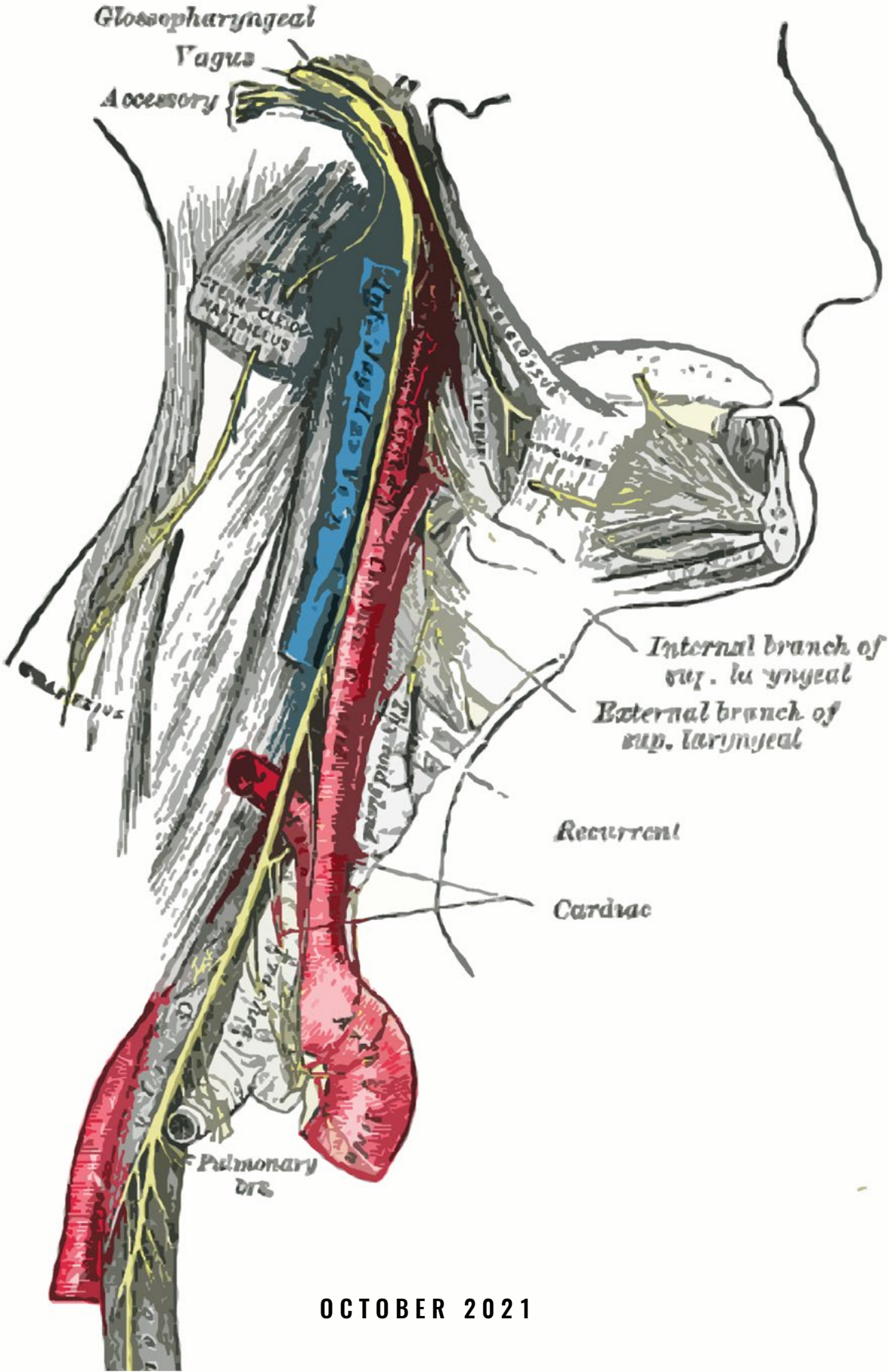
THE SCIENCE OF PSYCHOTHERAPY



OCTOBER 2021

EDITORIAL

"It was the best of times, it was the worst of times…" (*A Tale of Two Cities*, Charles Dickens) is one of the greatest opening lines in literature. Another equally engaging opening is from *Under Milk Wood,* by Dylan Thomas, "To begin at the beginning" (most effective said in a Welsh accent). What makes these opening statements great, to me, is their obviousness and the truth in their simplicity. Our current times seem to have unleashed a plague of complication and consequent confusion of truth. In one of my books, I say that when a client comes for therapy, they say in a million different ways, "I'm not ok." Then, after some effective therapeutic work, they say, "I'm ok." Finding the pathway between the simplicity that those statements exude can be challenging and tenuous, but fundamentally, we are all imbued with a sense of what is ok and what is not. In all the upheaval we seem to be experiencing today, is it possible that we can find some relief by seeking out "ordinary" and "simple" and "obvious" and "truth" and giving them credence?

I leave that question with you, but when I think of the inspiration of a simple question, I think of the work of Stephen Porges and the development of the polyvagal theory. He began with a simple question about a simple anomaly that opened a floodgate. Norton is releasing a new book of collated papers and we are fortunate to have a preview through the *Introduction: An Embedded History of a New Science*, which takes us back through the development of polyvagal theory and chapter 3, which looks at *Play as a Neural Exercise - Insights from the Polyvagal Theory.* Be sure to listen to our podcast with Dr Porges.

These wonderful excerpts sandwich something from my own work, *Complexity, Chaos and Creativity in Human Relationships*, where I try to make a little more sense of complexity theory and show how a case can be analysed in the context of what I call "thinking in the system".

We round off the content this month with a piece from Melissa Sanders that asks us to think about our practice methods in *How well does CBT really stand up to psychoanalysis?* Melissa shares her research and experience in an opinion that warrants your discussion. I do hope many more members of the SoP community share their opinions about the work they do.

I hope you enjoy this issue and that you consider contributing your ideas and expertise. Just email me and we can discuss the possibilities. Meanwhile, be safe and well.

RICHARD HILL | EDITOR

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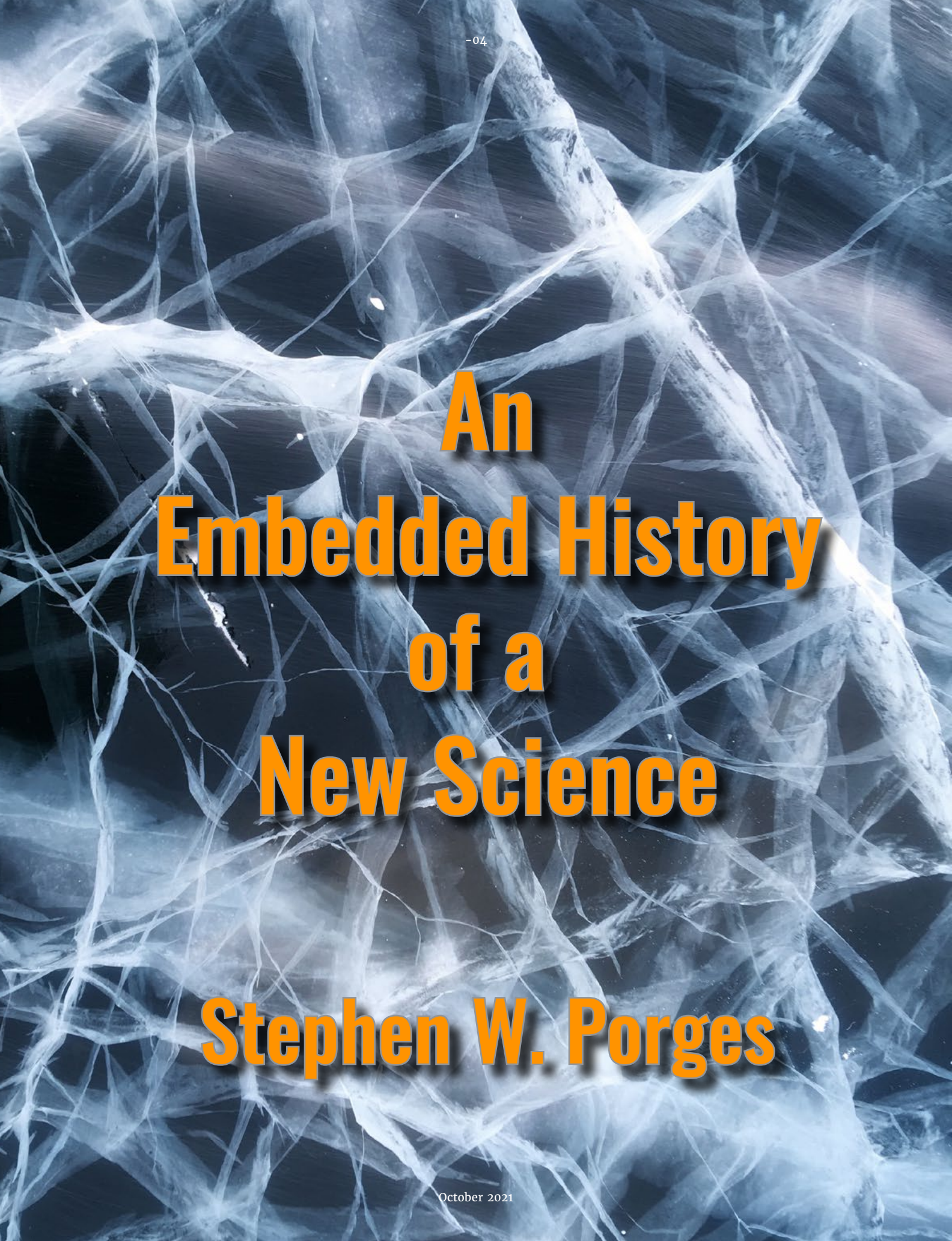


An Embedded History of a New Science

Stephen W. Porges

October 2021

FEATURE

When the Polyvagal Theory was initially conceptualized, I did not consider it as an expansive paradigm-shifting model. In developing it, I thought it was consistent with antecedent research and theory. In a way, I thought it was the obvious next step. During the 25 years following the initial presentation of the Polyvagal Theory, through my experiences with the scientific community across many disciplines, I learned that the theory provides the framework for a new brain-body or mind-body science. Moreover, I learned that as health-related disciplines embraced the theory, a new polyvagal-informed strategy could be embedded in mental and physical health treatment models. This strategy would focus on recruiting the nervous system of the client or patient as a collaborator on a shared journey toward wellness. Embracing this strategy would emphasize that the body's quest for safety is embedded in the actions of the nervous system in promoting health. Thus, safety and threat are not only psychological constructs, but have parallels in the autonomic nervous system. When the autonomic nervous system is in a state of calmness and social accessibility, then treatments for both mental and physical disorders can be efficiently implemented. In contrast, when the autonomic nervous system is in a state of defense and vulnerability, then it is in an antagonistic state that blunts the effectiveness of treatment. Simply stated, the theory uncovered the structures and portals through which our neurobiological quest for safety through connectedness with others may be implemented.

