible.

Similarly, environments of the future for young children and emergency medicine are likely to be re-designed to optimize for the social nervous system, in the knowledge that if this part is highly functional, the older sympathetic and parasympathetic systems will work better. The effect has been demonstrated very effectively by the “Roots of Empathy” program in which new mothers bring their young babies into



Research on the Roots of Empathy program found increases in these qualities:

- Emotional literacy
- Neuroscience interest
- Temperament
- Curriculum connection
- Participatory democracy
- Infant development interest
- Violence prevention
- Perspective taking
- Prevention of teen pregnancy
- Attachment
- Male nurturance
- Inclusion
- Infant safety

K-12 classrooms.¹⁶⁴ The mere presence of a baby triggers involuntary neurochemical changes throughout the whole classroom, with enormous benefits in learning and behavior that have been repeatedly confirmed in scientific studies. This program is another example of conscious actions (bringing a baby into the room) being able to reach into subconscious processes and definitely change ANS states and behaviors.

Uplifting the social engagement system is the new “holy grail” of therapy, health care and child care. When the highest resource of the whole ANS is fully operative, the immune system, neurological function, self-empowerment and related indicators all improve. These new methods have even worked with autism, using specific sounds to induce nerve signaling along the social group anatomy.¹⁶⁵

To illustrate the significance of this new understanding, a male client in his mid-60s came for sessions complaining of heart problems, particularly irregular heartbeat and episodes of not feeling well, including fatigue and mild depression. His family history featured an abusive, alcoholic father, so there was plenty of material for traditional psychotherapy and the trauma history was acknowledged but it was not the first emphasis of inquiry.

Instead of trying to resolve the past, we inquired into the surrounding context of his current life, focusing on the hierarchy of action fields and the ANS. He told a story of multiple disappointments in intimate relationships, including a marriage that “lost its spark” and ended in a disappointing divorce, followed by a more recent breakup of a subsequent relationship. Through a two-chair Yin and Yang counseling process, he gained insights into why these relationship patterns had developed in the past, and how to recognize

¹⁶⁴ <http://www.rootsofempathy.org>

¹⁶⁵ <http://www.education.umd.edu/EDHD/faculty2/Porges/tlp/tlp.html>

them in the present. He became more self-aware about the complexity of relationships and observed that his own social engagement system was under-nourished and under-utilized, especially since he was retired and living alone.

The deficiency of social stimulation was understandable in light of his history of disappointments, but once he became aware of the situation he resolved to consciously undertake remedial actions, such as going out into social situations more frequently. Over time he was able to make major changes, including creating a new relationship with a much stronger sense of purpose and an intentional basis informed by understanding Yin and Yang archetypes. Within a year his heart symptoms faded and then disappeared altogether.

In another example, a female client in her 30s sought help with severe depression. The initial sessions went fairly well, leading to resolving binds with her highly-inappropriate boyfriend as well as her parents who had been through a divorce a few years earlier. She was beginning to exercise more and get out in nature; these are signs of re-establishing sympathetic autonomic fulfillment, one step up the ladder from parasympathetic's bottom rung. She was improving but progress was slow. Then one week she arrived for her session and was visibly much better. When I asked what had happened, she reported that her sister and her best friend had both given birth that weekend, and she had spent the entire week holding newborn babies. In holding the babies, she was inadvertently stimulating her own ANS via the neurochemistry of the social nervous system, and her depression lifted. She did not have a relapse and discontinued the sessions to focus on her career.

Differentiating Normal Function from Stress Responses

The new ANS understanding also remedies a common error, confusing "normal functions" with "stress responses." This is an example of familiarity and habit obscuring critical

thinking. For decades the characterization of the ANS has been mixing apples (sympathetic's fight/flight, a stress response) with oranges (parasympathetic's rest/rebuild, a normal function).

Another effect of the new ANS understanding is to put the sympathetic branch in a new light. Previously, sympathetic was primarily known for its stress response, and its normal function was under-appreciated. Meanwhile parasympathetic's stress response, the freeze/dissociation response, was under-recognized as a more serious survival problem, the last resort for the ANS survival sequence.

Resolving this error overturns a popular therapy model misconception about the ANS, that the sympathetic, fight/flight autonomic response is worse for health than the parasympathetic. In fact, therapists of the future will try to re-establish the sympathetic through enabling thwarted defensive responses. The whole ANS can be seen as a three-step ladder, with parasympathetic being the lowest and last rung. The parasympathetic can appear to be calm and placid and thereby possibly "better" but in fact if the state is involuntary, such as in depression, it is far worse biologically and more challenging therapeutically.

