

TRANS=EMBODIMENT of BEING

**PROCEEDINGS of the 3rd WORLD CONGRESS
of TRANSDISCIPLINARITY**

February 3 and 5, 2021



**THE POST-SIMIAN PRE-HOMO SAPIENS
CONUNDRUM**

TRANS=EMBODIMENT of BEING
Proceedings of the Third World Congress of
Transdisciplinarity

was held virtually from Mexico City on
February 3 and 5, 2021

preview of all texts
© copyright 2021

All requests for reproduction, in any format,
should be addressed to the editor:

Susannah Hays
e-mail: sunprint@earthlink.net
website: intropy-entropy-institute.org

Video recordings can be accessed via
Congress YouTube Channel site:
<https://www.youtube.com/c/3CMTr/videos>

FRONT COVER

India ink drawing by H.T. Lindahl
from *Octave Series*, 2019

BACK COVER:

India ink drawing by H.T. Lindahl
As Above, So Below 2000

DEDICATION

ACKNOWLEDGEMENTS

We gratefully acknowledge the dedicated work of the
Third World Congress Leadership Committees

CIRET-FRANCE

Basarab Nicolescu + Florent Pasquier

Center International de Recherches et Études Transdisciplinaires

CETRANS-BRAZIL

Maria Fernández de Mello + Vitória Mendonça de Barros

The Transdisciplinary Education Centre, São Paulo

CTU-ITALY UNESCO

Paolo Orefice

Transdisciplinary Chair Human Development & Culture of Peace,

University of Florence

ENAH/INAH-MEXICO

Dra Julieta Haidar

The National School of Anthropology and History of Mexico.

with additional thanks and much gratitude to the
Intropy=Entropy Institute, San Francisco California

CONTENTS

FOREWORD	1
Maria F. de Mello	
INTRODUCTION	2
Susannah Hays, PhD	
A TRANSDISCIPLINARY THEORY OF SOCIALITY: Polyvagal Theory	4
Stephen W. Porges, PhD	
Margarita de Vivero Zuber, <i>Invited Respondent</i>	4
HIGHER ENERGY, HIGHER FOODS: The Practical Reality of the Spiritual Life	5
Joseph Azize, PhD	
Jack Cain, <i>Invited Respondent</i>	11
THE FORCE OF TRANSDISCIPLINARY IMPLICATION	13
Joseph E. Brenner, PhD	
Édouard Stacke, <i>Invited Respondent</i>	13
EDUCATIONAL FUTURES: The Transdisciplinary Pedagogies of Love, Life, Wisdom & Voice	14
Jennifer M. Gidley, PhD	
Nathalie Bois-Huyghe, <i>Invited Respondent</i>	14
HUMANOLGY	
Harold Terry Lindahl	
Maria F. de Mello, <i>Invited Respondent</i>	28
MOVING BEYOND OUR NATURAL ATTITUDE: The Science of Being	29
A conversation: Stephen W. Porges and Harold Terry Lindahl	
AFTERWORD	30
Susannah Hays, PhD	

FOREWORD

The theme “Trans = Embodiment of Being” is of enormous relevance to the effective exercise of Transdisciplinarity and of major concern to CETRANS research and studies, publications, formative processes, since its foundation in 1998.

The topics that will be addressed today are the result of years of creativity, herein presented in a succinct and brilliant way. It is impossible to imagine the extent of the work and dedication, as well as the changes and transformations that have occurred in the course of so many years of research that made it possible for this achievement be shared with us in this week’s Keynote, Roundtable and Symposium.

“Trans = Embodiment of Being,” more than seeing the world from the point of view of the “individual self” adopts another formula, in which: “the world becomes conscious of itself” or “the world recognizes itself,” as Kitaro Nishida posits. In this sense, this consciousness of Being in the World and Being the World, far from being mystified is to be felt through a direct experience, an experience commonly named: Absolute; Void; No—Thing, the profound foundation of “Being”. This means, knowing the facts as they are, without adding any measure of judgment or discrimination, or any of our elaborations.

To experience Embodiment of Being is to experience a state of consciousness of direct nature, where there is neither subject nor object, quite distant from the indirect experiences we attest in the disciplinary universe. However complex, the experience of the Embodiment of Being may be, it is in itself, universal, simple, singular, unifying, attuned to attention and to the instant.

“Trans = Embodiment of Being” is an invitation to a banquet, to be enjoyed in our intimacy, as a unifying activity that happens in agreement with feeling, with our inclination to access our ultimate possibilities and, perhaps, to see them transpire in our actions. Certainly, this is a genuine dynamic movement of Transdisciplinary nature.

To address a subject matter of such relevance requires a lot of rigor and openness, as well as adequate contextualization. For today’s presentations, a selection was made that intends to provide an understanding of the amplitude of this complexity, how challenging it is, in actualized practice.

I leave here my gratitude to the speakers and respondents. I thank Susannah Hays immensely for her careful and judicious work in articulating this week’s session theme, in addition to her selection of invited speakers in which she will conclude with an afterword essay.

Maria Fernandez de Mello
February 5, 2021
CETRANS
São Paulo, Brazil

INTRODUCTION

It's been a privilege and pleasure to collaborate with CETRANS co-founders Maria F. de Mello and Vitória M. de Barros on a two-day program for the 2021 Third World Congress of Transdisciplinarity. From the moment we met in Cluj-Napoca, Romania, in June 2018, where I presented *Nature as Discourse: Transdisciplinarity and Vagus Nerve Function*, our spirits harmonized due to the question: What is a Transdisciplinary Being?

Susannah Hays
I=E Institute
CIRET & CETRANS
Santa Fe, New Mexico

MORE INTRO TEXT

**Creativity & Productivity
in both the
Sciences & Humanities
are dependent on
the Evolutionary History
of Human Biology
and the Adaptive Features
of the Human Nervous System**

STEPHEN W. PORGES

A TRANSDISCIPLINARY THEORY OF SOCIALITY: Polyvagal Theory

Stephen W. Porges PhD, United States

KEYNOTE ADDRESS

Thank you for inviting me to participate in this conference. While preparing this talk, I came to the conclusion that I am a “Transdisciplinary”. My world has always been focused on bridging disciplines. I just didn’t realize how much my scientific perspective was bridging disciplines until I prepared this talk. This is a new type of talk for me to give. My normal audiences are generally faculty at medical schools and universities and scientists affiliated with specific organizations. Prior to this talk, my experience bridging disciplines has been to translate my science into a language that can be understood by clinicians, administrators, and educators.

My talk is about the human quest to be embodied, a process in which our mind and our body function in collaboration as an integrated system. One thing we need to know, as we start talking about this journey to embodiment, is that we’re really talking about an evolutionary journey of mammals—and we are mammals—into a social world, where we have to interact with each other to enable our body to, in a sense, be embodied. And as we detail the alternative discipline-dependent perspectives, we will need to acknowledge how our physiological state can distort or bias our acceptance of information from other perspectives. Thus, underlying our personal ability to be truly transdisciplinary is our nervous system and how it influences our mental and behavioral capacities to be informed.

THE TWO CULTURES

Many years ago, as an undergraduate student, I read C. P. Snow’s lecture, *The Two Cultures*. I never forgot it. I recall, at the time I read it, it seemed to be a pessimistic prediction of the intellectual future in Western cultures. It described an academic future in which the gap between foundational sciences and the humanities would expand and become separate intellectual cultures. The following quote summarizes his prediction.