Excerpt from *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, Self-regulation* by Stephen Porges – published by W.W. Norton.

When a new theory is presented, its intellectual accessibility is dependent on several complex and often not acknowledged historical features. Most importantly, there is a need to understand (1) antecedent theories, (2) the language used to describe the hypothetical constructs illustrating the functions described in the theory, and (3) questions that the theory proposes to answer. Since evolution is an organizing principle in Polyvagal Theory, in which neuroanatomical structures are proposed to facilitate specific adaptive functions, an understanding of vertebrate evolution and neuroanatomy of the neural regulation of the autonomic nervous system are required for a critical dialogue. In addition, since the theory leads to testable hypotheses based on dynamic adjustments in autonomic function, a sophisticated understanding of the metrics of measurement (e.g., time series analyses) is necessary.

At the time I first presented the Polyvagal Theory, arousal theory was prevalent in psychophysiology. Although arousal theory had a long, influential history in science, it had a relatively simplistic underlying model.

Basically, arousal theory emphasized that arousal was a linear construct indexing a dimension from low to high levels of activation that could be measured or inferred from observing behavior or physiology

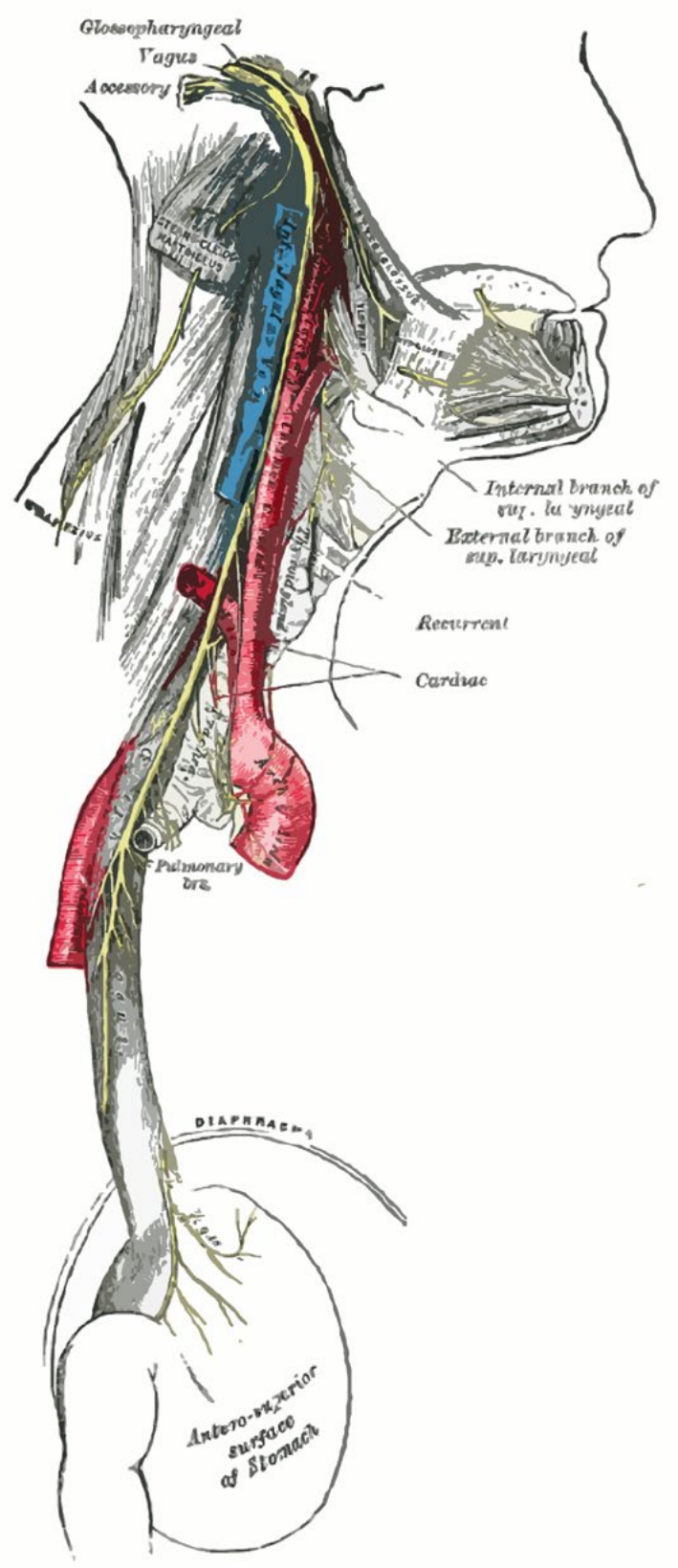
Scientists are intellectually focused and affiliated with peer groups defined by a shared commitment to study common problems. They see the world through their research questions, explicit and implicit theories, and methodologies. My scientific origins are rooted in the world of psychophysiology, a science that emerged in the 1960s to study how physiological responses paralleled psychological phenomena such as mental effort, attention, expectancy, stimulus detection, decision making, truthfulness, and preference. At the time I first presented the Polyvagal Theory, arousal theory was prevalent in psychophysiology. Although arousal theory had a long, influential history in science, it had a relatively simplistic underlying model. Basically, arousal theory emphasized that arousal was a linear construct indexing a dimension from low to high levels of activation that could be measured or inferred from observing behavior or physiology. The relationship between arousal and performance was often portrayed as an inverted U-shaped function in which optimal performance occurred within a midlevel range, while poor performance was observed at low and high levels of arousal. This relationship was known as the Yerkes-Dodson law (Yerkes & Dodson, 1908). Metaphorically, arousal represented the energy of the human nervous system. Arousal was easily understood, since when it was reflected behaviorally it could be quantified as greater activity and when reflected autonomically it could be observed as increases in sweating and heart rate.

Early psychophysiological research assumed that peripheral autonomic measures provided sensitive indicators of arousal. This view was based on a rudimentary understanding of the autonomic nervous system in which changes in electrodermal activity (e.g., sweating) and heart rate were assumed to be accurate indicators of sympathetic activity. As the activation arousal theory developed, a continuity between peripheral autonomic responses and central mecha-

nisms was assumed (see Darrow et al., 1942), and sympathetic activity was assumed to parallel activation of the brain. According to this assumption, organs influenced by sympathetic efferent fibers, such as the sweat glands, blood vessels, or the heart, were potential indicators of limbic or cortical activity (Duffy, 1957; Lindsley, 1951; Malmo, 1959).

Although the specific pathways relating these various levels were never outlined and are still sketchy, electrodermal (e.g., GSR) and heart rate became the primary focus of research during the early history of the Society for Psychophysiological Research. This was due to their presumed sympathetic innervation and, in part, to their measurement availability. By default, this emphasis created a research environment that neglected several important factors: (a) parasympathetic (e.g., vagal) influences, (b) interactions between sympathetic and parasympathetic processes, (c) peripheral autonomic afferents, (d) central regulatory structures, (e) the adaptive and dynamic nature of the autonomic nervous system, and (f) phylogenetic and ontogenetic differences in structural organization and function.

Polyvagal Theory proposed a more complex nonlinear model of autonomic regulation that focused on identifiable and potentially measurable neural pathways that contribute to autonomic regulation through a definable feedback system that could promote homeostatic function. The theory required a conceptualization of autonomic regulation that was challenging to psychophysiologists. At the time, psychophysiology emphasized a top-down representation of central nervous system function in measurable peripheral physiology (e.g., autonomic response



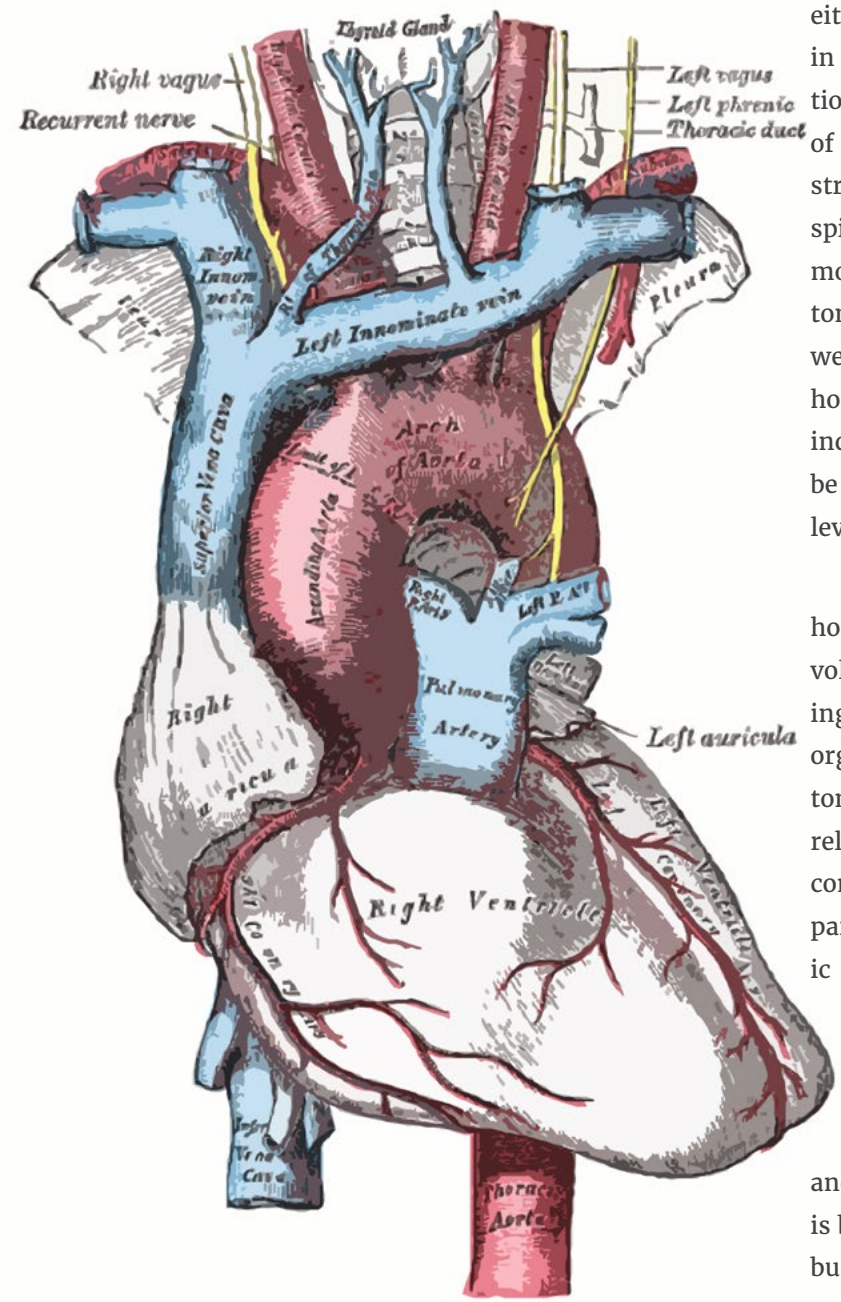
patterns). Thus, many psychophysiologists hypothesized that systematic quantification of peripheral autonomic responses would provide reliable information linked to brain function and mental processes. Prior to the Polyvagal Theory, my research was consistent with this top-down perspective. For example, I wrote an article titled "Heart Rate Patterns in Neonates: A Potential Diagnostic Window to the Brain" (Porges, 1983).

