



Nature as Discourse: Transdisciplinarity and Vagus Nerve Function

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Within the definition of evolution and Transdisciplinary Becoming the finer qualities of human awareness and perception are in question. This paper derives from a philosophy of nature and presents the argument that Transdisciplinarity's triad model will only succeed in obtaining the three levels of Reality that Being Transdisciplinary entails if it incorporates autonomic/cognitive forces within *Homo sapiens'* phylogenetic organization. Since co-evolutionary principles of human-brain and autonomic nervous system functioning are a biological imperative for raising normative levels of Being, individuals, schools, and cultural institutions must instill both phylogenetic and experiential understanding of human neurobiology in their curricula. After a brief historical introduction to metaphysics and vagus nerve functioning [Fig.1], I will move to the contemporary perspective of Polyvagal Theory and conclude with Transdisciplinarity's intrinsic need to articulate the science (nature's way) with regard to the project of grounding education within the whole primordial sense of Transdisciplinary Being.

Keywords: Transdisciplinarity, consciousness, college curricula, humanities, integrative, vagus nerve, polyvagal theory, G.I. Gurdjieff studies, evolutionary biology, neurology.

1 Introduction

In his prolegomena *To Any Future Metaphysics*, Immanuel Kant (1724-1804) specified metaphysics are “not for the use of mere learners, but of future teachers, and even the latter should not expect that they will be serviceable for the systematic exposition of a ready-made science, but for the use of the discovery of the science itself” [1]. Post Renaissance, marking the transition from medieval to modern world and the revival of Greek and Roman literature, Kant reached for the crux of what principle the concept of metaphysics extracts from the cognition of experience itself. Distinguishing *the science* from scientific thinking, he identified centuries of tangled knowledge to be inadequate to fulfill the experience of existence dynamics necessary for humans to adapt somatic agency toward their psychic potential.

Anticipating nature's process of assessment and re-

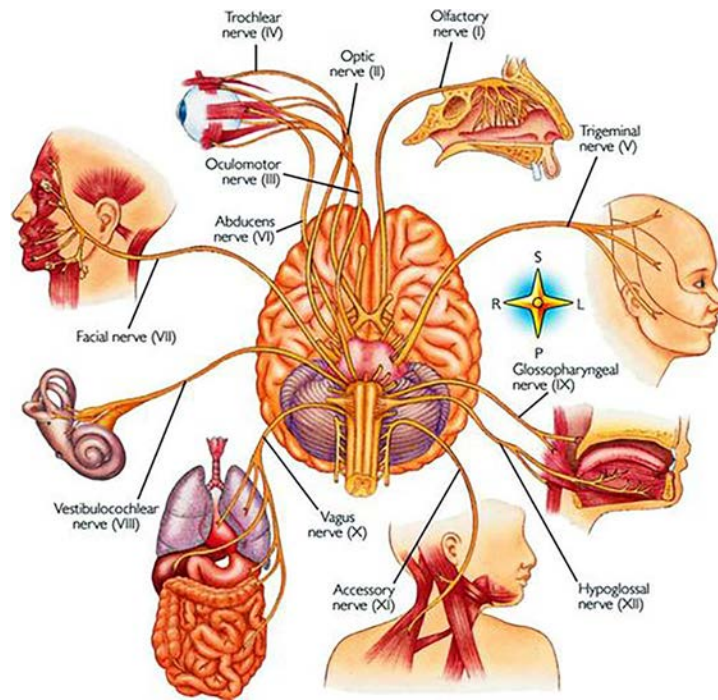


Figure 1: Cranial Nerves: Vagus (X). <http://nursingtips.tumblr.com/post/58902505692/cranial-nerves>

finement, Kant’s *Critique of Judgement* [1790] later asserted: “nature is not profligate” and “process is purpose,” [2] a fact that naturally transcends synthetic metaphysics. With Einstein’s $E = mc^2$ and G.I.Gurdjieff’s equation, extended by H.T. Lindahl (2018 [3]) : *the inverse ratio of the density-of-mass to the density-of-vibrations as regulated by the normalization of the entropy of existence by the intropy of experience* [4] , humans are signaled to the imperative for experiential observation of process and purpose in Being. How humans conserve or spend energy in relation to their phylogenetic disparate 3-brain system is a principle concept of intentional evolutionary development. It is therefore a critical principle of Transdisciplinary education, a philosophy of education that ultimately addresses nature’s process.