The diagrams below summarize ANS functioning. For efficient ANS therapeutic support, I suggest that the information in these charts be memorized in its entirety, so that ANS clients are correctly identified and appropriate therapeutic strategies can be deployed. I have made these into a poster (see the back of this book) so that they can be viewed repeatedly until they become second nature.

Reviewing the Stress Response Sequence

Because of its importance in health care, the sequential operation of the ANS deserves repetition and embellishment. Again, the ANS stress responses are organized in involuntary

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sequences. At the first moment of perception of novelty or threat in the environment, a precise set of step-by-step actions will ensue.

This can be readily experienced in everyday life by making a loud noise in a room of people, whether or not they are primed to study the topic. The fact that the responses are the same with or without prior warning shows that the sequence is involuntary and therefore autonomic; the same sequence appears because cognitive control does not reach deeply enough to manage the reactions. I first instruct the

Differentiating Normal Functions from Stress Responses

Although the terms are commonly used, “Fight-or-Flight vs. Rest & Rebuild” is a confusing and outdated characterization of Sympathetic and Parasympathetic ANS branches. Fight/Flight is a **Stress Response** whereas Rest/Rebuild is a **Normal Function**.

| | SOCIAL | SYMPATHETIC | PARASYMPATHETIC |
|----------------------------|--|---|--|
| Normal Functions | "Love" Communication & Language Social Organization Sex- Flirting, Afterglow Prosody, Vocalization Reciprocal Play Contact & Interaction | Mobilization Daytime Alertness Recreational Excitement Vocational Initiative Muscular activity Sex- Climax | Baseline metabolism 'Rest & Rebuild' Meditative States Sex- Arousal Sleep (4 stages) |
| Stress Responses | In-crisis contact & Communication First Aid "Tend & Befriend" Empathy, Comfort, Touch Emergency Teamwork Group Psychology | Alarm, Anxiety Orient Fight/Flight Discharge (shaking) Rest | Immobility (Freeze) Dissociation, Depression Catatonia Sleep Disorders Parasympathetic Shock |
| Fast Involuntary Transfers | Mob Behavior → | ← Eye & Verbal Contact Freeze → | ← "Startle Awake" |

Notes:

- A high percentage of health conditions are Autonomic Nervous System events, including immune system disorders, attention deficit conditions, psychosomatic issues, post-traumatic stress effects and others.
- Normally, ANS stages flow and interchange rhythmically based on routine stimuli and biological sequences such as circadian rhythm, digestion and sexual processes. ANS fixation or loss of flow is a sign of PTSD.
- Voluntary and Involuntary functions overlap significantly, and most of the functions listed here could be either. But voluntary and involuntary can be distinguished by close observation. Involuntary (autonomic) responses are immediate and universal across differences of age, gender, education and culture. The conscious mind cannot fully control face and body expressions. The ANS seems to be mainly incapable of inauthenticity or deception (Paul Ekman (2009).
- In the presence of novelty or threat, we try our phylogenically newest, best strategy (Social) first. If that does not work, or has not worked in the past, we try our older, second strategy (Sympathetic). If that does not work, we try our most primitive, last strategy (Parasympathetic). If that does not work, we are in great danger and we experience Immobilization, deep depression or parasympathetic shock.
- “The higher nervous system arrangements inhibit (or control) the lower, and thus, when the higher are rendered functionless, the lower rise in activity.” –John Hughlings Jackson (1835-1911), Neurology Pioneer.

Recognizing ANS stress responses

| | |
|-----------------|--|
| Parasympathetic | Flat affect, depression, pale, quiet; degenerative conditions |
| Sympathetic | Agitation, anxiety, speediness, eyes hyper-active; inflammation conditions |
| Social | Lack of eye contact, unclarity of speech, incapacity for rapport and feeling at ease in the relationship |

group to take an internal inventory of sensations and self-awareness, to get a baseline state. Then I make a loud noise, and each person closely observes what happens next. Regardless of education, age, gender, religion, culture, belief system or any other demographic variable, everyone will have similar physiological involuntary responses.