By 1994 when the Polyvagal Theory was introduced, my views about neural regulation of the autonomic nervous system had changed. At that time, I was working on what I called the vagal paradox. The neural pathways underlying the plausible solution to the paradox became the Polyvagal Theory.

By 1994 when the Polyvagal Theory was introduced, my views about neural regulation of the autonomic nervous system had changed. At that time, I was working on what I called the vagal paradox. The neural pathways underlying the plausible solution to the paradox became the Polyvagal Theory. In contrast to the prevalent working models of my colleagues, Polyvagal Theory emphasized bidirectional communication between the brain and the visceral organs represented in the autonomic nervous system. Acknowledging the theory confronted scientists with the plausible possibility that peripheral visceral organs could influence brain processes, including the cognitive and emotional processes assumed to originate in the brain.

Polyvagal Theory did not fit well within the constraints of arousal theory, although Polyvagal Theory could provide a neural explanation of arousal theory. Arousal theory fit an outdated, but still taught, model of the autonomic nervous system that interpreted arousal as a competition between the sympathetic and parasympathetic nervous systems. However, it did not provide any explanation of how low arousal could occur with increases in parasympathetic nervous system activation.

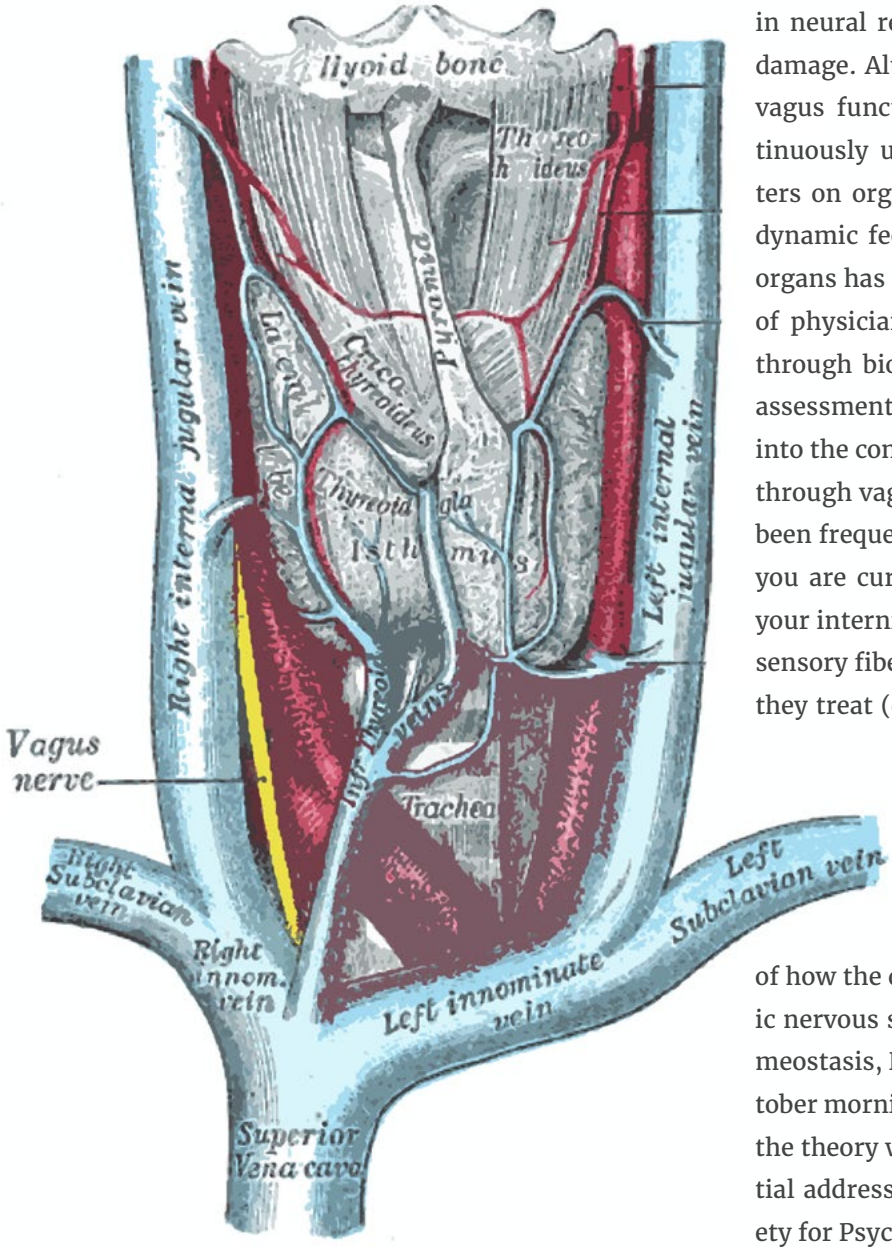
Polyvagal Theory required a different quantification strategy, and a new family of metrics (e.g., respiratory sinus arrhythmia as an index of vagal regulation of the heart) was needed to be developed to accurately monitor the dynamic regulation of the autonomic nervous system. The theory encouraged scientists to look beyond mean levels of variables and to study the periodicities in the physiological signal that represented the features of the feedback system that evolved to optimize homeostasis. Time series methodologies complemented descriptive statistics, and new measures could describe the systematic perturbations around the set point. In my world, this was observed as periodic variations in heart rate around the mean or set point of the heart. For example, the periodic variations of heart rate at the frequency of spontaneous respiration define respiratory sinus arrhythmia and neurophysiologically reflect the feedback between the heart and the brainstem through the ventral vagus. The amplitude of this oscillation is a valid index of a component of cardiac vagal tone being mediated through the myelinated ventral vagal pathway to the sinoatrial node, the pacemaker of the heart. In preparation for, or while, moving, the amplitude of this oscillation is dampened to optimize the sympathetic nervous system's influence on the heart to increase cardiac output to support mobilization. The damping of this feedback loop also represents the dampening of



the role the autonomic nervous system is playing in maintaining homeostasis. Conceptually, we can visualize the amplitude of respiratory sinus arrhythmia as an index of the degree that the autonomic nervous system is supporting either homeostasis or bodily movement, often in support of flight and fight behavioral reactions to threat. In addition, since the amplitude of respiratory sinus arrhythmia represents the strength of the vagal brake, by monitoring respiratory sinus arrhythmia we are functionally monitoring the homeostatic reserve of the autonomic nervous system to the challenges that we often label as stress. Thus, disruption of homeostasis would be an accurate measurable indicator of the impact of challenges and might be a more functional definition of stress than levels of adrenal hormones (e.g., cortisol).

Through the lens of the Polyvagal Theory, homeostasis has a more nuanced meaning involving the status of feedback circuits involving the bidirectional communication between organs and the brainstem. The traditional autonomic model assumed that homeostasis was relatively stable and was maintained by the competing inputs from the sympathetic and parasympathetic divisions of the autonomic nervous system, although the pathways involved in feedback circuits determining homeostasis were not elaborated. Polyvagal Theory, with its emphasis on bidirectional communication between brain structures and visceral organs, assumes that homeostasis is best described not solely by a static set point, but requires an additional assessment of the systematic perturbations around the set point.

Strikingly, there is little acknowledgment of the important role of visceral afferents that



travel primarily through the vagus from each visceral organ to a brainstem center, providing the relevant information to ensure that the output to the organs supports homeostasis. Without sensitive metrics to assess the neural regulation supporting visceral organs, medicine is unable to detect the antecedent disruption in neural regulation that would precede organ damage. Although the sensory pathways of the vagus function as a surveillance system continuously updating brainstem regulatory centers on organ status, this conceptualization of dynamic feedback in the regulation of visceral organs has not been emphasized in the training of physicians. Although end-organ evaluation through biopsy and blood tests dominates the assessment models of visceral organs, tapping into the constant surveillance of visceral organs through vagal or other neural pathways has not been frequently acknowledged by physicians. If you are curious about this statement, just ask your internist what they have learned about the sensory fibers linking the brain with the organs they treat (e.g., heart, kidney, liver, lung).

Against the backdrop of arousal theory, a bias toward static metrics of autonomic function (e.g., resting heart rate, blood pressure), and a limited understanding of how the dynamic regulation of the autonomic nervous system could support or disrupt homeostasis, Polyvagal Theory emerged on an October morning in 1994. The initial framework of the theory was introduced during my presidential address at the annual meeting of the Society for Psychophysiological Research in Atlanta, Georgia. The presentation was formalized into a manuscript and published in the society's journal, Psychophysiology (Porges, 1995). At that time, my objective was to archive the extract-

ed principles from my previous 25 years of research and to challenge my discipline to explore autonomic reactivity from a new perspective. Although several of the principles were novel, the general questions were familiar to psychophysiologists, who were vested in exploring the utility of monitoring heart rate patterns to gain additional information about mental and health-related processes. My address was well received by my colleagues, and I anticipated that formulation of the theory would drive research within psychophysiology by providing an alternative perspective of the role that the autonomic nervous system played in regulating mental processes, physiological state, and behavior. At that time, I had no expectation that Polyvagal Theory would lead to clinical insights, interventions, and new approaches to mental and physical health.