2 Nature as Discourse^[5]

Today, correspondences between Gnostic and Empirical research are in plain view. The earliest touchstones of intuitive processing of knowledge go back to Pre-Socratic reasoning. The philosophers who wrote about a cosmological unified natural world and alchemical processes were, namely:

Thales	620 BCE – 546 BCE	Pythagoras	570 BCE – 495 BCE
Heraclitus	535 BCE – 475 BCE	Parmenides	510 BCE – 560 BCE
Anaxagoras	500 BCE – 428 BCE	Empedocles	490 BCE – 430 BCE
Epicurus	469 BCE – 399 BCE	Socrates	469 BCE – 399 BCE

While the qualities of intuitive examination remain preserved in Eastern sacred texts and traditions, self-knowledge in traditional Western education and culture were largely lost to the Common Era. On the empirical side, proponents of taxonomical classification have, over two centuries, assimilated an objective understanding of naturally complex adaptive systems in anatomy and physiology. What is projected from somatic sentience, through autonomic nervous system processes, is the largely inactive, latently emerging adaptive potential of our psychic organs—thought, self-awareness, intention, attention—and, with investment of practice, the finer vibration rates of impartial conscience and objective reason.

3 Historical Scientific Perspectives of Vagus Nerve Function

A remarkably consistent development of empirical research traces our ability to understand Vagus Nerve function. In 1504-1506, artist and scientist Leonardo da Vinci drew the “reversive nerve,” as the vagus

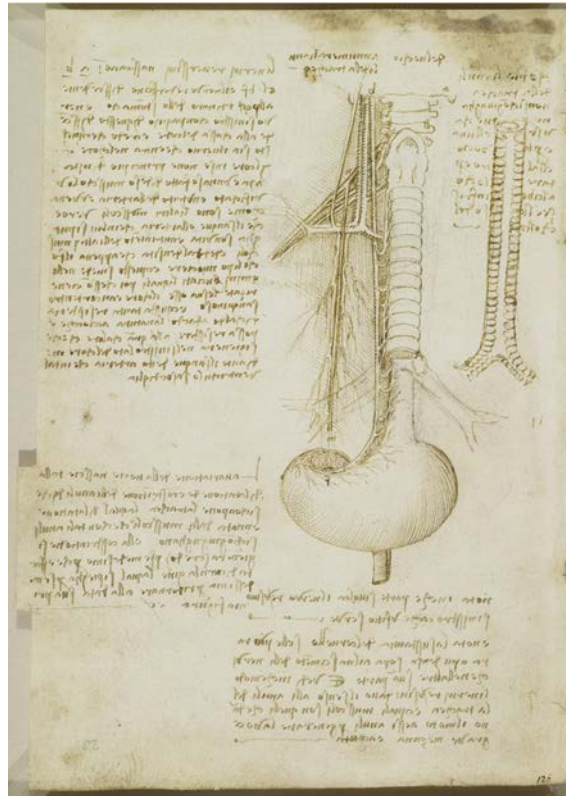


Figure 2: Leonardo Drawing 1504-1506 Leonardo on the Human Body: The Anatomical, Physiological, and Embryological Drawings of Leonardo da Vinci (N Y: Henry Schuman)

was known in his day (Galen 1275–1326). This study was published in his anatomical, physiological, and embryological drawings of 1795 (Fig. 2). In his notebook, da Vinci wrote:

If the heart's motion comes from the rever-
sive nerves, which have their origin in the
brain, then you will clarify how the soul
[i.e. animal spirits] have their own origin
in the left ventricle of the heart. So, you
should attend well to these reversive nerves
and likewise to other nerves because the
motion of all the muscles arise from these
nerves which with their branches are dif-
fused through the muscles (da Vinci, [1504];
1952 p.222).