First is an instantaneous elevation of the head, neck and shoulders (the “alarm” phase), quickly followed by a sharpening of the senses, especially eyes and ears, with a turning of the head to locate the sound (the “orient” phase). Less frequently, the head and neck may quickly contract downward, in a “duck and cover” gesture; the simultaneous up and down impulses may be a key to neck tension, because realistically the muscles can only do one at a time. Next appears one of two possibilities: a turning toward relationship, such as eye contact with other people and some form of the question, “What was that?” or a turning toward the disturbance, beginning a mobilization for action. The sequence continues with a sense of muscular engagement for fight or flight, whichever the ANS determines has the best chance of survival based on each individual’s prior history. In a real emergency there may be a quick deployment of teamwork strategies at this time, an expression of the social

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engagement system: one person is designated to telephone for help while another runs for the fire extinguisher.

If neither fight nor flight is effective, next there will be a “playing possum” state, in which the system suddenly “puts the brakes on” all the mobilization that was present an instant before. This is the moment of stepping down to a lower, less functional, more dangerous state, the parasympathetic stress response. It can be effective in dealing with a threat, because a frozen, dissociative “duck and cover” strategy can constitute a form of “death feigning,” making some predators lose interest. Unfortunately the dissociative state can become habitual, with severe health consequences. The analogy is a car with both accelerator and brakes both pressed to the floor: something has to give.

After the crisis has passed, the threat has been identified and removed, and the ANS perceives a return to safe conditions, shaking or micro-fibrillations in the tissues will begin. This movement discharges the intense ANS energy that was mobilized. Ideally the system will later experience a deep restorative sleep.

If every step is deployed, including subtle or obvious shaking and discharge moving to rest, the system is likely to re-set back to normal, ready for the next challenge. Problems arise when there is not enough time or capability to go through the whole sequence. Then the system will seem to get stuck at one point. For example, in a car accident, the person may have just noticed the impending problem and not have had time to swerve with the steering wheel or stab at the brakes; the ANS system tries to fulfill its program with defensive responses by the hands, shoulders and legs, but it cannot. Months or years later these parts of the body may be still trying to do what was intended before the response was interrupted. Physical problems may appear in the exact places, such as arthritis in the hands that gripped the wheel

and circulatory or structural problems in the leg that stabbed for the brakes.

Peter Levine has discussed the effects of “thwarted defensive responses.” The phrase refers to how there is a great value in helping clients experience fulfillment of defensive responses so that those impulses can be “retired” from continual effort. This can be done any number of ways; authors such as Levine and Diane Heller have given excellent descriptions, which will be explored later.

ANS portals

Another new concept for therapy arising from Porges’ work is the concept of “portals” for affecting the ANS branches. “Portals” refers to anatomical components of the ANS that can be physically stimulated to support a particular layer. By stimulating specific locations in specific ways, ANS changes can be created. Creating signaling along a portal pathway is very useful therapeutically because it is effective without cost or risk; methods for this are discussed in the following chapter.

For example, in The Listening Project research at the University of Maryland, Porges found that stimulating nerves of the social nervous system through specific muscular activation created profound improvement in the relational behaviors of autistic patients.¹⁶⁶ The effect is also seen in the use of vagus nerve stimulation, in which a pacemaker-like device is implanted adjoining the vagus nerve in the neck to relieve neurological and behavioral symptoms.¹⁶⁷

The portals for the parasympathetic system, based on anatomy, are the vagus nerve, accessible on both sides of the neck, and the sacral plexus. For the sympathetic ANS branch,

¹⁶⁶ <https://clinicaltrials.gov/ct2/show/NCT02398422>

¹⁶⁷ Taunjah Bell, *Vagus Nerve Stimulation and Anxiety*. iUniverse, 2010.

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the muscles of the limbs, and the sympathetic chain along the spine are highlighted; the superior cervical ganglion in the side of the neck provides access. For the social ANS branch, Cranial Nerves V, VII, IX, X and XI, observable as a group in the embryological “pharyngeal arches” structure, can be used by gently stimulating their sensory and motor components in the face and throat/neck areas.

The method for using these portals varies with different modalities. In massage, manual contact with the relevant areas, particularly the sides of the neck and the face, such as in a facial massage or lymphatic therapy, might be used. In Polarity Therapy, energy balancing and reflexology contacts could be employed. In Franklyn Sills’ *Craniosacral Biodynamics*, the “motility of the central nervous system” and “Becker’s Three-Stage Process” concepts are useful. In all cases, accurate knowledge of the anatomy is important.