During the following 25 years, as the science of the neural regulation of the autonomic nervous system grew, our understanding of how the theory informs us about human behavior and health expanded. In parallel to the growth in scientific knowledge, the theory evolved to include new constructs that were proposed to integrate and translate this new knowledge into a better understanding of mental health. Four new constructs, briefly described in the following paragraphs, provided a language to communicate relevant features of the theory to therapists. The publications documenting the introduction of these constructs are listed in Table I.1 and are reprinted in *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, Self-regulation (Porges, 2011).*

VAGAL BRAKE

The vagal brake reflects the inhibitory influence of vagal pathways on the heart, which slow the intrinsic rate of the heart's pacemaker (Porges et al., 1996). If the vagus no longer influenced the heart, heart rate would spontaneously increase without any change in sympathetic excitation. The intrinsic heart rate of young, healthy adults is about 90 beats per minute. However, baseline heart rate is noticeably slower due to the influence of the vagus functioning as a vagal brake. The vagal brake represents the actions of engaging and disengaging the vagal influences on the heart's pacemaker. Tasks requiring the systematic engagement and disengagement of the vagal brake may be conceptualized as neural exercises that would enhance vagal brake function, including self-calming and self-regulation. It has been assumed that the vagal brake is mediated through the myelinated ventral vagus. Although the unmyelinated vagal fibers appear to mediate clinical bradycardia in preterm neonates, this process has not been conceptualized in the vagal brake construct. The functioning of the vagal brake is a core foundational construct in Polyvagal Theory and is involved in downregulating defenses and promoting social accessibility that may evolve into coregulation.

SOCIAL ENGAGEMENT SYSTEM

The social engagement system consists of a somatomotor (i.e., neural control of striated muscles) component and a visceromotor (i.e., neural control of muscles of visceral organs) component (Porges, 1998). The somatomotor component involves special visceral efferent pathways that regulate the striated muscles of the face and head. The visceromotor component involves the ventral myelinated supradi-

aphragmatic vagus that regulates the heart and bronchi. Functionally, the social engagement system emerges from a heart-face connection that coordinates the heart with the muscles of the face and head. The initial function of the system is to coordinate sucking, swallowing, breathing, and vocalizing. Atypical coordination of this system early in life is an indicator of subsequent difficulties in social behavior and emotional regulation. It is through the social engagement system that individuals broadcast their physiological state in their voices and faces. Astute therapists intuitively detect these features and appropriately coregulate their clients into calmer and more accessible states.

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NEUROCEPTION

Neuroception is the process through which the nervous system evaluates risk without requiring awareness (Porges, 2003). This automatic process involves brain areas that evaluate cues of safety, danger, and life threat. Once these are detected via neuroception, physiological state automatically shifts to optimize survival. Although we are usually not aware of cues that trigger neuroception, we tend to be aware of the physiological shift (i.e., interoception). Sometimes we experience this as feelings in our gut or heart or as an intuition that the context is dangerous. Alternatively, this system also triggers physiological states that support trust, social engagement behaviors, and the building of strong relationships. Neuroception is not always accurate. Faulty neuroception might be an adaptive survival reaction that biases neuroception toward detecting risk when there is no risk, or identifying cues of safety when there is risk. Individuals with a trauma history frequently experience such a biased neuroception.

THE FREQUENCY BAND OF PERCEPTUAL ADVANTAGE

The frequency band of perceptual advantage represents the acoustic frequency range in which conspecifics vocalize to communicate cues of safety and reciprocal positive social intentions (Porges & Lewis, 2010). This band, based on the physics of middle ear structures, determines the specific frequency ranges within which cues of safety are communicated. Vocalizations occurring within this frequency band signal safety and calm the listener's internal state, while vocalizations occurring outside this frequency signal danger and threat and disrupt the listener's internal state. These interpretations of acoustic features are based on the phylogenetic evolutionary history of vertebrates. At relatively high frequencies, vocalizations represent distress calls and likely signal nearby conspecifics of injury or threat. An example can be found in the infant cry, which occurs in a relatively high spectral range of human hearing and produces caregiver responses to reduce infant distress. Low-frequency sounds below the low end of a mammal's frequency band of perceptual advantage have an unlearned association with cues of life threat. Over the course of mammalian evolutionary history, vocalizations in a relatively low-frequency region were likely to be produced by larger predators. Thus, acous-

tic signals with high energy (louder) above or below a mammal's frequency band of perceptual advantage may trigger resource mobilization for fight-flight responses or the shutdown behaviors that define death feigning. The Safe and Sound Protocol is an acoustic intervention that functions as a neural exercise of the social engagement system by focusing on the frequency of perceptual advantage. For more information on the intervention, see Integrated Listening Systems (https://integratedlistening.com/porges/).

With these constructs, the theory could inform therapists and potentially change treatment strategies. With understanding of these constructs, therapists could more effectively recruit their client's nervous systems as collaborators on a shared journey to wellness. Therapists, by leveraging their own social engagement systems to project cues of safety, could

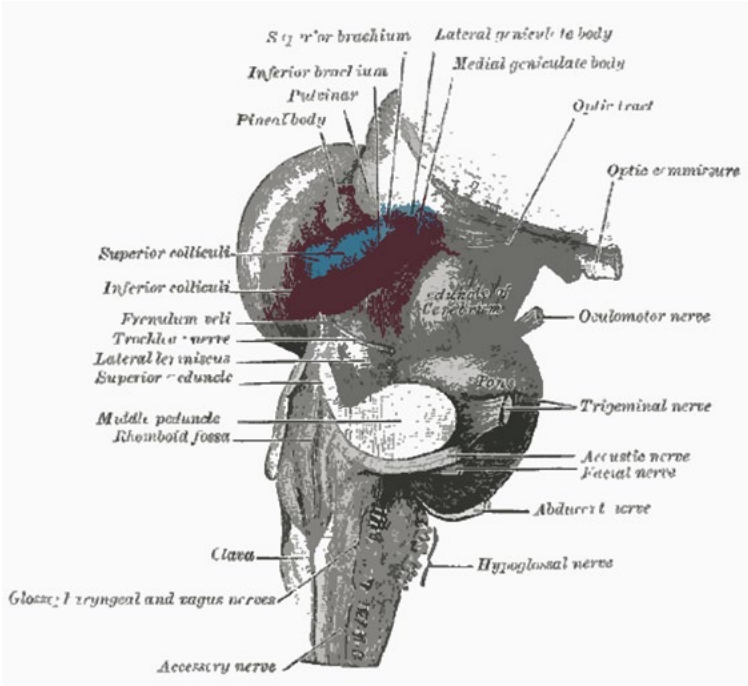

Table I.1.

Construct	Citation
Vagal brake	Porges, S. W., Doussard-Roosevelt, J. A., Portales, A. L., & Greenspan, S. I. (1996). Infant regulation of the vagal "brake" predicts child behavior problems: A psychobiological model of social behavior. *Developmental Psychobiology*, *29*(8), 697–712.
Social engagement system	Porges, S. W. (1998). Love: An emergent property of the mammalian autonomic nervous system. *Psychoneuroendocrinology*, *23*(8), 837–861.
Neuroception	Porges, S. W. (2003). Social engagement and attachment: A phylogenetic perspective. *Annals of the New York Academy of Sciences, 1008*(1), 31–47.
Frequency band of perceptual advantage	Porges, S. W., & Lewis, G. F. (2010). The polyvagal hypothesis: Common mechanisms mediating autonomic regulation, vocalizations and listening. In S. M. Brudzynski (Ed.), *Handbook of behavioral neuroscience: Handbook of mammalian vocalization* (Vol. 19, pp. 255–264). New York: Elsevier.

lead their clients through sequential states of coregulation to self-regulation and resilience. As the theory transformed from foundational laboratory research to clinical and applied areas, a new language evolved to communicate the constructs of the theory to a broader audience, including clinicians and their clients.

In the 25 years following the presentation of the initial features of the theory, the theory has evolved and transformed. Much of this transformation has been driven through my experiences and collaborations in clinical fields. During the 25-year period since the inception of the theory, thousands of researchers have cited the theory to explain their results, while tens of thousands of therapists and clients have used the theory to explain the impact of chronic stress and trauma on mental and physical health. The impact and application of the theory has crossed discipline boundaries.

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The impact and application of the theory has crossed discipline boundaries.

Accessibility is critical in translating scientific knowledge into the therapeutic and the public consciousness. Most peer-reviewed journals have costly subscriptions that limit readership to those who have academic affiliations. Even if articles are published in open-access journals, they are not written for the public. As aspects of the theory have become more accessible through the internet and books, creative and intuitive scientists and clinicians have embedded themes from the theory in foundational research and therapeutic treatments. A cursory survey using Google Scholar identifies more than 10,000 citations in peer-reviewed papers, while a Google search identifies more than 500,000 webpages, and a YouTube search identifies a vast selection of videos with accumulated views well above a million.

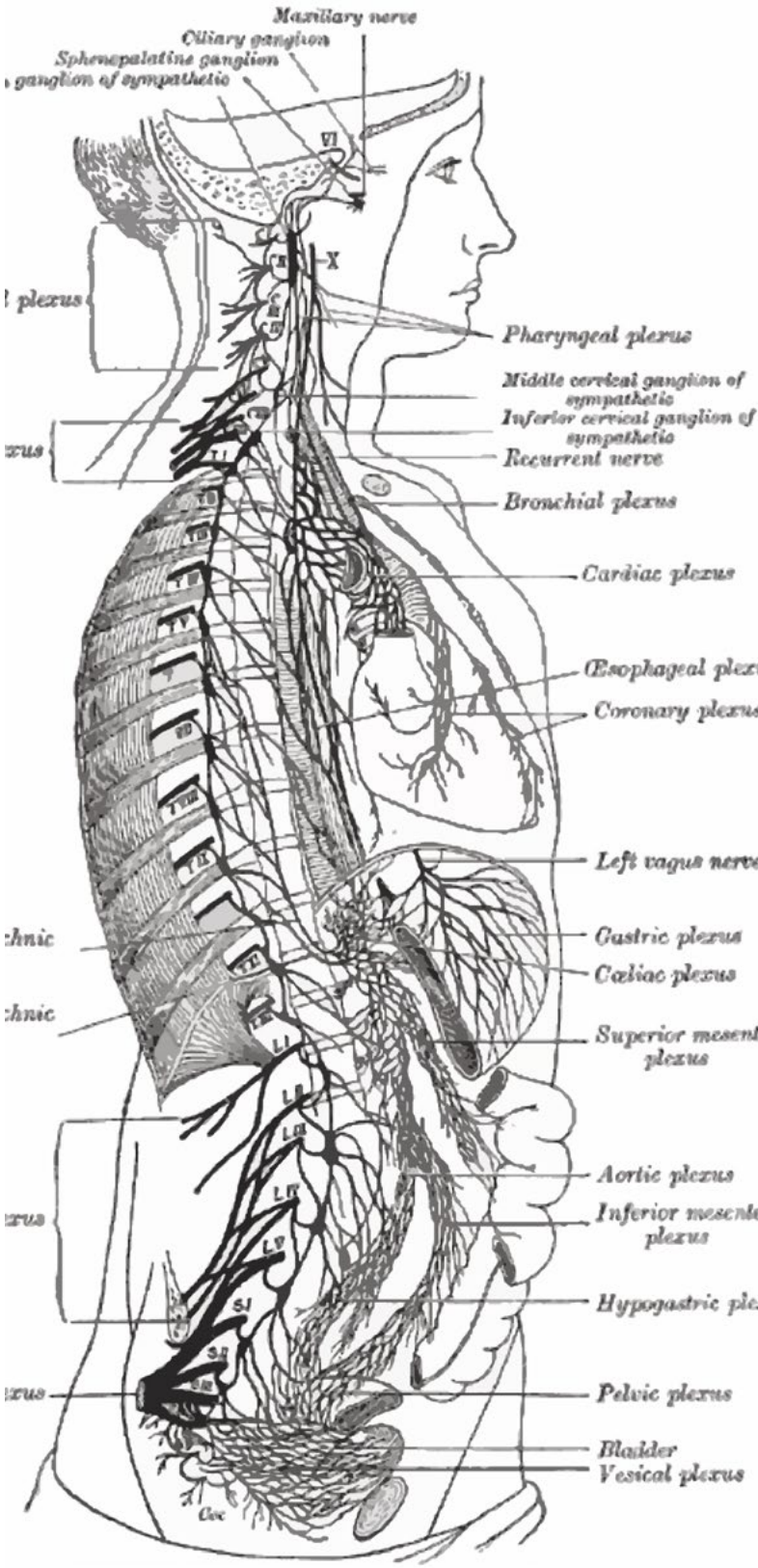
Over time, the theory became embedded in clinical perspectives, and polyvagal-informed therapies emerged. In 2018, Deb Dana and I edited a volume titled Clinical Applications of the Polyvagal Theory: The Emergence of Polyvagal-Informed Therapies (Porges & Dana, 2018) in which independent and creative therapists across several disciplines wrote chapters illustrating how they embedded Polyvagal Theory into their practice. Editing the book was a transformative experience and left me with a sense of gratitude as I witnessed Polyvagal Theory being incorporate into the creative works of others.