Since da Vinci, 19th and 20th century empirical data has significantly refined our understanding of the relationship between vagus and human brain development. Four key figures brought the following findings into the 21st century:

1. Charles Darwin *Pneumogastric Nerve*

2. John Hughlings Jackson *Theory of dissolution*

3. Paul MacLean *Triune-brain neuroethology*

4. Stephen Porges *Polyvagal Theory*

In his book *The Expression of Emotions in Man and Animals* (1872), Charles Darwin proposed the central nervous system and *pneumogastric* (vagus) nerve is evolved, adaptive, and serves crucial survival and social communicative functions largely through the facial muscles. Rather than being simply a reaction to experience, Darwin postulated emotional expression is reciprocally linked to physiology. With distinct neural pathways, he observed that the vagus bi-directionally exchanges information between brain and major visceral organs such as the heart, lungs and abdomen. He wrote, “When the heart is affected it reacts on the brain, and the state of the brain again reacts through the pneumogastric nerve on the heart; so that under any excitement there will be much mutual action and reaction between these, the two most important organs of the body” (Darwin, 1872 [6]).

Jackson's Theory of Dissolution

“The higher nervous system arrangements inhibit (or control) the lower, and thus, when the higher are suddenly rendered functionless, the lower rise in activity.”



—John Hughlings Jackson (1835-1911)
 Father of English Neurology
 Quoted by Stephen Porges 11/01

Slide prepared by John Chitty, Colorado School of Energy Studies, www.energyschool.com



Figure 3: John Hughlings Jackson Theory of dissolution [1884] Picture supplied by John Chitty, Colorado school of Energy Studies, www.energyschool.com

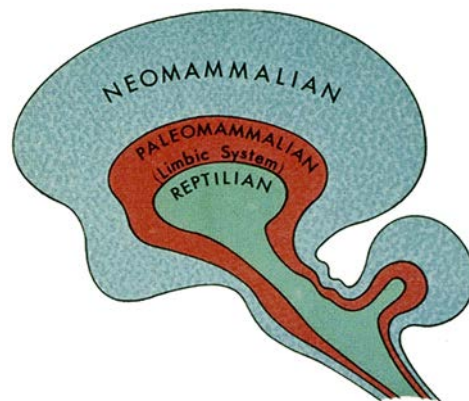


Figure 4: Symbolic triune brain, expressing the evolution of the brain from reptiles, early mammals to man. After P. D. MacLean (1967, 1990)

Following Darwin, John Hughlings Jackson (1835-1911) developed his “theory of Dissolution.” In his 1884 Croonian Lectures, Jackson stated: “the higher nervous system arrangements inhibit (or control) the lower, and thus, when the higher are suddenly rendered functionless, the lower rise in activity.” [7] While Darwin’s theory identified mind-body connection, Jackson illustrated its dynamic relationship, whereby our inherited hierarchical three-brain structure is a disparate, unschooled, natural default system [Fig. 3].

In 1966, Paul D. MacLean (1913–2007) further detailed the phylogenetic development of three brains from reptiles, early mammals to man, in his book *Triune-Brain neuroethology* (MacLean, 1962) [Fig. 4]. From his clinical and laboratory observations at Yale Medical School, MacLean concurred with Jackson, that the human brain is a nested hierarchy, and focused particular interest in observing how emotions effected the middle Paleomammalian limbic brain. “The appeal for an evolutionary approach to the study of the brain,” he wrote, “is because it