Having clients participate in ANS stimulation has also proven to be supportive. For the parasympathetic nervous system, paying conscious attention to the breath and its involuntary movement of the belly is helpful. For the sympathetic system, engaging the muscles of the whole body, or, more specifically, the arms and legs for fight/flight defensive response fulfillment, followed by relaxation of the muscles and being conscious of subsequent sensation, can be effective. For the social nervous system, the approach can include recalling a favorite person or pet and using the imagination to induce the warm feelings and neurochemistry of being lovingly recognized. By stimulating the various nerve pathways of the ANS, old thwarted impulses can be fulfilled safely.

Recognition of the client’s ANS state provides a blueprint for therapeutic strategy. Identifying the currently active layer, we can use the portals to guide clients in fulfilling the impulses of that layer, and support them in

naturally moving through the three-part sequence. The therapeutic goal is to restore capacity to function at all three layers, but the third, the social, is the key because it is the most sophisticated tool in the stress-response repair kit.

Applications in Pre- and Perinatal Therapy

Pre- and perinatal psychology is a rich field for application of the new ANS understanding.¹⁶⁸ Before birth, babies are immersed in their mother's experience yet also super-sentient on their own. The fetus definitely responds to the environment. The goal is to minimize feelings of threat and disturbance for as long as possible so a new baby has maximum time to experience security and trust, building a strong base that will serve throughout life as the ANS foundation for resiliency.

The Polyvagal Theory can transform treatment of infants as well. Among other benefits, there is now a measurable scientific basis for emphasis on ANS support as described above. Prior to Porges' work, modern anti-bonding medical practices often felt wrong to parents, observers and some primary care professionals, but clear information about the nature of the damage was lacking. Babies cannot report their experiences in normal language and the prevailing attitude was that babies are insentient and have no memory.

Now we know that newborn quarantine, anesthesia, cord cutting and circumcision affect the ANS of babies, their most important lifelong anatomical group. The practices defeat a baby's best (social) stress-response resources and force the baby to a sympathetic (fight-or-flight stress response) or, worse, to a parasympathetic (immobilization)

¹⁶⁸ See Bibliography for Ray Castellino, William Emerson, David Chamberlain and Thomas Verny.

strategy. The baby's subconscious brain¹⁶⁹ is imprinted with an expectation of betrayal in intimacy that may endure long into adulthood. The impact is high because of the social nervous system's top-rung place in the ANS hierarchy.

Trauma experts such as Bessel van der Kolk have noted that the two greatest determinants of "recoverability" from trauma are how early the incident occurred and whether betrayal was involved.¹⁷⁰ Flawed birthing beliefs create stress on both ways. An optimum birth is an excellent preventive strategy for lifelong ANS and immune system resiliency.

The discovery of the social nervous system also makes sense of the observation that humans are especially prone to post-trauma dysfunction. In the wild, other animals do not show PTSD symptoms with any frequency. There is something in human processing that engenders PTSD, and the answer is likely about our emotions. Levine and others have noted that the emotional component of a trauma, such as rage or terror, is often more overwhelmingly painful than the physical experience. In Stone's words, "A mental pain can be far more devastating than a mere physical pain."¹⁷¹ The problem is particularly true in the case of betrayal trauma.¹⁷² The experience of emotions and thoughts may be what makes humans so susceptible to being traumatized. The discussion of emotions will be continued further in Chapter 12.

Another explanation for humanity's PTSD tendencies may be modern life itself. Human biology evolved over eons

¹⁶⁹ Specifically, the amygdalae, the paired almond-size brain areas that sort our experience for threat. These brain regions are located about one inch beneath our temples and one inch behind our eyes.

¹⁷⁰ Bessel van der Kolk, Alexander McFarlane, Lars Weiseith, *Traumatic Stress: The Effects of Overwhelming Experience on Mind, Body, and Society*. Guilford, 2006.

¹⁷¹ R. Stone, *Polarity Therapy, Vol. 1*. CRCS, 1986. Book 3, p. 12.

¹⁷² Jennifer Freyd, *Betrayal Trauma*. Harvard, 1998.

of time spent in hunter-gatherer and agrarian lifestyles. In just the last century, the challenges have changed significantly. As writer Nathan Seppa observed, “Human biology is ill-prepared for this lifestyle.”¹⁷³ Some PTSD reflects a mismatch between ANS biological design and modern life’s inevitable alienation, pace and pressure. This also applies to technology: humans were not constructed to experience many commonplace events of modern life. For example just one century ago the ANS dealt with a different environment. The night was dark instead of being in constant illumination. The seasons were a primary feature of experience instead of controlled central heating/cooling. The social fabric was a direct daily interpersonal process instead of through modern isolation and technological media. One century is far too short a time for evolutionary adaptation, and ANS symptoms are epidemic.