Following more recent discussions with Deborah Malmud, the director of Norton Professional Books, we decided to create a book that contained relevant articles published primarily since the publication of The Polyvagal Theory (Porges, 2011). Polyvagal Safety is the product of those discussions. This book provides the opportunity to share our expanded understanding of the theory since the publication of the initial polyvagal book.

In reading this book, keep in mind that scientific knowledge upon which the theory is based has expanded since 1994. Basically, what is now known is not equivalent to the informa-

tion available when the theory was developed. Also, consider the value of a theory in providing plausible explanations of clinical observations and how theory is tested. In general, theories explain phenomena and are seldom proven true or false. Rather, they are either updated by information derived from research or displaced by a competing theory that is more effective in explaining the phenomena. By tracking the publications following the disclosure of the theory, the reader can grasp the refinement of the theory as it has continued to focus on clinical features. The collective work continues to emphasize that our mental and physical health can thrive only when our autonomic nervous system is in a state of safety.

Polyvagal Theory is not a static theory, but a framework for organizing information and structuring hypotheses. It is a theory about our human interface with the world and our need for safety and connection through trusting relationships. Through a polyvagal perspective, there is only one nervous system that integrates the regulation of brain and body. Functionally, Polyvagal Theory provides a brain-body neuroscience that links social communication to the regulation of our autonomic nervous system. It is a theory that is agnostic about the causal direction of mental and physical comorbidities. It is a theory that emphasizes feedback systems that support homeostasis and focuses on operational definitions of stress (e.g., disruption of homeostasis) and emphasizes the role of autonomic state in creating both vulnerabilities for mental and physical health and opportunities for rehabilitation and healing. As you read the book, I welcome you to share my enthusiasm for discovery as we learn to appreciate the wonderful attributes of being a human mammal.



The book contains 14 chapters that provide examples of recent theoretical, empirical, and applied elaborations of the theory. The appendix provides an additional chapter: a primer summarizing the theory.

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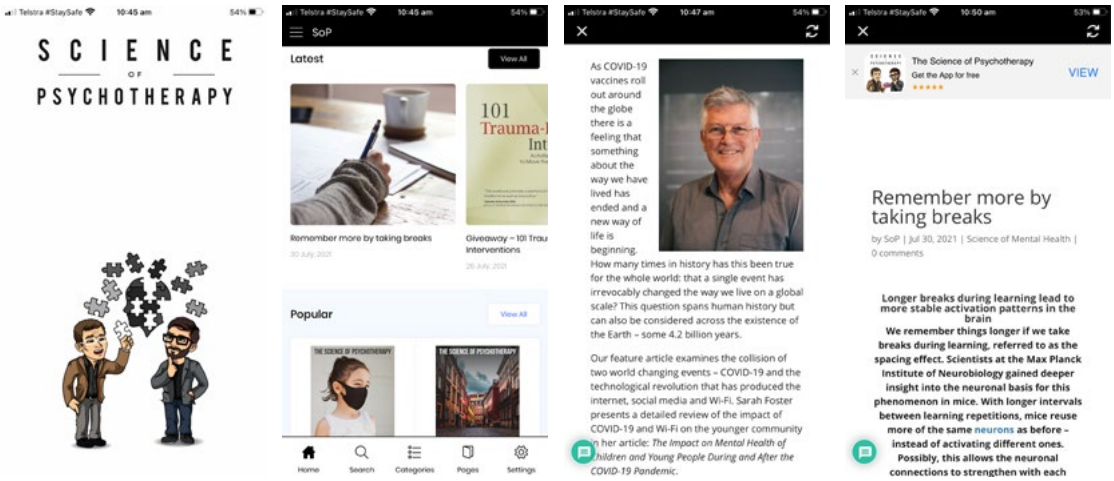

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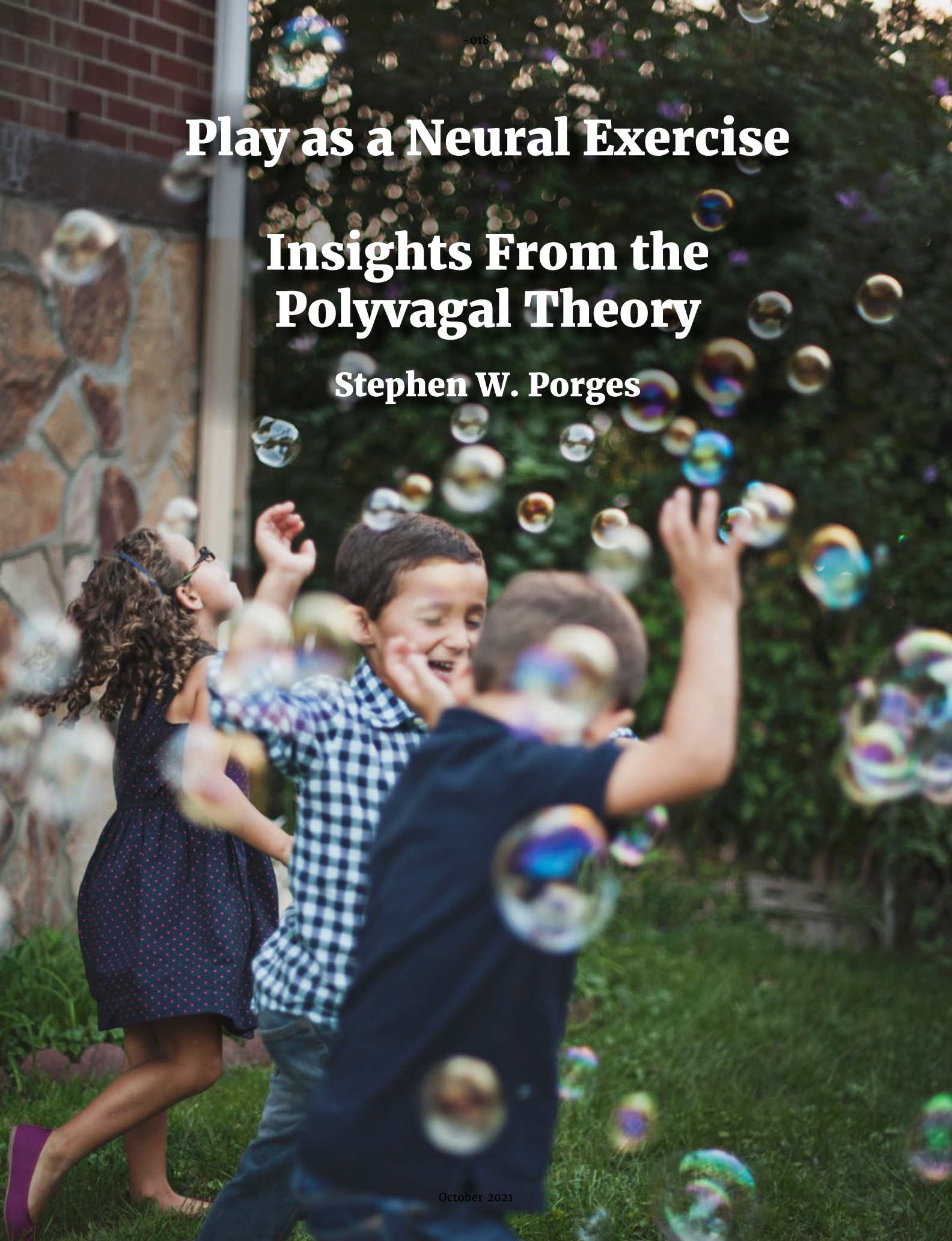
Play as a Neural Exercise

Insights From the Polyvagal Theory

Stephen W. Porges



FEATURE

We often think of play as an amusement or a diversion from the real work in our lives. When we observe children playing, we might judge the time engaged in play as a distraction from opportunities to learn. This view, denigrating play and revering classroom learning opportunities, is consistent with our cultural view of education. Educational systems attempt to maximize opportunities for classroom instruction and to minimize opportunities for social interactions available during recess and other interactive forums such as team sports, music, and theater. From an educator's perspective, play is the antithesis of learning; play steals the precious time that could be dedicated to learning. This perspective is based on assumptions derived from learning theories that were outlined by behaviorists about 100 years ago. What if this perspective, prevalent in our society, is outdated? What if play, rather than displacing learning experiences, actually provides a neural exercise that would facilitate learning?

Excerpt from chapter 3 in *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, Self-regulation* , by Stephen Porges – published by W.W. Norton.