I believe the intellectual life of the whole of western society is increasingly being split into two polar groups... Literary intellectuals at one pole—at the other scientists, and as the most representative, the physical scientists. Between the two, a gulf of mutual incomprehension—sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding (Snow, 1959).

Since, as a developing scientist, I was also interested in the Arts and Humanities, I interpreted this premise as a personal challenge. As an undergraduate I wondered how an intellectually curious student would be able to navigate through this complex world of discrete disciplines. Today, I’m going to tell you that it’s much worse than he saw it in 1959. I recently found a quote

from a position paper I wrote in the 1990s. The quote below expresses my personal feeling as an established full Professor.

I have spent my entire professional life in the academic scientific community, a community that takes a Tower of Babel approach to scientific inquiry. Often, I felt I was talking to illiterate primitives. Although these individuals had doctorates from the major research-oriented universities. At times, I've struggled to understand the research questions about their disciplines. And, at other times, I have attempted to convey the most basic concepts of my research. I've struggled with communication and have searched for a common vocabulary and scientific metaphor (Porges, personal communication 1998).

Over the years, I realized that if I could develop a language to convey the passion and intuitions of my work, then my ideas would be more acceptable to those who were within or outside my discipline. The acceptability of novel ideas is biased by the knowledge and orientation of the audience. Currently, within Universities there is a bias away from a broad liberal arts education and a bias towards STEM disciplines and applied programs. STEM is a shorthand for Science Technology Engineering and Mathematics. Its interdisciplinary and applied approach is not transdisciplinary or reflective of the integration of shared disciplines. Rather it structured on the common core knowledge of the STEM disciplines and a separation from the arts and humanities.

Even in the biomedical or mental health areas, we learn that when stakeholders encourage interdisciplinary research, they are basically arguing for a place at the table. They're not arguing about sharing underlying principles or solving problems. They're arguing for resources to fund their programs. Over the past 75 years, the disciplines that were fortunate to be funded by government agencies and foundations have flourished, as have applied areas such as business schools that attract students

focused on obtaining jobs and not discovery or creativity. In Universities this trend translates into the shrinkage of academic departments in the Arts and Humanities.

In university settings we are well aware of the consequence of this strategy. For those of us who have been faculty members for several decades, we have observed the impact of a bias towards technology, science and application and what it's done to the humanities and arts. It's basically diverted resources. Now in most universities, the academic departments representing the humanities and the arts are literally starving. Since these departments rarely receive grants from foundations and government institutes, the disciplines tend to be solely dependent on University resources. Moreover, the humanities and arts are attracting fewer students and thus receive less funding from their Universities. As Universities continue to lose federal and state funding, the business plan of Universities has focused on faculty generating funds and offering high demand undergraduate courses. In both these domains, the humanities and the arts have lagged behind the STEM sciences and applied areas such as business. On an individual level, faculty in the humanities and arts receive lower salaries than faculty in the STEM disciplines or business. In fact, faculty in highly rated schools of business, may be receiving salaries as high as surgeons.

WESTERN PHILOSOPHY/ SCIENCE CARTESIAN DUALISM: UNDERSTANDING OUR BIOLOGY

Is this disinterest in linking disparate intellectual strategies a reflection of a culturally deficient link between an awareness and a respect for mind and body? Missing in our institutions is a deep understanding, or even an appreciation of mind-body and brain-body relationships that would enable a convergence between objective neural measurements and subjective feelings and thoughts resulting in a truly transdisciplinary approach to the construct of embodiment. However, what happens when disembodiment is the cultural norm? When it is, we actualize C.P. Snow's vision. And, if we affiliate in our thinking with the objective

and mechanistic sciences, we literally, reflexively become disinterested in the humanities. Missing in the narrative of how institutions have become 'disciplined', is an understanding of biology and the role of the nervous system in our objective and subjective experiences. Missing is an awareness of how biology biases emotional, mental, and behavioral processes, including boldness, insight, creativity, aesthetic expression, and even spirituality.

Our biology influences our capacity to accept and process novel information and alternative perspectives and models. Functionally, our biology determines or limits whether we can accept a transdisciplinary perspective. On a personal level, it determines whether transdisciplinarity is a viable concept that we welcome, because our capacity to incorporate transdisciplinarity in our world view is dependent on our biology as expressed in our physiological state. This functionally means that when our bodies are in states of threat, we limit our intellectual and emotional access to novel information. For those of us who have bounded our intellectual experiences and professions by joining university communities, we realize through our experiences that universities are not safe places. Since the day-to-day experiences within Universities are framed through continuous evaluation, our nervous systems are bathed in cues of constant threat. Our nervous system unambiguously interprets evaluation as threat.

Through the process of creating intellectual domains or disciplines, we have lost the knowledge and insights that are not disciplined defined. As a product of this process, we have lost the tools and strategies to fulfill our basic need to connect and truly cooperate with others. This need to connect is not merely an intentional behavioral action, it is a profound expression of our biological imperative—our need to survive through connection and cooperation with others. This biological need to connect and cooperate is a major theme of this talk. If we don't have access to this process of connection, we will fail to appreciate the biases we experience when we are either feeling safe or threatened. Thus, as a threatened species, we focus on the predictable and the familiar.

We gravitate away from novelty and curiosity. However, when we feel safe, we spontaneously become curious, bold and creative.

ESTABLISHING DISCIPLINES AS INTELLECTUAL 'SANCTUARIES' COMES WITH A GREAT COST TO SOCIETY.

Academic disciplines provide a platform to un-educate the educated. If we look at the prevalence or percentage of bachelor's degrees in the United States by discipline major, we are informed that the most popular major is business, which accounts for about three times the total majors in the humanities and liberal arts. In fact, more than 50% of the majors are focused on professions (e.g., business, education, journalism, etc.). In contrast, in the 1960s or the 1970s, most majors were included within liberal arts, which represented a broader educational experience including courses in both the humanities and sciences. At the time, this composite of educational material helped form the concept of a 'well rounded' educational experience producing a culturally embodied educated person. In today's academic institutions, majors in liberal arts have become a much smaller segment as students move towards applied areas that fit targeted professions. In a historic way, University students are no longer being educated, but being trained similar to the traditions of technical schools. However, as a byproduct of this strategy, was the creation of an 'educated' population in which many have lost the history of their own humanity.

Disciplines functionally limit understanding and creativity beyond the defined boundaries of the discipline. A discipline-oriented education functionally imprisons the creative mind. I have frequently used the concept of being imprisoned to describe my experiences as a University professor. This doesn't mean that my experiences as a professor were negative and that I did not enjoy or experience benefits of exploration and discovery. But, in retrospect, I realize that my experiences were primarily limited by the administrative structures within a university of colleges, departments, institutes, and divisions. The structures form ecological

niches, since they have responsibilities for delivery education (i.e., teaching), conducting and obtaining resources for research, and the hiring and evaluation of faculty. Similar to most business models, finances limit the vision.

As a professor, I certainly did not have the time or resources to venture too far from my 'unit' and build bridges across disciplines that might foster the defining of new problems and creative problem-solving techniques. Thus, we were functionally imprisoned and now need to reflect on these administrative and self-imposed limitations. We need to break the chains that restrain scholars from a true commitment to transdisciplinary research.