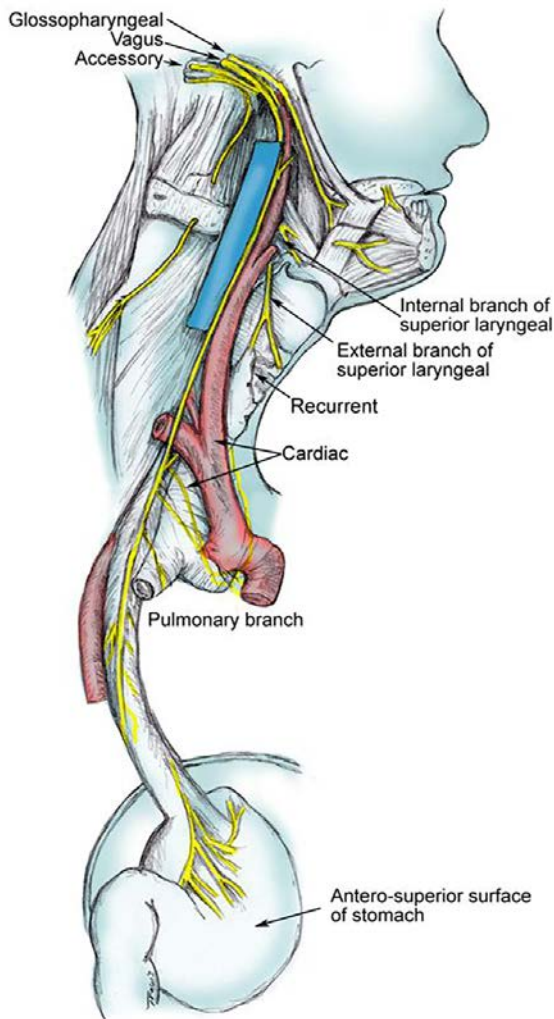


Figure 5: Vagus: Brain to Abdomen (yellow line)
<https://emedicine.medscape.com/article/1875813-overview>.

requires both reductionistic and holistic analysis. It is now recognized that in all animals there are molecular commonalities with respect to genetic coding, enzymatic reactions, and so on that carry over into complex cellular assemblies. Nowhere is the uniformity of complex cellular assemblies more striking than in the cerebral evolution of vertebrates, both as applies to similarities within classes and to certain commonalities across classes” (MacLean, 1988 p.126). MacLean, speaking allegorically, candidly pointed to the peculiar yet genuine human paradox when he cleverly remarked, “We might imagine that when a psychiatrist bids the patient to lie down on the couch, he is asking him to stretch out next to a horse and a crocodile.” [8].

4 Stephen Porges’ Polyvagal Theory

Today, three-brain dynamics are ever more experientially verifiable given empirical data Stephen Porges (1945–) provides in *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication and Self-regulation* (1994). While Porges confirms unique traits of the vagus, he specifies the degree to which humans must learn to adapt, in order to reach latent neocortical capacity. What is not self-evident to humans is their inherent, functionally distinct brain structures and branches of the vagus nerve. It is from this evidence that I argue for Transdisciplinary educators to make provisions for conveying *the science* of that which challenges intentional neocortical development without education.

A “wandering nerve,” the vagus is a conduit motor pathway that extends from the brain stem to the abdomen’s digestive system [Figs. 5 & 6]. A division of the parasympathetic Autonomic Nervous System, the vagus regulates our digestive, reproductive, endocrine, cardiovascular and neurological systems via three primary circuits: *dorsal vagal complex* (DVC) sympathetic nervous system (SNS) and the *ventral vagal complex* (VVC). The parasympathetic vagus also provides the ability for the body to repair itself during sleep [Fig 7].

Overall, Porges’ model imparts a more complete understanding of how our bodies make decisions, given natural phylogenetic “stress” pressures on Autonomic Nervous System circuitry. As he refined Jackson and MacLean’s principle findings that (1) humans carry a more recently evolved (higher) myelinated sensory apparatus and (2) the ANS functions in a predictable, hierarchal dynamic, he brings exercises for assisting connectivity to our higher (newer) neocortex circuitry, some of which are found in sacred traditions.