Is our conceptualization of play inadequate? Are our views of play restricted interpretations dependent on a limited understanding of learning embedded in our educational institutions, parenting styles, and expectations of socialization? Can we take a different perspective and emphasize that play provides opportunities to exercise features of our nervous system that would foster learning and social behavior? If play were perceived from this perspective, then play, as a neural exercise, might foster state regulation, enabling individuals to transition efficiently from active to calm states. Consistent with this perspective, the ability to move rapidly into a calm state would facilitate efficient learning and optimize spontaneous and reciprocal social behavior.

The importance of play is dismissed in the cognitive-centric world of education. Within theoretical models of learning, little importance is placed on how bodily feelings, as an intervening variable, influence the ability to learn. Although we may want to sit and attend, at times our body may want to run, fight, or hide. Calmly sitting enables us to attend and to efficiently learn. However, when our body wants to run, fight, and hide, we are in a physiological state that supports defense. During these physiological states, neural feedback from our body to the higher brain structures will interfere with cognition and learning. Missing from the cognitive-centric perspective is the role that play may have in strengthening the neural circuits that can rapidly downregulate defense systems to foster learning by enabling us to sit calmly and attend.

The roots of play are linked to the evolution of a neural mechanism that enables mammals

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to shift between mobilized fight-flight and calm, socially engaging states. From an evolutionary perspective, mammals had to rapidly detect whether a conspecific was safe or dangerous. If the interaction was dangerous, they needed to be in a physiological state that would produce sufficient energy to defend (fight) or facilitate an instantaneous escape (flight). If the interaction had cues of safety, then the physical distance could be reduced and physical contact might ensue and terminate with mating behaviors.

To mate or to be in close contact with a conspecific, defense reactions have to be inhibited before cues of aggression or fear are expressed. An immediate decision has to be made to distinguish potential mate from potent threat. This process was so important to survival of both the individual and the species that the neural mechanisms were subjugated to brain processes outside the realm of conscious awareness.

Within the context of the Polyvagal Theory, the instantaneous process of evaluating risk outside the realm of awareness is called neuroception. Neuroception is the neural process through which our body reacts to features in the environment and shifts physiological state to deal with potential risk. Neuroception is not perception, because the process does not require awareness. If the cues trigger a neuroception of safety, our physiological state calms immediately, then we can easily socially engage or attend. If the cues trigger a neuroception of danger, our body prepares for movement. If the cues trigger life threat, then we lose social contact and immobilize. Although we are not aware of the stimuli that trigger our sense of danger or safety, we can become aware of our bodily responses triggered by neuroception. Thus, the cues from our body influence our personal comfort, which will vary as contexts and interactions with people change.

Functionally, play is a neural exercise in which cues triggering neuroception alternate between danger and safety. As an example, we can think of the simple game of peek-a-boo that a mother may play with her infant. By hiding her face and removing the cues of safety normally generated by the social engagement system (prosodic voice, facial expressions), the mother is creating a state of uncertainty in the infant. This state of uncertainty is followed by the mother startling the infant by showing her face and saying "peek-a-boo!" The sequence of the peek-a-boo game is ended, when the moth-

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er uses a prosodic voice with warm facial expressions to calm the startled infant.

Deconstructing the behavioral sequence involved in peek-a-boo, we see the neural exercise embedded in this play behavior. First, the initial hiding of the mother's face elicits a state of uncertainty and vigilance. This state is associated with a depression of the infant's social engagement system, including a withdrawal of the myelinated vagal pathways to the heart. This puts the infant in a vulnerable state in which a startle stimulus could easily recruit sympathetic activity to support mobilization (i.e., fight-flight behaviors). The mother provides the startle stimulus by showing her face and saying "boo" in a relatively loud and monotonic voice. The acoustic features of the mother's vocalizations support the unpredictable presentation of the mother's face, since the vocalizations of "boo" have acoustic features that are associated with danger and lack the prosodic features that would be calming. The cues of this sequence trigger a neuroception of danger, which recruits increased sympathetic activation. The next step in the sequence of this game provides the opportunity for a neural exercise that promotes resilience and enhances the infant's ability to calm.

After the infant is motorically and autonomically activated by the "boo" sound, the mother needs to calm the infant with her social engagement system by using a prosodic voice with warm facial expressions. The prosodic voice and warm facial expressions trigger a neuroception of safety, and the infant calms as the social engagement system comes back online, and the myelinated vagal pathways downregulate the sympathetic activity. When effectively imple-

mented, peek-a-boo provides opportunities for the infant to neurally navigate through a sequence of states (i.e., from calm, to vigilant, to startle, and back to calm). Repeating this game provides opportunities for the social engagement system to efficiently downregulate, via social interactions and sympathetic activation. The child will need this neural skill to adapt in the classroom. In fact, the ability to use neural resources to regulate biobehavioral state is as important as IQ and motivation in predicting classroom performance.

Kittens playing provide a relevant example. I recall what I was taught about the play of cats and other mammals in graduate school. In courses in comparative psychology and animal behavior, we were taught that kittens were practicing their hunting and aggressive skills. However, when I revisited these images from a polyvagal perspective, I saw that the behaviors may have served another purpose. Visualize kittens in bouts of rough-and-tumble play. They are using their claws and teeth, but rarely injure each other. In fact, if you have a kitten, you may be surprised that they know when to retract their claws and relax their jaws once they make a gentle bite. However, an extremely important feature often goes unnoticed. The kittens maintain face-to-face interactions during most of the play. If a bite hurts, there is an immediate face-to-face interaction of their social engagement systems, and they cue each other that there was no intention to injure. But kittens, like children, vary in their ability to be aware of each other in a play scenario. If awareness of the other is poor, then injury may occur. In primate social groups, the juveniles who enthusiastically engage but, due to a lack of awareness

of others, may injure peers are ostracized and marginalized from social groups.

Dogs have similar play sequences. Dogs will play a structured game of chase. One dog runs and is chased by another. When the dog chasing catches the other dog, the dog may bite the rear leg to inform the dog being chased that it is caught. The caught dog turns toward the other dog to initiate a face-to-face interaction to determine whether the bite was aggressive or play. If it is play, the two dogs interact via their social engagement systems (i.e., face to face), and then the game continues with a role reversal. If the bite is aggressive, then face-to-face is replaced with a face-to-neck attack.

We can observe similar situations on the playground. For example, when playing basketball, players are often shoved and fall. If the social engagement system is employed following this event, aggressive behaviors will be dampened. For example, aggression is defused if the person who did the shoving makes eye contact with the person on the floor, helps the other person off the floor, and asks if the person is okay. However, a fight might be triggered if the person who did the shoving just walks away. In my talks, I use an example from a professional basketball game in which this sequence results in a fight between Larry Bird and Julius Irving (Dr. J.).

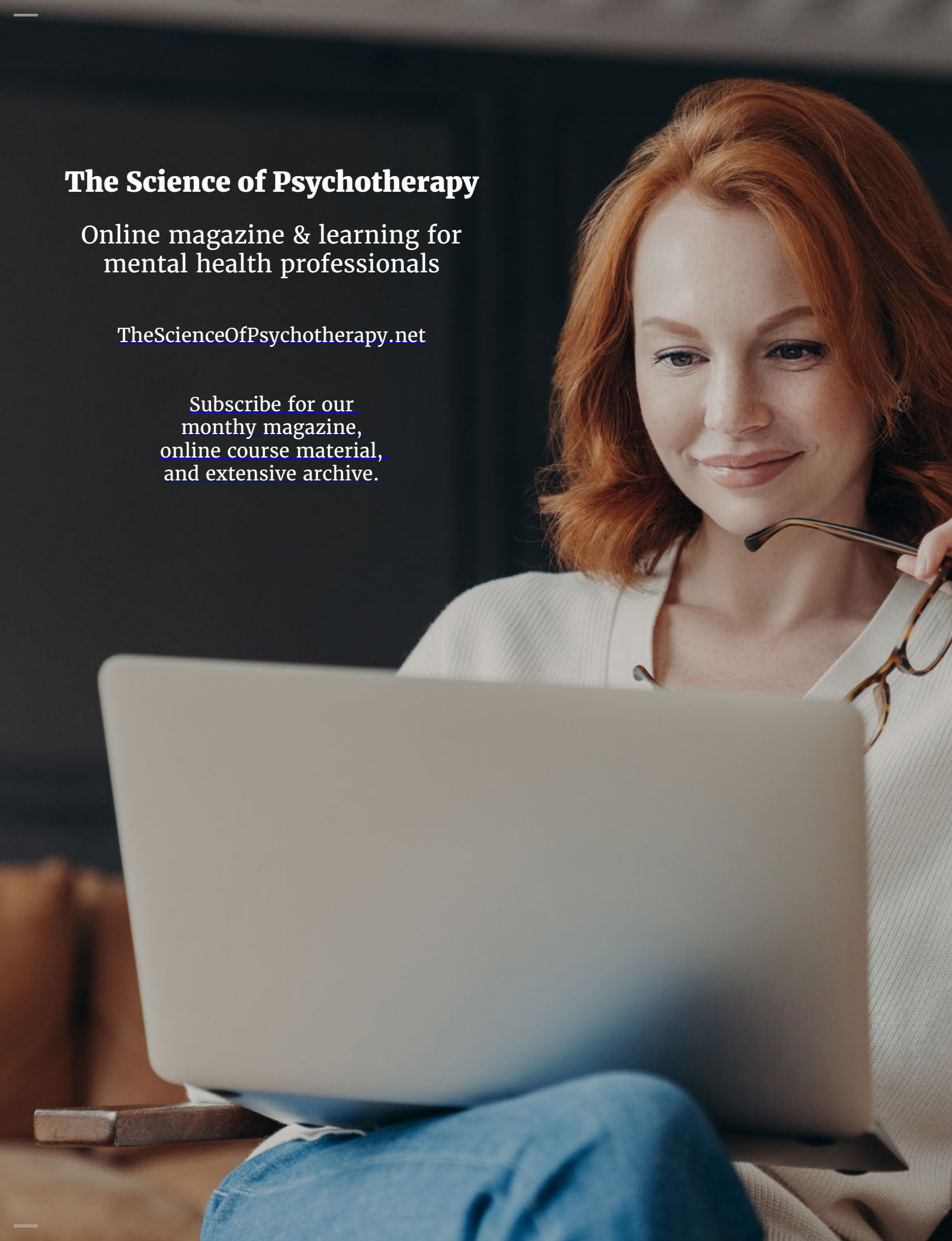
By deconstructing the play of mammals, whether we are observing kittens, dogs, or children on the playground, we see a common feature of behaviors that simulate features of fight-flight that are actively inhibited by social engagement behaviors (e.g., facial expressions, head gestures, prosodic vocalizations). In the examples above, we can see that play transitions into aggressive behaviors, if the social engagement systems are not employed to downregulate any potential neuroception of danger.