In my quest for transdisciplinary solutions, I use the Rubik's cube as a metaphor. The metaphor is useful in understanding my work in developing the Polyvagal Theory. To understand the origins of Polyvagal Theory, visualize a Rubik's cube with the surfaces representing different scientific disciplines moving in time as each science is selectively updated by new information. Metaphorically, Polyvagal Theory is the solution of a Rubik's puzzle, a solution to how evolution repurposed the mammalian autonomic nervous system to contain defensive reactions and enable sociality to thrive. This metaphor is helpful, since Polyvagal Theory is an extraction of principles derived from the integration of several disciplines each with its own history, research paradigms, literature, methodology, and theoretical context. Polyvagal Theory provides both an example of a transdisciplinary theory and an explanation of strategies that would encourage or discourage transdisciplinary work.

If we are interested in identifying principles that are not discipline-based but may underlie several disciplines, we would compare and contrast information as if we were playing with a Rubik's cube. We're twisting and translating discipline-dependent constructs as we try to find common themes and principles across disciplines. When we solve the puzzle, we identify relatively simple common themes, in which human experience is limited by biology. Some of these principles bridge the arts and sciences.

For example, pointillism pioneered by Seurat in art could be studied from sciences dedicated to the study of both perception and brain processes.

When we appreciate that we are a biological system, we acknowledge that our biology limits and biases our experiences. Our intellectual accessibility to a transdisciplinary perspective is vested in our biology. When we are threatened, our biology changes our accessibility and flexibility becomes limited as we shift our resources to deal with threat and survival. As we bring our biology and physiological state into the discussion of transdisciplinarity, we start to acknowledge general themes about our own biology and how our biology can impact on our understandings from other disciplines.

I believe, in our journey to become rationale and objective, we have neglected our biological roots and assumed that we are a simple input-output machine governed by the laws of learning and personal intentions. However, we are an adaptive biological system with a flexibility to shift physiological states based upon threats or conditions in the environment or health conditions. Polyvagal Theory emphasizes that physiological state influences how we process and evaluate information. Creativity and productivity in both the Sciences and the Humanities are dependent on the evolutionary history of human biology and the adaptive features of the human nervous system.

OUR BIOLOGICAL IMPERATIVE: CONNECT, COOPERATE & COLLABORATE

I now want to emphasize that a powerful motivator for human behavior is our biological imperative to connect, to cooperate, and to collaborate. Mammals evolved from ancient now extinct reptiles. They survived through their ability to cooperate and to share, and to be safe in the presence of others. We need to rectify a common misunderstanding of the survival of the fittest. We frequently are led to believe that survival of the fittest is related to those who are the strongest, who have the most resources and not those that can co-regulate

with others and cooperate. Through a different lens we can twist the Rubik's cube and start to extract principles of a science of sociality. We can look at the newborn baby's reaction to the mother, we see a common theme—the ability of maternal behavior to trigger in the nervous system of the infant a unique ability to give up all defenses. As these threat reactions are resolved by the vocal and behavioral gestures and vocalization, the infant's nervous system can now regulate internal organs to efficiently support health, growth and restoration. This behavior is reciprocal and co-regulatory. The mother's potent cues are enabling the infant to relax on the chest of the mother, while synchronously enabling the mother to relax as well. This co-regulatory interdependence among individuals is shared with different mammalian species.

EVOLUTIONARY PERSPECTIVE: A Coherent Transdisciplinary Narrative

Theodosius Dobzhansky, an Evolutionary Biologist (1900-1975) stated that “Nothing in Biology makes sense except in the light of Evolution” (Dobzhansky, 1973). I want to extrapolate from that statement and move it to other areas of the human experience that would include transdisciplinarity and state that: Intellectual products in the Sciences, Arts and Humanities makes sense only in light of evolution. Generalizing from this statement, we might conclude that the totality of human experience is bounded and at times biased by our biology. By acknowledging our biological basis, we can create organizing principles that initially appear to be oblique or unrelated to our biology. But if we understand our biology as the foundation of our experiences, we see commonality across disciplines, and it may help us create a more coherent transdisciplinary narrative. Dobzhansky also stated that: “The fittest may also be the gentlest because survival often requires mutual help and cooperation” (Dobzhansky, 1962). When we see this statement as a hint about how knowledge of the human experience might be shared, it leads us into transdisciplinary perspective.

CONNECTEDNESS: A BIOLOGICAL IMPERATIVE

What is a biological imperative? It defines what living organisms need to perpetuate their existence. It's survival of the fittest, not the strongest, but those who cooperate, those who help each other mitigate threat responses, and to co-regulate and create. Connectedness is this process, which we as humans express as our biological imperative. It's the body's need to co-regulate our bio-behavioral state through engagement with others. Connectedness is the ability to mutually synchronously and reciprocally regulate our physiological and behavioral state and optimize social interactions.

When we reflect on the terms synchronous and reciprocal, we realize that in our current digital and asynchronous culture our nervous system is not getting the contingent signals that support our biological imperative of connectedness. Without an efficient access to social connectedness, we experience chronic stress due to our inability to efficiently down-regulate defenses. It is only when we down-regulate our defenses that we can enjoy the benefits of sociality. These precious attributes that we experience as trust and safety with others reflect the underlying biological principles that allowed mammals to survive in a hostile world. Connectedness is an evolutionary biobehavioral process that linked social behavior with both mental and physical health. Connectedness leads to cooperation and collaboration, which fosters creative, intellectual expansiveness in us and even spirituality. The basic underlying transdisciplinary principle is that human sociality is not solely a social behavior, but rather a biobehavioral process that enables behavior to regulate our biology to promote calmness and to optimize not only social behavior, but also to optimize collaboration in all forms of problem solving.

As a metaphor, we can use the protective functions of the 'energy shields' employed on the Star Ship Enterprise. In the Star Trek movies and television series, we realize employing protective shields utilizes energy and compromises the mobility and function of the Star

Ship. In contrast, when the shields were not necessary, the energy of the Star Ship could be directed to increase speed and provide greater mobility that support the mission of exploration. Similarly, when we as humans feel safe, we are more likely to explore, to create, and to cooperate and collaborate. However, if we have to use our defenses, we use our resources to protect rather than integrate or problem solve. Similar to Star Trek, human defenses are metabolically costly. It takes energy to defend and defenses compromise function by diverting energy away from intellectual pursuits and our accessibility to interact with others, to learn from others, to exhibit a type of intellectual flexibility, to be respectful, and to be compassionate about others. In other words, we have the capacity to be transdisciplinary only when we are not in a physiological state of defense.

POLYVAGAL THEORY

The name, Polyvagal, comes from poly, meaning many, and vagus, the name of the tenth cranial nerve. During the evolutionary transition from reptiles to mammals, mammals developed a unique vagal pathway that enabled them to down-regulate defenses, which enabled mammal to come in close proximity and to create social relationships. This evolutionary change in neurophysiology enabled mammals to engage in a journey to sociality. As Polyvagal Theory developed, it provided a theoretical basis for a neuroscience of safety and explained how safety promotes both spontaneous social engagement behaviors and optimizes health growth, and restoration. The theory provides insights regarding the role that feeling safe plays in education, medical care, and social relationships.