The ANS in Large-Scale Popular Culture

Given that the large majority of human behavior is ANS-driven, any enormously popular phenomenon, including religion, entertainment and politics, must have an ANS basis or it would not become large-scale. The logic is circular but compelling. Cognitive processes alone do not explain the size of major events. Most obvious are movies and television involving ANS-centered fear (action thrillers, fright-inducing movies) or sex (romantic love stories, pornography, onscreen nudity) because these functions are at the very foundation of biological design and most fully in the domain of the ANS. The ANS is in the driver’s seat of behavior: if something happens in social groups, there is likely to be an ANS explanation for who, when, where and how it manifests.

¹⁷³ Nathan Seppa, reviewing the book *Present Shock: When Everything Happens Now*, by Douglas Rushkoff (Current, 2013). *Science News*, June 15, 2013.

An entertainment experience that has not received much commentary is the phenomenon of children's cartoons. Since television first arrived, Saturday mornings have been filled with children hypnotically watching all kinds of mayhem; "Roadrunner and Coyote" is an example. These show exaggerated crashes, collisions and falls, in the expectation that these are funny. The movie *Who Framed Roger Rabbit* (1988) addressed the topic directly and skillfully. Any laughter that appears in such a context is the ANS releasing stress, as health visionary Moshe Feldenkrais observed: "[ANS] Laughter is when we realize the danger is to someone else, not us."¹⁷⁴ Again, we are so surrounded and immersed in all this that we do not notice the phenomenon, an ANS disturbance hiding in plain sight.

My earliest memory of film is *Dumbo* (1941); I mainly remember the heart-wrenching separation of baby from mother. With the new understanding of the ANS, I realize how the movie had such a big impact.

Along with entertainment, advertising is the preeminent ANS pop culture application. Long ago, especially since the advent of television, commercial artists and producers figured out how to influence buyers by using subliminal messages. The craft of ANS manipulation has only become more sophisticated through the years. If there is any doubt about the supremacy of the ANS in determining behavior, commercial activity is conclusive proof. There is a wealth of information published in this topic area, so I will not dwell on it here.¹⁷⁵

¹⁷⁴ Moshe Feldenkrais, *The Potent Self: A Study of Spontaneity and Compulsion*. Frog Books, 2002.

¹⁷⁵ Wilson Bryan Key, *Subliminal Seduction*. Signet, 1974. This gives a relatively early overview. For something more recent: Dave Lakhani, *Subliminal Persuasion: Influence & Marketing Secrets They Don't Want You To Know*. Wiley, 2008.

Major holidays reveal ANS behaviors, if we look beneath their formal titles. Pay “ANS attention” the next time you are attending a large-scale celebration, and you are likely to see subliminal processes at work, including ritualistic restoration of social engagement bonds, discharge of pent-up stress, increased financial activity and related possibilities. The time of the winter solstice is celebrated in most cultures, as is the springtime equinox with its theme of rebirth, fertility and renewal; Mardi Gras comes to mind as an ANS spectacle. At the harvest time we seem to have ancient echoes of famine during the long winter that is approaching. Perhaps most amusing from an ANS perspective is Halloween, a day given over to alter egos and frightful archetypes, ritually instilled in very young children with the odd twist of saturation bombing with sugar, a well-known hormonal toxin linked with mood changes, attention deficit disorder, diabetes and obesity. We might ask, “What are we thinking?” but there is no answer because the ANS is not about thinking.

Sports are of special interest for me, not least because I enjoy them so much. Huge crowds gather, at great expense, to don the tribal colors and join in boisterous, rhythmic Yang rituals. The spectacle comes complete with patriotic ceremonies and displays and sexually provocative sideline “entertainment,” super-charged subliminal ANS practices that have no rational link to the game itself. I invite you to go to any large sporting event and watch the crowd as much as the game, viewing through ANS-colored glasses.