If our ability to inhibit earlier (lower-sub diaphragm) circuits of defense and immobilization depends on recruiting our more recently evolved neocortex, we as a species can recognize what’s at stake. While reptilian and mammalian circuits are related to associative patterns of emotion—i.e. limited to a reflexive dynamic between voluntary and involuntary actions—the new third neo-cortex represents a latent (hidden) potential reconciling force, which, with intentional effort, brings an inner transformation of Being [Fig 8].

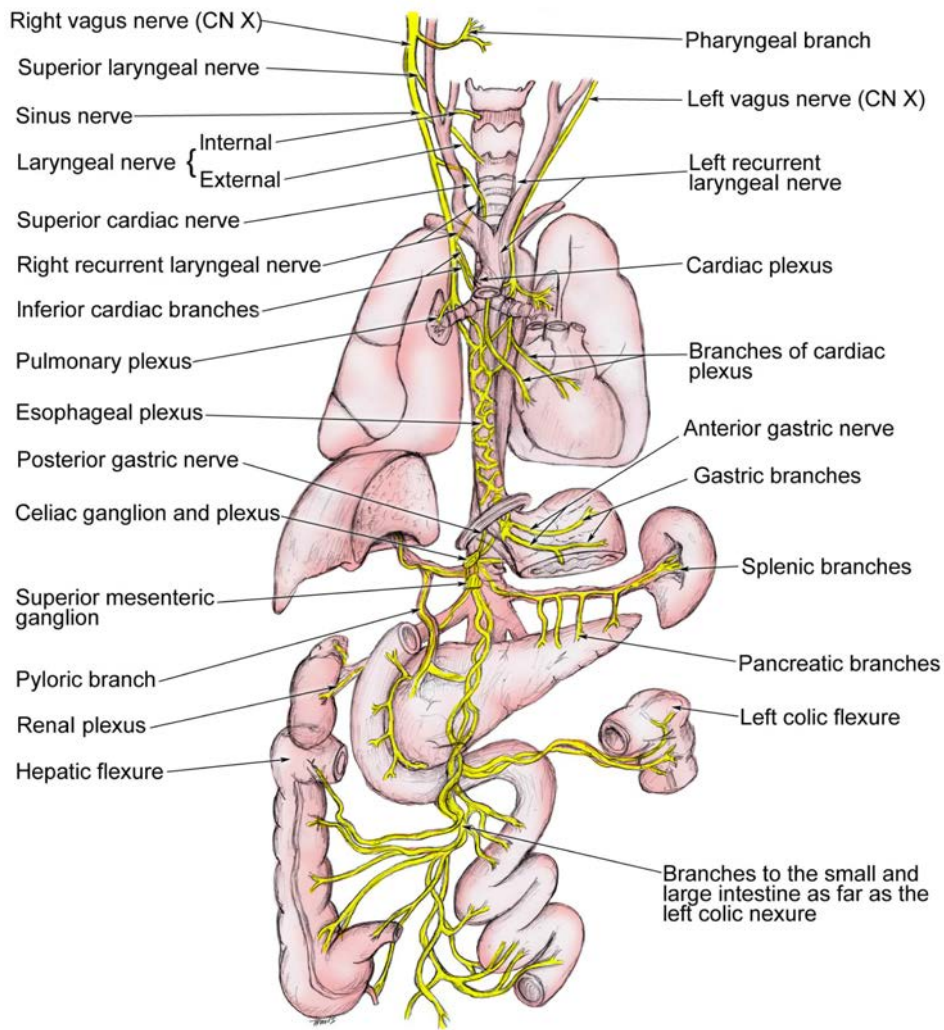


Figure 6: Vagus Nerve (yellow line) <https://medicine.medscape.com/article/1875813-overview>.