If you're involved or interested in education, reflect on the school experiences of many young children. Going to school is frequently a trigger of painful somatic symptoms such as gut pains. For these children, the school environment provides triggers to their autonomic nervous system indicating that they're under states of threat. Typically, how do educators and parents respond to these situations? They frequently demand and even force the child to

attend school. They tell the child to get over these responses and assume that the child is feigning distress. In making these appraisals, the parents and educators are not respecting that the child's nervous system is detecting threat.

We need to acknowledge and respect that only when our body (i.e., nervous system) feels safe, will our minds expand our mental capacities to be creative and to develop bold new ideas. In acknowledging this dependency, we also acknowledge that the chronic evaluation in our educational systems trigger threat reactions that limits our productivity. As we visualize the educational experience on all levels, including universities, evaluation emerges as the powerful primary principle and evaluation procedures are potent triggers of threat. A focus on this process impacts and compromises intellectual resources. Are our respective roles supporting intellectual growth and creativity or are we compromising it?

The models that we use for evaluation compromise how our nervous system works in intellectual pursuits. We can apply the same model to medicine. Medicine has become a discipline of evaluation and assessment. How does our body react to evaluation and assessment? Our responses are reflexively and adaptively dependent on recruiting neural circuits that support defense and efficiently express threat reactions. However, threat reactions interfere with accessing the higher brain circuits that support creativity and problem solving.

Could a new transdisciplinary model be developed for disciplines, such as medicine and education, that appreciated the dependence of learning, creativity, and collaboration on a physiological state reflecting feelings of safety instead of feelings of threat? Do we go to a physician to learn about our body and develop a strategy for health? Or are our appointments with physicians cloaked with feelings and uncertainty and fear reflecting our personalized physiological state of defense? Do we leave the physician's office in a state anxiety in a state of fear, not knowing what the tests will uncover while assuming that the tests may detect a potentially fatal disorder?

In 1994 I introduced the basic principles of the Polyvagal Theory in my *Presidential Address to the Society for Psychophysiological Research*. The address was published in 1995 (Porges, 1995) with a title that succinctly abstracts the core of the theory—ORIENTING IN A DEFENSIVE WORLD: MAMMALIAN MODIFICATIONS OF OUR EVOLUTIONARY HERITAGE. A POLYVAGAL THEORY. The title emphasizes the importance for mammals to be able to direct their attention, while actively inhibiting their defensive reactions. To reliably and efficiently implement these functions, mammals had to repurpose their evolutionary heritage. Through evolutionary processes the transition from asocial reptiles to social mammals required changes in how the nervous systems regulated physiological state. Our intellectual creativity and problem-solving capacity are dependent on these changes. In retrospect, Polyvagal Theory is transdisciplinary, since it provides identifiable and quantifiable links among physiological state, social behavior, and cognitive function. At its core, the theory explains the emergent products of our evolutionary journey to sociality. Thus, the theory elevates sociality and feelings of safety and threat to discussions of all aspects of the human experience.

THE AUTONOMIC NERVOUS SYSTEM

All vertebrates have a nervous system that detects threat and reflexively defines and responds defensively. However, unlike our reptilian ancestors, mammals have a nervous system that detects safety and reflexively calms. This distinction is important and provides important information in how a polyvagal-informed culture would structure social and educational institutions. Respecting this knowledge means that if we need to send the right cues to our family, our colleagues, our students, our children. With neutrally informed contextual cues, the nervous system shifts the body from states of defense transforming these individuals into states in which they are more emotionally, physiologically and intellectually accessible.

Depending on the physiological state we are in, we are either socially and intellectually accessible or defensive. Our physiological state influences our accessibility to new perspectives and information. To be transdisciplinary in our approach, requires a physiological state in which our nervous system supports accessibility and intellectual flexibility. Understanding this dependence on physiological state, needs to be an underlying theme within strategies that encourage transdisciplinary approaches. Our physiological state determines whether we can even think within a transdisciplinary perspective or whether it's viable for us to encourage others to think in a transdisciplinary way.

Some of you may be familiar with the primary components of the autonomic nervous system, the sympathetic and parasympathetic nervous systems. The sympathetic nervous system, which is a set of pathways coming off our spine, which functionally acts like an accelerator. It tends to activate the visceral organs within our body to promote movement. Juxtaposed to the sympathetic nervous system is the parasympathetic nervous system that acts as a braking system. The primary parasympathetic influences are transmitted through a large nerve called the vagus. The vagus is a cranial nerve that originates in the brainstem. The vagus is the longest nerve in the body and travels through the viscera providing a bidirectional communication 'highway' between the brain and the visceral organs. The vagus and the sympathetic nervous system send signals to the same organs. This observation leads to a paired antagonistic model in which the sympathetic nervous system functioned as an accelerator and the vagus functioned as a brake.

Polyvagal Theory challenged this model, while acknowledging that under specific conditions it may be true. The theory emphasized that we react to the environment in a different way. We react with two different vagal pathways, because mammals have a second one. Mammals have a second vagal pathway that goes primarily to the heart and lungs and is connected in the brainstem to the nerves that regulate our facial expressions, our vocalizations, and even whether we can extract human

voice from background sounds. This second vagal pathway originates in an area of the brainstem ‘ventral’ to the evolutionarily earlier ‘dorsal’ vagal pathway that is shared with most vertebrates and in mammals provides the primary vagal regulation to organs below the diaphragm.

When the ventral vagus is working appropriately, it down-regulates the sympathetic nervous system that supports defensive behaviors such as fight and flight activities. However, the more ancient vagal circuit that goes primarily below the diaphragm, can be recruited in defense. When this occurs, it disrupts our digestive system and provide the ‘neural’ mechanism through which threat reactions are manifest in gut problems. Many people who experience severe abuse and trauma have severe problems in their sub-diaphragmatic organs including gut and genitals.

This provides some of the background of the evolutionary journey of the autonomic nervous system and how in mammals social behavior is dependent on autonomic nervous system state. With the evolutionary emergence of a brainstem area known as the ventral vagal complex, the mammalian ventral vagus becomes involved social communication and social communication becomes a regulator of autonomic state. Specifically, the ventral vagal complex identifies the neuroanatomical structures that link the ventral vagus with the nerves regulating the muscles in face and the head, producing an integrated social engagement system that enables us to calm. This system also enables those with whom we interact to be calmed by us through the facial, vocal, and gestural cues of our engagement behaviors. The evolutionarily more primitive systems, the sympathetic nervous system and the older dorsal vagus, have critical roles in our survival, but only during states of safety are those roles related to sociality, trust, connectedness, collaboration, and co-regulation. When under threat the sympathetic nervous system and dorsal vagus promote defensive reactions respectively characterized by flight-flight behaviors and immobilization (e.g., death feigning, fainting).

What happens when the social engagement system is ineffective in moving us into a state of safety or helping us survive? We use evolutionarily more primitive adaptive circuits in our quest to survive. In the absence of an effective social engagement system, we recruit the sympathetic nervous system as an efficient system to mobilize, to fight or flee. And if mobilization doesn’t effectively serve to move us into a safe place, we recruit the dorsal vagal complex. This ancient neural circuit conserves metabolic research and is observed as immobilization with lower heart rate, cessation of breathing, and at times, fainting, defecation, or appearing to be dead. This reaction mirrors the reptilian reaction to threat. When reptiles are threatened, they frequently immobilize. However, since mammals have large brains and great needs for oxygen, when they immobilize under threat the slowing of heart and the cessation of breathing is potentially lethal.