The process of play is about active inhibition of the neural circuit that promotes fight-flight behaviors. Play functions as a neural exercise that improves the efficiency of the neural circuit that can instantaneously downregulate fight/flight behaviors. If we translate this into the classroom, we can identify children with difficulties in downregulating the neural circuits that promote fight-flight behaviors. These children have difficulties in sitting, in attending, in listening, and in socializing. If we watch these children on the playground, we might see deficits in their ability to play with others. They may not accurately anticipate the behaviors of

others and, instead of a reciprocal interaction that inhibits fight-flight behaviors, they may functionally be physically bouncing off their peers.

When we are in neurophysiological states supporting mobilization and shutdown, our cognitive processes are greatly compromised. However, we have a neural circuit that can rapidly downregulate mobilization behaviors to foster the calm states that optimize learning and social behavior. Although play is frequently characterized by movement and often recruits many of the neural circuits involved in fight-flight behaviors, it may be operationally distinguished from defense, since it is easily downregulated by the social engagement system. However, the effectiveness of the social engagement system to downregulate fight-flight behaviors requires practice. This practice may start early in a child's development through play.

In this chapter, the definition of play, similar to other forms of co-regulation, requires reciprocal and synchronous interactions between mammals while using the social engagement system as a regulator of mobilization behavior (e.g., fight-flight). This definition of "play" may differ from the use of the term to describe interactions between an individual and a toy or computer. Play with a toy or computer lacks face-to-face interaction and will not exercise the social engagement system as a regulator of the neural circuits that foster fight-flight behaviors. Thus, as mammals, we need to respect our phylogenetic heritage and appreciate the importance of synchronous face-to-face interactions as an opportunity to exercise our social engagement systems. As the neural regulation of our social engagement system improves, we gain resilience in dealing with disruptions in our lives. Many of the features of play are shared with psychotherapy. A deconstruction of a therapeutic session will find the client (and often the therapist) shifting states from calm to defense and back to calm. Fortunately, we as mammals have a social engagement system that evolved to employ cues from face-to-face interactions to efficiently calm our physiological state and shift our fight-flight behaviors to trusting relationships.



CHAOS & COMPLEXITY CREATIVITY IN HUMAN RELATIONSHIPS

RICHARD HILL

FEATURE

INTRODUCTION:

The Complexity Theory and Chaos Theory are predicated on non-linear systems and unpredictability. Through the process of self-organisation it is possible for there to be emergent qualities. Is there any predictability to emergence and, if so, what are the conditions under which this might be possible? Can this be explored in relation to human experiences? We will look at a real-life case and how the concepts of complexity can show us how therapeutic resolution is possible and often probable. The underlying principal is whether there is weight of reason to be confident that tomorrow can be a better day.

BACKGROUND:

Complexity Theory describes non-linear systems that, instead of following a linear cause-and-effect paradigm, evolve and adapt to changing conditions with random unpredictability. Complex systems can self-organise and produce emergent qualities and quantities that are more than just a conglomeration of the initial quantities and qualities. A system is considered to be self-organising when it is somewhere between the conditions of rigid order (no change leading to dissipation of the system) and chaos (continuous unpredictable change leading to disintegration of the system). Between rigid order and chaos is found the 'edge of chaos', the point where there is enough chaos for novelty and creativity, but also enough order for consistency and patterns to endure. This point is a magic point, where new and unimagined properties can emerge (Kellert, 1993; Lewin, 1992; Heylighen, 2008).

In the human experience, a complex self-organising system is reflected in the practice of psychotherapy where the purpose of the therapy is to create changes in the patient's state-of-being to afford their complex systems (their human neuro-psycho-bio-logical complex) an opportunity to self-organise toward a more satisfying and healthy state of well-being.

These opportunities are expressions of adaptations to changing conditions which are changes to the original state-of-being, or what is called the "initial conditions". In complex systems, small changes to initial conditions and

the introduction of new elements can produce large transformations in the system. It is therefore possible to conduct therapy with great subtlety and still achieve dramatic outcomes.

THE CURIOSITY:

Is it reasonable to assume, on the basis that psychotherapy often achieves a beneficial outcome, but especially because many people find resolution to problems, stresses and challenges without the help of someone else, that there is a tendency for humans to self-organise toward a state of wellbeing. This is certainly the tendency in biological health where a complex immune system has evolved to combat pathogens and poisons and those things that threatens survival. But disease and psycho-neurological disturbance still affect individual members of the population which can result in death. It is, therefore, necessary to acknowledge that it is possible to self-organise in an unbeneficial and even destructive direction.

Despite this proviso of negative self-organising possibility, if a predominant tendency to self-organise toward a beneficial outcome can be established, is it possible to reliably predict that human beings can expect to create a better day if they begin with certain initial conditions, are open to certain inclusions or interventions and then allow self-organisation to occur?

CASE STUDY:

This case is based on an actual case, but with some changes to protect from public recognition.

Brian and Jenny are father and daughter who have presented for therapy to save their deteriorating relationship. Brian divorced from Jenny's mother when she was only 6 and has had visitation rights over the years. When Jenny was 16, her mother died after a short battle with cancer. Her father had remarried long before her mother's death, so when Jenny moved into her father's house, she had to manage a new extended family. Jenny is now 21 and has come to the of age to receive a substantial inheritance set aside by her mother (over half a million dollars). Brian finds that Jenny has become uncooperative and doesn't allow him to be a source of advice and wisdom. He also finds that she does not accept her responsibilities regarding household duties and chooses not to attendance the extended family dinners. Jenny says that she does not feel close to her father and doesn't feel like the house is her home and she is keen to find her own way in life. She is distrustful of her father and her uncle (mother's brother), who holds power-of-attorney, in regard to her new-found financial fortune.

COMPLEXITY IN HUMAN RELATIONSHIPS.

Complexity Theory and the associated Chaos Theory came about in relation to mathematics, cosmology and inanimate systems. Extending the application of complexity to living systems brings a number of new and difficult elements into the equation. Several new approaches have been developed to incorporate living systems and especially those including human beings (Waldrop,1992).

So much has been written about complexity in various fields of study that it is difficult and

perhaps counterproductive to paraphrase the knowledge once again. In the context of human interaction and the changes and shifts that occur during psychotherapy, an elegant definition is presented by Dr Neil Theise from Beth Israel Medical Centre (2009):

In brief, complexity describes how systems of interacting individuals, whose interactions fulfil certain criteria, will self-organize into larger, adaptive, emergent structures or behaviors. These are known as complex adaptive systems. The four criteria are:

1. There must be large numbers of individuals. (Moreover, different numbers of individuals will yield different emergent behaviors).
2. Interactions must have an overall balance of negative feedback loops over positive feedback loops. (i.e., not a dominance of negative feedback)
3. No individual is sensing the global status of the system as a whole; instead, each individual is only reacting to local characteristics and events.
4. There must be some limited level of randomness, so called "quenched disorder". Too much randomness and the system will be chaotic or completely disordered. Too little randomness and the system is rigidly determined and therefore cannot adapt to a changing environment. (p.264)

The non-linear, less predictable qualities of complexity stand in contrast to the linear processing of simple cause and effect. The domi-

nance of cause and effect thinking comes from early thinkers and deductions such as those in Newtonian physics and the duality of Descartes but are pervasive enough to infect the situation between Brian and Jenny.

Brian sees the situation as very simple: I'm your father you should behave like a daughter; I have supplied money for your schooling and upbringing, you should now respond in kind. A world based on simple cause and effect would be a very straightforward and predictable place. Life is, of course, not so simple and this is what Brian needs to discover in contrast to his rigid, linear position.

Jenny, on the other hand, feels overwhelmed by emotions, ideas, expectations and needs. This is a chaotic state to which her response is to withdraw and disengage. In order to facilitate change, it is necessary to inject some stability or reliability into Jenny's chaos and perhaps a little chaos into Brian's rigidity. If they can be moved to the 'edge of chaos', then it is possible for spontaneous change to emerge. At the edge of chaos self-organisation can occur as a creative response. This means that changes can occur without Brian or Jenny consciously creating the change. From the psychotherapeutic perspective this is exactly what is wanted because it is their personal attitudes, beliefs and intentions that are barriers to resolution. Something needs to change for them and in a "magical way".

Brian and Jenny were each given homework tasks in the style of Cognitive Behavioural Therapy. Brian was to resist giving instructions, no matter how wise or beneficial he believed them to be, and Jenny was to perform tasks around the house without being asked to do so. In effect the tasks were designed to create new conditions that would require adaptive change. This change would be both within the individual and

the relationship.

This introduces one of the most interesting differences regarding complexity in living systems: there is an interactive process between organisms and particularly between human beings that creates a new set of potentials. This difference has spawned some interesting thinking.

AUTOPOIETIC AND SYMPOIETIC SYSTEMS.

Poiesis is a Greek suffix that indicates the act or process of producing something (Collins, 2009). Autopoiesis literally means self-production or the act of producing something in relation to and/or within the self. The term was originally introduced by Chilean biologists Francisco Varela and Humberto Maturana in the early 1970s (1980). More precisely, the term refers to the dynamics of non-equilibrium structures and states. The state of non-equilibrium is potentially the 'edge of chaos' where self-organisation and emergence can occur. Maturana and Varela introduced this term to describe self-sustaining complex systems (Knowledgerush, 2009).

A vivid example of a non-equilibrium structure is the Great Red Spot on Jupiter, which is essentially a gigantic whirlpool of gases in Jupiter's upper atmosphere. This vortex has persisted for a much longer time (on the order of centuries) than the average amount of time any single gas molecule has spent within it. Varela and Maturana were addressing the activity of biological cells and some have found this insufficient in relation to the complex relationship between humans.

Beth Dempster from the University of Waterloo has championed a new word to cover the

Chilean biologist Fancisco Javier Varela Barcia (September 7, 1946 – May 28, 2001).

existence of "produced activity" within ecosystems (2000). Ecosystems and human dynamics have the additional characteristics of being collectively producing, boundaryless and organisationally ajar (the potential to open or close, be accepting or resistant to incoming elements). She suggests that "Autopoietic systems are homeostatic, development oriented, centrally controlled, predictable and efficient. Sympoietic systems are homeorhetic, evolutionary, distributively controlled, unpredictable and adaptive." (p.1)

For Brian and Jenny, it is necessary for them to experience autopoiesis, but this is only to do with conditions within themselves. Changes within the relationship dynamic are much better defined as sympoiesis which may occur before personal change, after personal change or in a dynamic cycle of interactive change. The simple exercises given at the first visit did, indeed result in a surprising change.