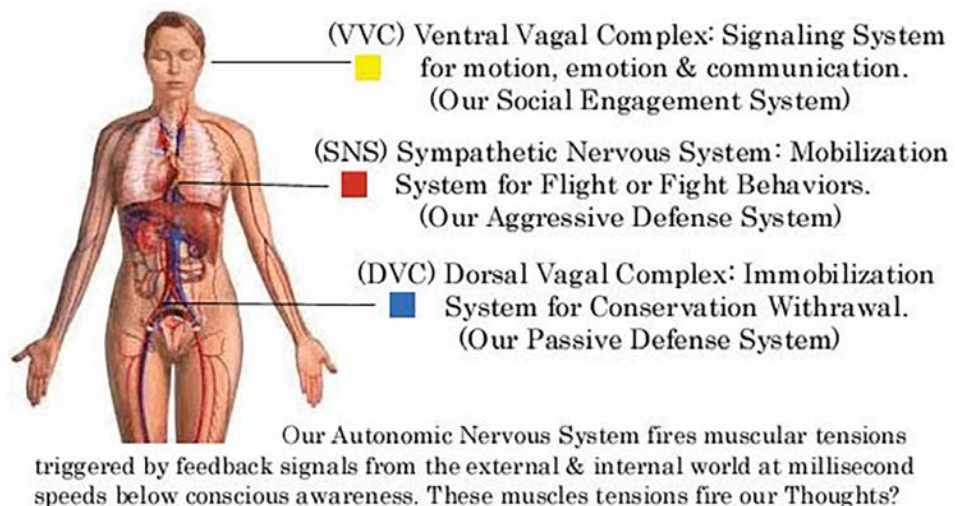


Figure 7: Stephen Porges Polyvagal Theory (1994) <https://attachmentdisorderhealing.com/porges-polyvagal/>

5 Implications

As humans discover higher levels of attention and intention for evolving somatic to psychic organs they come directly in touch with Transdisciplinary becoming processes. Because Porges' empirical understanding outdates the agonistic bi-directional "fight-flight" defense model previously taught in medical schools, without ambiguity, Polyvagal Theory deserves considerable thought within the Transdisciplinarity Congress as to its implications in relation to the challenges and advancement of humans reaching the unrealized capacity of their neocortical potential.

For the vagus nerve to function fully, it relies on vagal tone or the tonic influence of the myelinated ventral pathways of the heart to regulate the parasympathetic nervous system associated with rest, relaxation, and digestion (Porges, 1994, 2017). The identification of a third circuit, the Ventral Vagal Complex (VVC) offers a primordial understanding of the natural complexity of Post-Simian Pre-Homo Sapiens striving [9]. A signaling system for motion, emotion and communication, the parasympathetic vagus nurtures our potential cortical development—a potential humans may intentionally work toward developing. When possible to access and integrate the whole ANS range, the built-in default system of our older (lower) two-way system is held in check.

6 A 21st Century Call for Synthesis of Gnostic and Empirical Research

The enunciation for an integrated Gnostic and Empirical approach still had its predominating foot in metaphysics when Kant, Hegel (1770-1831), Schopenhauer (1778-1860), Nietzsche (1844-1900), William James (1842-1910) and Husserl (1859-1938) theorized its imminence. Perhaps Goethe's (1749 -1832) last letter, written on his deathbed in Weimar, 17th of March 1832, calls attention to the Zeitgeist and inevitable future alignment. His letter, a reply to Wilhelm von Humboldt, expresses what "awareness of mind" he had experienced, unlike any previous time in his creative life, when writing part II of Faust. The following passage implicitly lays forth his phenomenological experience:

The Ancients said that the animals are taught through their organs; let me add to

this, so are men, but they have the advantage of teaching their organs in return.