NEUROCEPTION AND THE QUEST FOR SAFETY

We live in an environment where we are bombarded with cues from inside the body and outside the body. Our nervous system evaluates this information through a process linked to Polyvagal Theory called neuroception. Neuroception is the process that evaluates risk without awareness. Neuroception interprets cues as safe, dangerous, or life-threatening. It’s not perception, which may have a cognitive component. Neuroception is reflexive and rapid. It happens before we can consciously interpret it. For example, if you step into the street and you hear a car horn or brakes squealing, your body reacts, you don’t know what the stimulus was until after you already reacted. This is a neuroception of danger. Similar someone talks to you with a warm smile and melodic voice and suddenly you feel calm and trust the person, even if the person is a stranger. This is a neuroception of safety.

Neuroception occurs rapidly to save us and to put our bodies into different physiological states without a conscious evaluation. It’s not perception. When we receive cues of safety, our faces become more animated. We make

eye contact, our voices become more melodic. As faces beam and social interactions occurs, the same neural pathways defining the social engagement system are supporting homeostatic regulation of our visceral organs including our gut.

When we are under threat, we mitigate our threat reactions through social interactions with others. When we detect via neuroception cues of danger, the social engagement system is reflexively down regulated to enable efficient mobilization that would optimize fight and flight behaviors. If a child is intimidated and overwhelmed by a large adult, the child's neuroception of potential life threat gets triggered and the child may totally shut down. This shutting down reflects a primitive reptilian defense reaction.

If we visualize the reaction of a mouse, in the jaws of the cat, we will see that the body of the mouse has lost muscle tone. This dorsal vagal state illustrates that loss of sympathetic activation that muscle tone requires. In the absence of sympathetic tone, the body collapses and literally motorically shuts down. Children can be so scared that they can pass out and may defecate—both processes being mediated by the dorsal vagus. Survivors of severe trauma and abuse may describe similar personal reactions to their abuser.

Although immobilization, as a defense strategy, is infrequently discussed within psychology or psychiatry, mobilization reactions such as fight and flight are. This focus on fight/flight is, in part, due to a relatively greater understanding of mechanisms that support fight and flight than the mechanisms supporting shutting down reactions. However, Polyvagal Theory basically explained shutdown as a defense system regulated by an evolutionarily older system of the vagus. Prior to the Polyvagal Theory, the vagus had been viewed in the literature as a system that supported health, growth and restoration. This led to the question of how could that same nerve be used in defense? Polyvagal Theory clarified this apparent contradiction by documenting the evolutionary history of the vagus and the adaptive roles of the ventral

and dorsal vagal branches are supporting the disparate functions of sociality and behavioral shutdown.

When we visualize a mother playing with her infant, we can see how the social engagement system is working. As we focus on the upper part of the faces of the mother and child, we see the liveliness and animation of the upper part of the face, especially the orbital muscle around the eye. The muscle is called the orbicularis oculi and is regulated by a branch of the facial nerve, which also is regulated by the anatomical structures in the ventral vagal complex. The orbicularis oculi sends cues between the mother and child reflecting their mutual feelings of safety, trust, and joy in the interaction. Underlying these observable facial expressions is a physiology that is also supporting health, growth, and restoration. In our visualizations we become aware that face-to-face interactions provide a portal to co-regulate physiology that support homeostatic processes. When face-to-face interactions degrade into arguments, physiological processes also become disrupted.

Conceptually, face-to-face interactions function as neural exercises of the social engagement system. These neural exercises become features of therapy, which can also be applied in the workplace or in education. Physiological processes are supported by face-to-face interactions including facial expressivity, vocalizations, and gestures. When cued by these features, immobilization becomes an opportunity to feel safe in the presence another and we can visualize the infant relaxed in the arms of the mother in a state of immobilization without fear not requiring metabolically costly muscle tone.

Immobilization without fear is the optimal state to rest, relax, sleep, digest, and perform bodily processes. When immobilized without fear in the presence of a trusting partner or friend, the state promotes intimacy and enables feelings of trust, safety, and love. However, it is a challenge for mammals to experience this state, because it requires down regulating defenses. If a person has a severe trauma history, their brain may detect proximity of another as threat and

a gesture of engagement or casual embrace may trigger an autonomic state change that would support severe defensive behaviors.

VAGAL BRAKE

Social behaviors are neural exercises of the vagal ventral vagal circuit, which function as a vagal brake inhibiting sympathetic activation that potentially could lead to fight or flight behaviors. These neural exercises are calming and promote neurophysiological states that support mental and physical health. Thus, positive supporting social interactions lead to physiological states of safety and enhance homeostatic functions with the emergent benefits of improved health, optimal maturation, and restoration. In contrast, histories of trauma and abuse lead to a retuning of the autonomic nervous system, in turn lowering the threshold to trigger defensive behaviors that disrupt connectedness and the ability to co-regulate.

With this knowledge that threat disrupts the neurophysiology of health and social behavior, we may reflect on the experience students have within academic institutions. Is the student's experience traumatic? For those who have higher education degrees, did they feel safe and enjoy the educational experience? Was the educational experience co-regulatory or was the experience traumatic?

MOVING TOWARD EMBODIMENT

Our body is on a mission. It's on a quest to be safe. We evolved with the tools to detect cues of safety such as intonation of voice, gesture, and facial expression. Our neuroception is our personal threat detection system. If we have a severe trauma history, the nervous system is potentially retuned into chronic states of defense, with a very low threshold for detecting threat. If our nervous system is more buffered, we are more resilient to transitory challenges. If we have safety in our lives and good relationships with opportunities to co-regulate, the threshold to react is elevated and we become a more resilient.

In the world of transdisciplinary studies, this may mean that if our body is in a sense safer,

we're interested in alternative models and views. We are basically interested in becoming transdisciplinary. If our bodies are in states of threat, we are not accessible to any idea that violates our expectations of what we already know, and this violation of expectancy can trigger a threat reaction.

If our social engagement system works, we may be more accessible not only to others, but also to new ideas. However, under chronic threat, the social engagement can become dormant. Retraction of the social engagement system is an adaptive response to chronic stress or threat. What happens when we experience chronic threat? We lack intonation or voice. We have poor eye contact with others, difficulties in social communication, blunted facial expressivity, and difficulties regulating our behavioral state. We may become hyper-vigilant, anxious, distractable, impulsive. Some individuals become irritable, have tantrums and panic attacks. Others become totally hypo-aroused and socially withdraw and may even dissociate. We might have a compromised visceral regulation that could be manifest in cardiac arrhythmias or digestive problems. We often have difficulties listening to verbal commands.

The profile of symptoms expands and crosses several domains and disciplines of healthcare. An individual with a dormant social engagement system might also express a vast portfolio of disorders including speech and language delays, sound hypersensitivities, oral motor defensiveness, selective eating, digestive problems, limited co-regulation and cooperation with other people, and limited creativity and intellectual integration.

In response to these problems, what does our society do? Does it do a good job creating access to our social engagement system? Do we have sufficient opportunities to exercise the social engagement system through opportunities to socially communicate? Are we replacing the opportunities our nervous system needs to regulate through social interactions with email, texting or other diversions? The bottom line is that we are wasting our creative intellectual

resources by supporting states with defense and not states of safety and connectedness?