An ANS explanation is that modern sports, both as participatory and as spectacle, fill an important role in subconscious experience. For millennia the human ANS has evolved, and been molded by circumstances, to perform as hunter-gatherer-protector. The sympathetic branch of the ANS, the Yang Principle, has existed to mobilize with daytime alertness, to solve complex threatening situations

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with skillful mental and physical skills, and to experience the satisfaction of victory by hard-fought struggle.

Now, in just the last century, the human system finds itself in a far different world, in which the challenges are muted at best. At worst, a creature who is biologically designed for active engagement lives a life confined to traffic jams, office cubicles, medications and nighttime TV. The situation has been depicted frequently, making comedy or tragedy out of the futility and alienation of modern existence. *Falling Down* (1993), with Michael Douglas, and *Office Space* (1999) with Peter Gibbons, depict the situation brilliantly.

Sports give us an outlet for our ancient ANS impulses. Each sport has some quality of sympathetic ANS fulfillment, and each can be analyzed as such, with great insight. Some are about the territorial imperative, some are more about aiming a projectile toward a target, some involve sexual symbolism (sexual processes being primarily ANS events). Many create fields of action for tribal instincts that engage and exercise the social branch of the ANS.

Participants and spectators experience a momentary deployment of biologically programmed physical, emotional and mental skills that otherwise would be mostly dormant in a modern life. We join with our tribe in mirror neuron gratification of super-skill performance, including dressing in the regalia of “our people,” and feeling fulfillment when “our” team wins. If the team wins the top place, mob psychology can occasionally be observed, as predicted by Levine and others. The neurochemistry of these experiences is no doubt deeply nourishing for the sympathetic ANS fulfillment-starved modern participants. This is a beneficial process, an under-appreciated form of therapeutic release.

An additional level of subconscious understanding is inspired by the book *Initis*.¹⁷⁶ The author makes reference to a distinction between “Contraries” and “Contradictories.” Contraries are the norm in daily experience, defined as anything that happens in relative “shades of gray,” such as light and dark, young and old, hot and cold. Contraries can be usefully modified by “somewhat” or “relatively.” Contradictories are very rare, being phenomena that are absolutely different from their complementary conditions. “Living” and “Dead” are the ultimate examples that meet the Contradictories criteria, and these are universally fascinating. The precision of science and mathematics, the celebrated winning of the big deal in commerce and the satisfaction felt by compulsive shoppers when they score a good bargain are other examples of much-enjoyed absolutist ANS satisfaction rarely available in normal daily life.

Everyone is fascinated by Contradictories, because they are a hint of the great mysteries and the infinite invisible world, which are so instinctually compelling. It seems that sports create an artificial experience of the Contradictory state, in that, unlike most of “real” life, each event has a definite outcome. The goal is scored, or not; the shot beats the clock, or not; the player is in bounds, or out; the putt is in, or out. Enormous technological sophistication is deployed to give super-slow-motion replays from every angle, with “life” and “death” hanging in metaphorical balance. Large masses of people attend these events with religious fervor, to catch a whiff of the infinite and have momentary relief from their daily grind of “maybe” relativistic experience.

In sum, sports can be seen as a much-needed field of action in a modern context, keeping the age-old sympathetic

¹⁷⁶ Andrea Ragliabati, *Initis: Congestion of the Connective Tissue*. Masterworks, 2012. This fascinating book was first published in 1910, and was brought back into print by Phil Young, www.masterworks.com.

nervous system juices flowing in a world which otherwise becomes “Yang-deficient” rather quickly.

The ANS in Medication

The enormous popularity of intoxicants can be seen as an ANS phenomenon. Each substance has a particular neurochemical effect, either excitation or soothing, and an ANS interpretation can help make sense of otherwise inexplicable behaviors. Intoxicants of all kinds can be interpreted as form of ANS self-medication. Although these are often sub-optimum in their effects, in fact many lives are ruined in the process, the usage is still arising from an intelligent ANS intention to re-establish equilibrium in response to extremely difficult circumstances.

Selective Serotonin Re-uptake Inhibitors (SSRI-class drugs, the Prozac family) deserve more attention than they have received. Numerous experts have pointed out that these are ANS-changing, and more risky than acknowledged.¹⁷⁷ About five percent of users have reactions, including suicidal or homicidal ideation. Unexpected domestic violence and mass killings (such as Columbine and Virginia Tech) often coincide with SSRI usage, but news reports rarely include such information. A review of the data reveals the enormous extent of the problem.¹⁷⁸ In the future, investigations of these horrific events will include the question, “What medications was the perpetrator on, if any?” Patients will be much more supervised including inquiry about problematic ideation and access to weapons. ANS-distressed teenagers are a recipe for disaster if they have a set of very commonly-intersecting circumstances: a disabled social ANS, immature risk

¹⁷⁷ Peter Breggin, *Medication Madness: The Role of Psychiatric Drugs in Cases of Violence, Suicide, and Crime*. St. Martin's Griffin, 2009.