Every action, and so any talent, needs some inborn faculty, which acts naturally, and unconsciously carries with it the necessary aptitude, and which, therefore, continues to act in such a way that though its law is implicit in it, its course in the end may be aimless and purposeless. The earlier man becomes aware that there exists some craft, some art that can help him towards a controlled heightening of his natural abilities, the happier he is; whatever he may receive from without does not harm his innate individuality (Goethe, 1957 [1832] p.537), [10].

7 G. I. Gurdjieff: Somatic Evolution to Psychic Psyvolution [11]

A "true to life," transdisciplinary education would teach isomorphic qualities intrinsic to perception, pattern mapping, language, and aesthetic (non-directive) skills. Curricula utilizing these somatic educational tools can result in indispensable, creative learning environments. For this pragmatism to make its way beyond a natural skepticism, humans and institutions must critically engage what innately polarizes integration. That is, the inherent driven conflict that naturally emerges in human neuroception activity is the nexus where ecological aesthetic responses have the specific potential to adopt all three levels of Transdisciplinarity's theoretical model.

To adopt verifiable practices is an imperative for humans to trans perfunctory "being". G. I. Gurdjieff's (1866-1949) not widely known transdisciplinary based methods initiates three brained or three centered Intellectual, Moving, Emotional work on one's self. The pragmatic aim of his experiential methods was to assist humans in self-observation of their formative inheritance as they work to intentionally evolve their psychic, human potential.

Gurdjieff's magnum opus Beelzebub's Tales to His Grandson, published a year after his death in 1950, was separately recorded in dialogues that P.D. Ouspensky published in *In Search of the Miraculous: Fragments of an Unknown Teaching*, (1949). Where Goethe, Kant, Husserl and Heidegger, et al., were

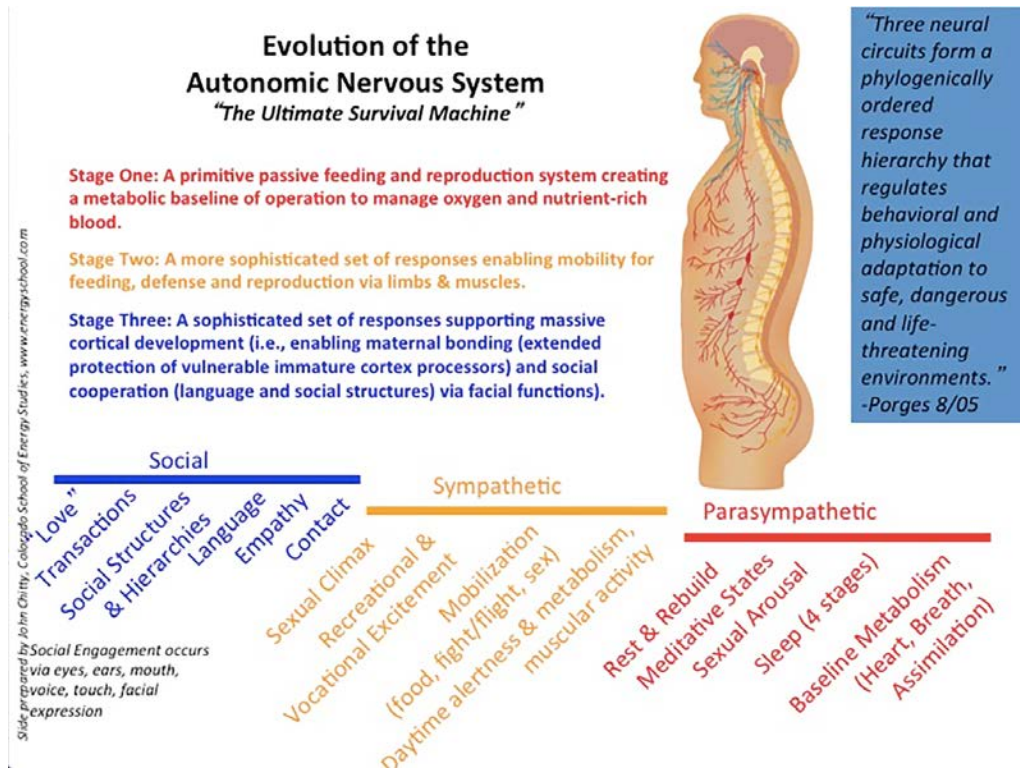


Figure 8: Stephen Porges Polyvagal Theory of Emotions (1994) Picture supplied by John Chitty, Colorado school of Energy Studies, www.energyschool.com