Even in the realm of spirituality, we have to evaluate whether we are sufficiently embodied. Are we safe enough within our body to promote the bidirectional communication between our brain and visceral organs through the vagus? Are we safe enough to connect and trust others? Are we safe enough to have a pathway to spirituality through connectedness with others versus the pathway to spirituality through detachment and dissociation? These two paths that lead to different conclusions about our own personal spiritual experience. Polyvagal Theory, by emphasizing the biological roots of safety and sociality, offers a perspective that transforms the human narrative from a documentary emphasizing events and objects to a pragmatic and often heroic quest for safety with the implicit bodily drive to survive emphasizing feelings.

POLYVAGAL THEORY: INFORMATION FROM MANY DISCIPLINES

Polyvagal Theory is transdisciplinary and integrates information from several disparate different disciplines including themes common within the transdisciplinary worldview such as pathology, ontogeny adaptation, and phylogeny. As the theory is becoming recognized, interest and applications have broadened beyond psychology and medicine to neuroanatomy, evolutionary biology, speech and hearing sciences, and comparative and developmental physiology. Applications of Polyvagal Theory are moving into mental health therapies, speech and hearing sciences, institutional organizational models, educational models, classroom design, treatments for auditory processing deficits, language development, and treatment for chronic pain, health-related assessments, musical composition to enhance healing, architectural design of healing spaces including schools and hospitals. In practice, Polyvagal Theory is truly transdisciplinary, both in its basic background and in its applications.

The theory informs us that our nervous system craves safety and when safe is accessible

for collaboration and creativity. We need to rethink our conceptualization of collaboration and how it leads to creativity. Safety is the foundational substrate for collaboration and collaboration is a form of the connectedness, that promotes safety. These are essentials in our biological imperative to survive.

Much of the information about the integration of brain and body systems has been available for decades but was not integrated into medicine. For example, Walter Hess received the Nobel prize in 1949 for an integrated perspective of the brain body system. A quote from the first sentence of Hess's Nobel speech is truly transdisciplinary. He says,

A recognized fact, which goes back to the earliest times is that every living organism is not the sum of a multitude of unitary processes, but is, by its virtue of interrelationships of higher and lower levels of control, an unbroken unity (Hess, 1949).

Hess's transdisciplinary conceptualization has not been embedded in contemporary medicine. It was just oblique to the mechanistic machine model that contemporary physicians frequently apply, which focus on external fixes such as pharmaceuticals and surgery. Hess's perspective includes a respect for the body's own resources to heal. This point is consistent with Polyvagal Theory, which would emphasize that when 'feeling safe' (i.e., being in a physiological state that supports feeling safe) the nervous system promotes homeostatic functions that lead to optimized health, growth, and restoration. Basically, feeling safe allows the body to repair and heal itself.

Once we respect our biological nature, we can begin to adaptively incorporate a transdisciplinary approach. Being in a physiological state of threat or chronic evaluation limits acceptance of 'other' discipline-defined knowledge and insights. Being in a physiological state of safety, promotes accessibility, cooperation, connectedness and opens portals to other discipline-defined knowledge and insights. Being transdisciplinary is not solely about accumulation or integration of information from

disparate disciplines, but about the interactions and 'connectedness' with thought leaders in these disparate disciplines.

In closing I ask you to join me in speculating what our contemporary world would be like, if Descartes had been polyvagal informed and, instead of stating "I think, therefore I am," stated "I feel myself, therefore I am."

Thank you.

Dr. Stephen W. Porges' Keynote address © 2021 was originally prepared for the Third World Congress of Transdisciplinarity held virtually from Mexico City, on February 3, 2021. The session, Trans=Embodiment of Being moderated by Dr. Susannah Hays, included Margarita de Vivero Zuber as an Invited Respondent.

BIBLIOGRAPHY

Bulbena, A., & Porges, S. W. (2018). Assessing body awareness and autonomic reactivity: Factor structure and psychometric properties of the Body Perception Questionnaire-Short Form (BPQ-SF). [International Journal of Methods in Psychiatric Research](#), 27(2), e1596.

Dobzhansky, Theodore (1973) [American Biology Teacher](#) Vol. 35(3) pp. 125-129.

Dobzhansky, T. (1962). *Mankind Evolving* New Haven: Yale University Press (pp. 150-152).

Hess, Walter R. (1949). [Nobel lecture](#). Nobel Lectures, Physiology or Medicine (1942-62).

Jackson, J. H. (1884). *The Croonian lectures on evolution and dissolution of the nervous system*. British Medical Journal, 1(1215), 703.

Porges, Stephen W. *The COVID-19 Pandemic is a paradoxical challenge to our nervous system, a Polyvagal Perspective*. Clinical Neuropsychiatry, 17(2), 135-138.

Porges, S. W. (2004). *Neuroception: A subconscious system for detecting threats and safety*. Zero to Three (J), 24(5), 19-24.

Porges, S. W. (1994) *Orienting in a Defensive World: Mammalian Modifications of Our Evolutionary Heritage*. Psychophysiology, 32(4), 301-318.

Snow, C. P. (1959) *The Rede Lecture: The Two Cultures*. Cambridge Press, London.

Carolina, and Professor Emeritus at both the University of Illinois at Chicago and the University of Maryland. In 1994 he proposed the Polyvagal Theory that links the evolution of the mammalian autonomic nervous system to social behavior and emphasizes the importance of physiological state in the expression of behavioral problems and psychiatric disorders. The theory is leading to innovative treatments based on insights into the mechanisms mediating symptoms observed in several behavioral, psychiatric, and physical disorders. Author of *The Polyvagal Theory: Neurophysiological foundations of Emotions, Attachment, Communication, and Self-regulation* (2011) and *The Pocket Guide to the Polyvagal Theory: The Transformative Power of Feeling Safe*, (2017), he is the creator of a music-based intervention, the Safe and Sound Protocol™, which improves spontaneous social engagement, language processing, state regulation and hearing sensitivities.

www.stephenporges.com

STEPHEN W. PORGES PhD is Distinguished University Scientist at Indiana University where he is the founding director of the Traumatic Stress Research Consortium. He is Professor of Psychiatry at the University of North

Margarita de Vivero Zuber, Invited Respondent CIRET, France

I am very pleased and honored to interact with you, Dr. Porges, especially in the context of this Third World Congress of Transdisciplinarity.

By focusing your presentation on a transdisciplinary perspective, I would like to emphasize the concept of connectedness, which resonates with the same musicality as *Reliance*, characterized by Edgar Morin in its activating meaning, going beyond the binary relationship between antagonists. In this sense, I salute your contribution that sheds light on positive health approaches, which is at the heart of my practice and research: studying and promoting the strategies that keep people healthy in the light of the discoveries of the causes that produce the disease. Today's health situation shows us how essential it is to integrate, into education in general, *salutogenic* approaches that promote connectedness, self and co-regulation, as well as empowerment of individuals.

As a practitioner-researcher in perceptual Psycho-Education, my practice is based on the *paradigm of the sensible*. This approach also endorses the notion a fundamental organismic process that tends towards the very best and underlies the individual's ability to find their own solutions. To this, we add a further dimension—the inner movement of the fascia—that we posit to be a tangible expression of Roger's 'organismic force', which we call "the sensible body". Perceptual Psychoeducation focuses on the inner phenomena lived, thus placing lived experience, particularly bodily sense-felt experience, at the center of its process.