¹⁷⁸ See www.ssristories.com for a chilling ten-year summary of hundreds of known cases of SSRI being present in suicide and homicide events.

assessment brain areas, SSRI medications, a devotion to hypnotic “shooter” video games and access to their parents’ military-grade weapons.

Additionally, the ANS effects partially account for the popularity of lotteries and gambling. The odds of winning are very low, but the players experience a temporary “what-if” euphoria before the selection of a winner. The neurochemistry of optimism surges for a time, making a lottery ticket a relatively inexpensive self-medication for anxiety or depression, with few side effects and some voluntary taxation benefits. The tax is regressive, since the buyers often are not affluent, and should be spending scarce resources on something tangible, but the analgesic effect is also significant.

The ANS in politics

Understanding the ANS also sheds light on politics. The notion that elections are decided by thoughtful people analyzing issues and positions has been thoroughly disproven.¹⁷⁹ While a fraction of our mental processing does pay some attention to issues, the real action is behind the curtain, where feelings call the shots. Political persuasions generally follow ANS criteria.¹⁸⁰ Candidates’ electability closely follows people’s quick subjective impression of images of their faces.¹⁸¹

Marshall McLuhan anticipated the effect of the internet when he described how subconscious processes influenced

¹⁷⁹ Drew Western, *The Political Brain: The Role of Emotion in Deciding the Fate of the Nation*. Public Affairs, 2008.

¹⁸⁰ Emily Laber-Warren, “Unconscious Reactions Separate Liberals and Conservatives.” *Scientific American*, Sept. 4, 2012.

¹⁸¹ Kyle Mattes, Michael Spezio, Hackjin Kim, Alexander Todorov, Ralph Adolphs, and R. Michael Alvarez, *Predicting Election Outcomes from Positive and Negative Trait Assessments of Candidate Images*. Caltech 2010. [http://www.hss.caltech.edu/~rma/Election Outcomes and Trait Assessments_02.pdf](http://www.hss.caltech.edu/~rma/Election%20Outcomes%20and%20Trait%20Assessments_02.pdf)

behavior as new media were introduced, with print, radio and television all having specific effects.¹⁸² Now the whole phenomenon is being magnified by the emergence of the internet, and a new science specialty is arising to interpret trends in social media traffic. Political strategists are increasingly seeking to strike the ideal emotional tone to gain advantage for their candidates, and attempting to use emotional responses to control behavior; politicians now need to be effective actors as much or more than policy visionaries.

Politics are also a playground for Yin and Yang. The modern continuum ranges between sympathy or antipathy for the poor, freedom or structure, liberty or protection, opportunity or security. All these and more can be interpreted as dualistic processes. Governments, just like families, tribes and organizations, always deal with the universal question: is it better to have a more democratic system (Yin, the periphery), which tends to be less decisive and more chaotic, or a more authoritarian system (Yang, the core), which is extremely efficient but prone to injustice and exploitation? Political parties can be characterized along these lines, and voters will align for ANS reasons more than actual policies. This can get a little strange, as some people, in acts of cognitive dissonance, may actually vote against their own best interests. The ANS perspective explains why maps of voting patterns so often resemble maps of ANS phenomena such as obesity, diabetes, poverty and education level. Even the USA political parties' blue and red color schemes match the traditional colors for Yin and Yang.

From a Yin and Yang perspective, the answer to the age-old political question, "Freedom or control?" lies in finding balance, with a gentle flow back and forth between core and periphery, and a highly functional neutral to avoid

¹⁸² Marshall McLuhan, *The Gutenberg Galaxy*. University of Toronto, 2011. First published in 1962.

tendencies for fixation. The designers of the American system, with its three-part structure, were brilliant in trying to design a sustainable system for balancing between the two great polarities.¹⁸³ In the three governmental branches, Executive represents Yang principles, Legislative represents Yin and Judicial represents Neutral. Where are Goethe and Franklin (philosopher-scientist-politician-artists of their era), now that we need them?