philosophically (mentally) aware, Gurdjieff blended sacred Eastern intuitions with Western empirical science, through a cogent practice of methods, which physically and emotionally carry the potential to unify the three brains of the human autonomic nervous system. These practices continue to be taught in small groups around the world, with headquarters located in Paris, London, and New York.

8 Conclusion

Polyvagal Theory and ANS regulatory functions are too strongly aligned with human evolutionary development to ignore in relation to raising higher normative levels of education. A Transdisciplinary education practice toward Being invites individuals to research, "in situ", illusionary brackets within the body/mind's natural environment. If principles of evolution were taught with intentional participation, the perceptual shift necessary to evolve Transdisciplinary Being would, in time, emerge.

Since the parasympathetic vagus is the primary conduit for sensory neo-cortical adaption processes, it necessarily becomes a core focus within Transdisciplinarity Being curricula. To emphasize study

of the biological dynamic that naturally regulates our Autonomic Nervous System in a predictable way would establish *the science* for all future experiential learning practices of Being Transdisciplinary. Today, by changing nothing but our opinions, a cultural engagement with the much sought-after goals of metaphysics would mean adapting neural perceptions whereby the process of the release of information conserved in phenomena is expressed through the transdisciplinary instincts of science, art and religion (Lindahl, 2018). Because a trajectory for emphasis on cross-cultural research in human-brain and autonomic nervous system dynamics has not yet been explored in other literature on Transdisciplinarity, the following objectives provide focus toward formatting Transdisciplinary curricula:

Co-evolutionary, Transdisciplinary Being practices require humans to evolve self-knowledge in relation to a cosmological worldview. This micro/macro worldview offers scale and context for refining ecological aesthetic perception.

Creating transcendental coherence, where individuals re-cognize how humanity as a

whole relates to larger living systems, is a gradual, natural turning point based on individual and community intentions.

By refining our perceptions, humans are directed toward parsing distinctions between objective and subjective associative psychology.

The Vagus Nerve is the biological instrument that regulates higher normative levels of perception, response, and communication in a predictable phylogenetic manner. An experiential Gurdjieffian holistic gestalt offers specific practices conducted in life itself.

The transition from the predominance of our somatic survival instincts through the assisted refinement of our psychic organs of thought, self-awareness, intention, attention, evolves the higher normative levels of objective reason, requisite for becoming a Transdisciplinary Being.

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- [4] Intropy = Experience. The digestive refinement processes of food, air, impressions, and psychic education. Entropy = Loss of vibration rate due to the weight and complexity of existence.
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- [10] 1957 *Letters from Goethe*. Translated by von Herzfeld and Melvil Sym (University of Edinburgh Press), p. 537.
- [11] Psyvolution is a neologism coined by the Intropy=Entropy Institute expressing the process in which, what will emerge can be sensed from what has emerged. The passage is paraphrased from the Institute's mission statement whose aim is to develop a College of Humanology, where by the study of essence and being are experientially discerned. Susannah Hays is co-founder of the Institute, working with founder, Harold Terry Lindahl.

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Dr. Susannah Hays is an American artist and educator practicing in the fields of philosophy, ecology, book arts, analogue and digital photography. Her fine art work has been widely exhibited and collected by numerous private and public institutions, including Stanford University's Green Library who acquired her archive in 2010. Presently administrating the Intropy=Entropy Institute's transdisciplinary projects to the general public, she joined the faculty at the San Francisco Art Institute between 2000 and 2012, and has since been contributing faculty