I would therefore like to underscore the main points where I sense Polyvagal Theory intertwines with Danis Bois' corporal *mediation of the sensible*, based in fasciathérapie as well as provide the particularities that complement us. As you indicated, "Nature has wired us to this evolutionary principle that supports sociality, optimizing health growth and restoration". This evolutionary principle has an organic reality. I would like to emphasize the systemic

dimension that this connection implies in our approach.

As you illustrate, this connection is not only a metaphor, since fascia is a connective tissue beneath our skin, that attaches, stabilizes, encloses, and envelops all the structures of our body: our bones, muscles, organs, brain, spinal cord, and of course the nerves. But to use another metaphor: fascia is the paper on which the nervous system prints all our single states, among other informants. As a facilitator when I touch a person, I touch all her intimacy, so this needs a respectful and empathic relationship, that we call *actuating reciprocity*. I would like, if you could, to shed light in this unity of the organism.

STEPHEN PORGES: Thank you for your very insightful comments. Let's break it down to a terminology I would use. Your manipulations are metaphorically neural exercises of embodiment. Through your interactions with the client, you guide the client through a personal journey of becoming re-embodied as they become more aware of their bodily feelings.

If we start with the neural exercise and we start building the model, that if the body's not in a state of defense, that portal opens up for a neural exercise in which the fascia becomes more palpable, more easily moved. Several somatic therapists who may be directly or indirectly targeting the fascia use the acoustic intervention I developed called the Safe and Sound Protocol to calm their clients' bodies making them more accessible to being touched. Touch is an important part of the dialogue between therapist and client.

When implementing somatic manipulations, the client has to be accessible and not defensively reactive to touch. This sequence of being invited to touch and then touching is the initial level is a neural exercise. The exercise starts with requesting a co-regulatory therapist to initiate a self-regulatory process. As a model, we can visualize a human newborn. When the infant is born, the infant's physiological needs are dependent on others and the infant needs to be co-regulated. Co-regulation supports the infant and provides the resources for the baby

to develop into a self-regulatory organism. This sequence also occurs with somatic manipulations in which the sequence starts with co-regulation to form a neural substrate, via neural exercises, that would support self-regulation and embodiment.

Recently, I have been discussing neural exercises as opportunities for us to be welcomed back into our body, away from numbness. From a neuroscience perspective, numbness is a product of dampened feedback systems. With numbness our organs attempt to regulate on their own without input from the master control system—our brain. Our brain evolved to regulate these organs, to adjust their functions from a homeostatic mode when we are safe to support other needs such as defense. The nervous system can adjust the organs to support mobilization without fear, which we recognize as play. Play is mobilization with that social interaction occurring. We like to move, but we really don't want to move under states of fear or threat or aggression. We want to move with a smile on our face.

MARGARITA: Thank you. If I may, I still have at least one or two more questions. What I understand of what you said is also this intertwining of our body. If you touch one part, it is already interacting, one with the other. So, both, it's like a transdisciplinary approach.

STEVE: I totally agree. In the post Descartes world, a philosophy embraced by modern medicine and education, all elements of the human body and human experience are treated independently; a product of separating the brain from the body. Modern medicine partitions health care into separate subdisciplines. When you have an ailment, you go to specialists whose training is focused on one organ system (e.g., cardiology, dermatology). This 'specialist' usually has very limited knowledge of the rest of body or the nervous system's involvement in the regulation of the organ of their expertise. Likewise, when you deal with muscles or tissue or posture or structure, they may not have the metaphors to understand the dynamic feedback through which the nervous system regulates structures.

I want to go back to fascia. Although currently there's a lot of interest in it, relative to 30 and 40 years ago, there's still very little knowledge about how it relates to the nervous system and specifically to the autonomic nervous system. Yet, we observe comorbidities that document that ailments tend not to be isolated to a single organ. For example, many people suffer from chronic pain and assume that the pain is a valid signal of damage to an organ or structure. If we delve deeper into the clinical presentation, we observe pain is part of a bodily reaction to threat suggesting that the autonomic state of individuals who suffer from chronic pain might be in an autonomic state that supports defense. Clinicians are learning that, if their patients start to feel safe and increase the function of their ventral vagal circuits, they adaptively move out of a defensive state and pain subsides. I wonder if this is similar with fascia, when your clients feel safe?

MARGARITA: Yes, exactly. Yes.

STEVE: The bottom line is that somatic therapies actually have two portals to engage with their clients. They have a portal of direct manipulation, but the other portal is probably more important. A portal of co-regulation through psycho-education in which the client develops a positive narrative based on honoring their body. Even when they are in a state of defense, they can learn that the body's reactions have been protective. Through the psycho-educational process you convince the body to be safe and to become accessible.

MARGARITA: Both are important. Yes. Well, there's another point I would like to highlight. Having learned music with the Marenco method and having conducted transdisciplinary research to support Integral Educational projects, integrating Willems Music Education, I would like to express the importance of musical education from a salutogenic perspective.

Your work highlights the intuitive and pragmatic knowledge of these two pedagogies of the beginning of the 20th century. For them, music contributes to the integral education of the person in its physical, physiological, affective mental, and spiritual dimensions. Besides

developing a music educational method, Martenot also created a meditation method to support an integral education of the individual. In 1928, he invented an early electronic music instrument with the expressiveness of the cello. Willems created an integral method of musical education based in the uniqueness of the human being. He also invented an entire hearing aid. They both knew very well anatomy and psychology and took into account body exercises—to solicit all the sensory-motor, affective, mental, and intuitive (inventive and creative) faculties, to develop and harmonize them.

STEVE: Well, we evolved. The major transition for mammals from reptiles was that they had certain frequencies that they were able to use to communicate safety. That happens to be what we use in music as melody. They're well-defined or maternal vocal voices capturing. So vocal music primarily by women. In terms of classical music, it's going to be violins, flutes, clarinets conveying these melodies that are biologically based to the physics and physiology of our middle ear structures. There's a foundational science here that informs us that if we provide these cues to our nervous system, and our nervous system will become accessible and calm down. It's not weird, it's understanding how the system works.

MARGARITA: Yes, for both of them, but they know, from studying music, because it works with all the muscles. When you prepare to sing, you're already working with all the facial muscles.

STEVE: My examples are personal and relate to my experiences as a clarinetist. It was about breath and slow exhalation, the embouchure, the muscles of the face, and listening. Collectively these processes, although provoking meditative feelings of connectedness and expansive thinking are functionally neural exercises. When I talk about wind instruments and singing at any of my talks, I always get questions. And the questions are - we don't agree with you because we're percussionists or, we're keyboard players or we play stringed instruments—we all breathe the same way, we

breathe with the phrasing of the music. They were right and by emphasizing wind instruments, I missed the general principle that is embodied in musicians. However, if you're a clarinetist or a singer, you exhale as you play the phrase and you're inhaling prior to starting a new phrase. As a singer or clarinetist, you're constrained by the breathing actions required and have no choice but to be involved in this massive neural exercise.

MARGARITA: I have a last, last question, if it's possible. Thank you. I am currently conducting transdisciplinary research with a physician and a gestalt psychologist to help people who have been affected by Covid-19 as well as a preventative program. I would be interested if you could give us some examples of an integrative method you have developed.