Applications in Groups

Because groups automatically invoke the social ANS, Porges' work has profound implications for group dynamics.¹⁸⁴ In a sense, the whole multi-person group is functioning as what therapist and teacher Mukara Meredith calls "one living system," with many individual cells.

In a group setting, each person's relational experience becomes expressed in a collective form. Some participants' higher faculties, namely the social nervous system layer, will be operational, but some will have experienced defeat on that level and habitually respond in older sympathetic autonomic ways (conflict or flight); more severely damaged group members will tend to use their most primitive parasympathetic responses (withdrawal).

When a group attempts to accomplish a task together, especially in a difficult or seemingly threatening context, all three layers of autonomic function will be discernible. At first, relational (social) strategies will be exhibited, except under severe conditions. These will be successful or gradually yield to sympathetic (fight/flight) tactics, and ultimately to

¹⁸³ The appearance of pyramids with single eyes on the back of dollar bills derives from the founding fathers being informed by their participation in Masonic ideals, which included esoteric material.

¹⁸⁴ For an exploration of Polyvagal Theory applications in groups, see seminar leader Mukara Meredith's <http://matrixworkslivingsystems.com>.

**An ANS Terminology Note
for Readers of Randolph Stone**

Writing in the period 1948-1954, Stone used the language of his era, creating a problem for modern readers. For example:

"The sympathetic or vegetative nervous system... repairs the body and keeps it in tune with the natural forces." -Polarity Therapy, Vol. 1, Book 1, p. 38.

"Sympathetic" here refers to the whole Autonomic, not just the mobilization/fight/flight subgroup, the modern meaning. In addition, the term "Vegetative" is also used to mean the whole ANS.

The reasoning behind these old terms is derived from categorizing the nervous system parts between Voluntary and Involuntary action. To repeat, the voluntary nerve groups operate for conscious volitional movements, while the involuntary nerve groups operate for actions that have little or no voluntary control, such as essential visceral functions.

In an earlier era, the voluntary groups were considered to demonstrate "antipathy" in that a separate-from-body witness consciousness is the operator. This is a Yang perspective, involving the ectodermal embryonic tissues, the brain and sense organs. The mind has to be functionally somewhat separate from the body in order to tell it what to do. Conversely, the involuntary ("autonomic") groups were considered to be in "sympathy" because there is no apparent separate control, and "vegetative" because they regulate more primitive functioning of the viscera and metabolism. This is a Yin endodermal perspective. To be in sympathy is the opposite of being in antipathy, therefore sympathetic made sense as the opposite of antipathetic (voluntary).

As discussed earlier, a third perceptual perspective, empathy, represents a mid-point Neutral (embodied in the meso tissues) and is considered by embryologist and anatomist Jaap van der Wal to be the territory of the heart.

To correct this problem, van der Wal advocates returning to the earlier language, with the divisions of the autonomic being known as parasympathetic (Yin, baseline metabolism) and orthosympathetic (Yang, mobilization). "Para" means *along with*, and "ortho" means *straight to*.

isolation and immobility within individuals and the group. For individuals in the group, there will be a “bell curve” effect with some people exhibiting behaviors in advance of or trailing the majority. For example, as a group under stress shifts from relational to fight/flight behaviors, some participants will already be showing immobility while others will be continuing to try social engagement. This sequence sheds light on the perplexing phenomena of mob psychology, and guides us toward optimum group management.

Groups can be facilitated to “evolve” up the three-part ANS chain, using awareness and careful management. The key is to gently re-establish full range of motion in the ANS, by intentionally invoking the highest function, the social nervous system, while also acknowledging, de-pathologizing and safely fulfilling the impulses of the older ANS branches. For example in a classroom dealing with challenging material, teachers can splice in social nervous system activities (having students interact with allies), encourage movement (sympathetic ANS fulfillment) and provide snacks (parasympathetic fulfillment). Similar to the effects of the “Roots of Empathy” program, such strategies can be expected to lead to enhanced learning, less anxiety, more creativity and higher and more integrated functionality.

Similarly, groups can be managed to maintain functionality in the collective social nervous system layer by carefully noting when individuals, or the group as a whole, start to slip down to a lower base. For optimum functionality, the critical mass majority should be maintained at the social ANS level. Group participation can help individuals by pulling them up to function at a social level, even though their individual systems may be habitually more inclined to lower levels. Properly conducted, a group experience can be healing for an individual with an ANS problem, rather than making it worse, as is often the case.