STEVE: I'm of course, very interested in the pandemic because we're living it. We published a research project on it. We found that people with a trauma history and a more reactive autonomic nervous system during the pandemic have more mental health symptoms, more worry symptoms, trauma symptoms. But the pathway from their trauma history to their symptoms goes through whether or not their nervous system is retuned to be more threat oriented. I'm getting feedback from people who are using the acoustic intervention that I developed, the Safe and Sound Protocol, which uses vocal music and amplifies the prosodic features within the music to such a degree that the nervous system basically can't refuse it. Think of these acoustic signals as a distilled essence of trust that the body cannot refuse.

Recently I received an email from a psychiatrist from Chile, whose husband was a nephrologist in the intensive care unit. She makes sure that he hears it every day. And in fact, the physicians now are making sure he hears it every day in the intensive care unit. There are a few people are doing that. The reason it's effective is that it functions as if it were a vagal nerve stimulator. By having it is sort of like listening to Mozart or listening to melodic music. It's comforting and you can calm down. It's an amplification of the features that calm the body down. It's

functioning like an acoustic vagal nerve stimulator. My suggestion is melodic of vocal music is going to be helpful. If you have access to a clinical provider that can deliver the Safe and Sound Protocol that would be more effective, but it doesn't mean that listening to Mozart or melodic music would not be helpful.

MARGARITA: Yes, of course. And maybe a silence? Have you made some studies on meditation?

STEVE: I have not published any research on meditation, but I have written on compassion and the relationship with the vagus. I have emphasized how breathing regulates the vagal brake, the ventral vagal pathway. When you exhale slowly, which may also be part of a meditative practice, the ventral vagal brake becomes more effective in calming your physiology. You will not benefit from meditation when you're in a state of anxiety. Clinicians have informed me that meditative practices may destabilize trauma survivors. They believe that closing of the eyes may trigger a sense of vulnerability. Clinicians need to be aware of their client's clinical history, because structuring procedures, such as sitting in a room with eyes closed would be experienced as a 'safe' context for many, but for those with a trauma history the same instructions and context would be destabilizing and a trigger to becoming defensive. In the situation of the individual with a trauma history, their body does not readily give up its defenses. In contrast, the more resilient individual welcomes the opportunity to turn off defenses and to calmly move into a meditative state. Imbedded in the trauma survivor is a nervous system set from the traumatic experience that is functionally reliving a narrative stating that the last time my body was accessible, I was injured! Trauma therapists are learning these lessons about both obvious and paradoxical triggers in which cues of safety become triggers to defend, like eye contact or proximity. With breathing techniques and Safe and Sound Protocol, the therapists are in a sense creating neural exercises. They implement strategies similar to yours that slow move the client in and out of safety and their body, giving them feedback for

understanding their body. And once their body gets that knowledge base of that interaction, then they function much better.

SUSANNAH: Margarita, thank you very much. This exchange has been very helpful.

MARGARITA de VIVERO ZUBER member of CIRET (Paris, France) and *Fernando Pessoa University* (Portugal) is a practitioner-researcher at CERAP Laboratory teaching Perceptive Psycho-Education. For over 25 years, she has guided individual and collective projects in Education, Care and Performing Arts in France, Mexico and Peru (her homeland). Having dedicated a great part of her life to the study of dance, rhythm, singing, and sculpture she became attuned to the connection between a living force that intertwines body, emotion, and thought not only in the artistic process, but also in the process of individual and collective transformation. Moving more deeply into the tissues of the body, her work today implements innovative pedagogical strategies, based on Fasciathérapie (Danis Bois' Method), a hands-on gestural / verbal engagement process that supports personal and professional transformations in adults, children and youth.

QUESTIONS FROM THE AUDIENCE

SUSANNAH: Now a few questions from the audience. Édouard Stacke would like to ask if experiments are being made in schools now.

STEVE: There are professionals using the technology in schools. The Safe and Sound Protocol has been used with autistic kids and reduces hypersensitivities and improves language skills. Research is being conducted. Some of it within my laboratory and hopefully more outside. This is a time for other people to get involved. I am pleased that educators are getting interested in this whole issue of physiological regulation of students, because we've been, exposed, for the past hundred years, to a behaviorist bias in which behavior is viewed as primarily intentional and reflexively adaptive. This bias has resulted in children being abused and punished for acting out or for becoming impulsive when the behaviors are emergent

properties of dysfunctional regulation of their physiological state. If therapies can target the physiological state, without pharmaceuticals, through neural exercises, then the child may gain the capacity to self-regulate. We look forward to future findings as research in this area continues.

SUSANNAH: A number of questions revolve around fear, fear that humans naturally engage with when they're moving beyond boundaries—transing or, as your Polyvagal work points to, fear that is coming from the somatic defense and new experiences. Vitória de Barros asks how do you deal with fear in your practice? For example, when a child says to their mother, I'm afraid of the swimming pool, for example.

STEVE: I'm not a clinician. I don't have a practice. I develop ideas. I do research and I encourage clinicians to apply the technologies I've developed, but I'm not a clinician. The first part about fear is really about honoring and respecting the child's physiological state. The issue is that we tend not to acknowledge it because we tend to see other people's experiences through the lens of our own body. And we are disrespectful to others. We might say, oh that doesn't bother me, go ahead and do it. But the child or the other adult telling them this is really disrupted, they're feeling bad. First, we have to understand our evolutionary history and how through that evolutionary history have inherited tools to mitigate threat reactions. The primary tool is through social interactions involving talking, listening, and being witnessed by another.

I think what's missing in most dialogues is that we try to fix things without witnessing the other person's reaction. I think most people want to be heard. And, being heard, we feel that we're being supported. If, when we tell people how we feel and they want to fix it, or they want to rate it or evaluate it, our body's sticks to that state of threat. So, if we have an audience and we feel that we are well witnessed, I think our nervous system will start to mitigate the threat through supportive social interactions. Bottom line: We need to learn to be better witnesses of our friends, our children, and even of ourselves.

SUSANNAH: One last question from Cristian Ungureanu: "What do you think about the possibility that the brain is only the hard and the reality of the complex phenomenon of the mind, the rational thinking, is the result of some soft programs."

STEVE: This has to do with what metaphors you want to use. One metaphor, in terms of the notion of a program or flexible or soft program, is that the information is really evolving from inside the organism. And it's part of an emergent property. It's a viable, plausible model. Another one that is not frequently mentioned, which I find extremely intriguing is a reconceptualization of our nervous system, not as a generator, but as a transducer where we're taking energy or information, which energy is information, and our nervous system is transducing it. This would shift the locus of input outside of us, but it places the responsibility of what we do with that information inside our nervous system. As a scientist I have not spent much time thinking about the basis of consciousness. Of course, many others do. The simplest way for me to explain what other call consciousness is for me to view it as an emergent property of the dynamic activity of our nervous system. This is similar to how I conceptualize spirituality. If our body is in specific states, we have different emergent properties. What may be experienced as spirituality or an altered form of consciousness, is a property of this system. The system has different emergent properties in different states.

SUSANNAH: Unfortunately, we will have to stop here even though there's tremendous interest. For our audience, I have put the [Polyvagal Institute](#) website link into the chat box so you can find future events with Dr. Porges. This is where you can also find courses and workshops he's offering with Deb Dana.

Thank you again Steve so much, for being with us today.

STEVE: You're quite welcome Susannah. And thank you for inviting me and challenging me to articulate how Polyvagal Theory is transdisciplinary.

TRANS=EMBODIMENT of BEING

SUSANNAH HAYS, Editor