The individual does not have a global sense of activity, just an awareness of their personal experience - Dr Neil Theise.

At the second meeting it was found that Brian was frustrated by holding back his well-intentioned instruction and Jenny felt a little guilty as she noticed the number of things that she could do around the house and had not seen before. Each felt a personal shift in their world view, but more importantly, Brian felt that Jenny was more appreciative of the parental home and Jenny found that she could enjoy longer conversations with her father.

Although these may seem small changes, this was a large effect on day-to-day happiness and interpersonal warmth. This shift was not an intention of their behaviour but was a very welcome emergent quality from the process. Both expressed their surprise. This is reflective of Dr Theise's 3rd criteria that the individual does not have a global sense of activity, just an awareness of their personal experience.

Interestingly, despite the surprising benefits of the week's homework, Brian's conversation rapidly returned to the elements that had not yet been "fixed". The therapist decided to encourage Jenny to pursue her feelings and the emotional interaction between them. It was hoped that Brian might shift from his pragmatic behavioural expectations and see the importance of how they felt about each other. The conversation brewed and bubbled and boiled

over with Jenny declaring that she loved her father but didn't like the man who had all these expectations. Brian made a stumbling attempt to avoid his emotional reaction by returning the conversation to cleaning up after the cat. This interaction pushed the session to the very edge of chaos, but this time it was Brian who was teetering on the edge. It seemed that, for the first time, Brian could see the emotional energy between them and that this was different from the emotional energy within himself. For a mature man, this was an interesting experience of realisation that was clearly shaking him. In that moment Brian realised that he was not the font of all knowledge and emotional understanding. In that moment he was at the same level of emotional developed as his daughter and they were encountering something together as equals.

This was more than autopoiesis, although that was occurring on one level. It was a sympoietic function. Self-organisation manifested a beneficial change, or at least a change that made everyone feel better. This is typical of the many experiences in psychotherapy where people self-organise towards a mental and emotional state where they feel better. This is exactly the phenomenological experience that has led to the questions at the beginning of this paper. It is interesting to discover that there are dissenting views to the process of self-organising systems that warrant mentioning.

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DEMAND SIDE DYNAMICS:

Graeme Snooks of the Australian National University has pursued a theory to explain complex living systems for the past decade (2008). The boldness of this work involves presenting an alternative theory to the Darwinian model and an attempt to create a unified theory of complexity. Snooks suggests that there must be separate theories to explain inanimate and animate systems. He suggests that the physics model of inanimate systems is insufficient to explain living systems. Dempster's sympoiesis also embraces the idea that living systems are not only affected by elements entering, but also the dynamics within and between the elements.

Snook explains that the usual approach to complexity is to examine an open system consisting of a large number of particles that are interacting energetically producing complex structures that reach a critical point and self-organise radical change. A well-known experiment is the sandpile by Bak (1996) where particles of sand are poured onto the apex of a sandpile. Transition from one phase of existence to another occurs when a critical build-up reaches a point of collapse in unpredictable ways. The unpredictability is due to the large number of interacting objects. Newtonian physics is only reliable when confined to 2 or 3 objects. These types of inanimate examples are dealing with states of equilibrium that occur before and after the phase transition. Complexity theory allows for the examination of the non-equilibrium processes of change. Ilya Prigogine, one of the early developers of the physics of complexity, proposed the process of bifurcation when alternate paths are unpredictably followed creating change and non-equilibrium (1997). It is Snooks contention that the process has internal elements that enhance predictability. He calls these influences demand-side as different from supply-side (Snooks, 2007).

Rather than an unpredictable emergence from the pressures of complex input, Snooks suggests that, in living systems, there is a '... "strategic exchange" between the demand and supply sides of dynamic living systems, rather than the outcome of supply-side local interactions between agents' (2008, p15) He goes on to say, '... It is this exchange that lies at the very heart of the self-sustaining dynamics of living systems. Social agents are self-motivated and self-driven, and they construct complexity and order in a creative response to the continuously changing needs ... of their society.' (p.15)

It is possible to see parallels and similarities to sympoiesis here. Without going into a deep analysis, I suggest the common element is that living systems have embedded elements that have an inner relational impact. Not only is there a complex response to the combination of many elements, but there is a "fuzziness" that is the effect of internal and relational complications.

Brian and Jenny are not just trying to find a place of equilibrium, nor are they just trying to find a place at the edge of chaos that enables them to be satisfied by whatever might emerge. They are seeking to find some place of integration that provides enough room for change and enough stability of continuity, but they are seeking a place of satisfying integration. Within the system of their relationship there are preferred emergent qualities and those that are not preferred. Something is inherent in the system that determines that preference.

Snooks is suggesting that there are elements of demand, or preference, within the social systems that exist at the time. Dempster is suggesting that the process is not constrained to boundaries or limited to the inputs. I suggest that there are also biological (which includes neurobiological) determinants as well, which I shall elaborate shortly. For Brian and Jenny, it is relatively simple. They are seeking an outcome that feels better and satisfies their perceptions of a healthy relationship where their emotional interaction is less pragmatic and more emotionally based. When solar systems or storms of Jupiter settle into states of equilibrium or states of non-equilibrium, there is no opinion of preference given. The state of self-organisation and resulting emergence are what they are. 'Closed and open systems ... can be maintained in dynamic, non-equilibrium, stationary states indefinitely as long as energy and/or matter is continuously supplied' (Mikulecky, 1995). Human systems, on the other hand, must include the concept of choice or preference which comes with the capacity of consciousness and the ability to act on choice.

Graeme Donald Snooks, ANU, September 1989

The italicized words above are potentially open to interpretation. It is the mechanisms involved in this interpretation that might be the key to the principal question of this paper. One last aspect of theory in the literature needs to be discussed: evolved disposition.

EVOLVED DISPOSITION:

Living systems, and especially developed organisms like human beings, have gone through lengthy periods of time where the organism's design is the outcome of evolutionary changes. In other words, humans have developed systems that cope with their environment. These systems are based on a selection of the best mechanisms for maintaining health and well-being especially in order to achieve procreation.

There are a number of evolved dispositions that incline a human being to prefer one set of feelings to another. An overarching response is that the body responds well to positive emotions (Fredrickson, 2001). The principle here is that negative emotions are responses to possible threats which changes the brain to become focussed on the problem. The body responds to threat by closing down the social engagement systems and engaging the systems that prepare for fight or flight – the sympathetic nervous system (Porges, 2001). Social engagement is an essential element in the processes of attachment and bonding (Porges, 2005). (Creating a satisfying parent/child attachment was a vital desire for Brian and Jenny.) Social threat produces many of the same biological responses as mortal threat and when this becomes chronic (sustained over a long period) the body can produce an inflammatory response in the immune system (Kiecolt-Glasser et al, 1986) which can cause the neurological 'sickness behaviour' response. This response sends the body into a series of protective behaviours including social withdrawal, lethargy, increased temperature and reduced tolerance to pain and social distress (Harrison et al, 2009). Social rejection can also manifest as physical pain (Eisenberger & Lieberman, 2004) because of the common proximity of these responses in the brain.

These are just a handful of examples of the biological processes that produce clear inclina-

Social threat produces many of the same biological responses as mortal threat and when this becomes chronic (sustained over a long period) the body can produce an inflammatory response in the immune system

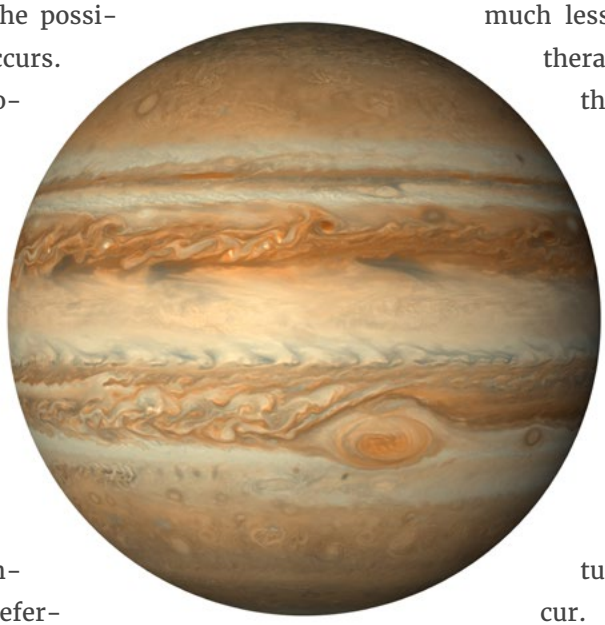
tions to move away from or avoid certain behaviours and/or internal biological functions. There are hundreds of research papers that show that there are innate responses to the environment, lifestyle practices, social engagement and levels of stress that can cause a human being to become consciously aware of a need to alter behaviour or environmental circumstances or at least question that something is not "right".

This is what happened to Brian and Jenny. They became consciously aware of an unsatisfying disturbance in their existence that they wanted to change. Even though the easy option was to simply move away from each other, which would have been facilitated by Jenny utilising her financial freedom to seek her own accommodation, there was an even deeper calling for familial attachment that caused them to seek a healing of their difficulties, rather than just an easing or avoidance. During the therapeutic process they would both comment on their improved feelings. By this, I expect that they were referring to changes that they could not definitively or objectively describe but knew that it was better – they could feel it. It was something abstract, but tangible in improvements to sleep, stress levels, pleasure of family social engagement and a greater sense of trust and safety.

DISCUSSION:

Stephen Porges from the University of Chicago created the word 'neuroception' to describe the mental process of persistently scanning the environment for threats and levels of safety (Porges, 2004). This is just another indicator of an innate mechanism that determines our quality of experience. It seems clear that a desire for a better quality of experience has been evolutionarily selected. Our preference is for a positive, open, creative, socially interactive, healthy experience. Much of our efforts in day-to-day existence are geared toward maximising the quality of our experience from overt expressions like laughter and social pleasure, to the innate expression of a balanced biochemical system and a healthy immune system.

That these systems are subject to complexity and its conditions of chaos, unpredictability and sudden bifurcations may be unavoidably true. That there is something that a living system can do to influence or direct some of these processes is more than just a question. It is a research-based probability. It seems clear in the information presented in this paper that there are biologically preferred processes and emotionally desired processes in human interaction that can have an effect on the nature of creativity at the edge of chaos where creative self-organisation and the possibility of emergence occurs. Despite the constant processes of change within a person and the constant input of interactions with other people and the environment, the human system has the sympoietic capacity to maintain a beneficial energetic supply of positive feedback generated by the positive preference of conscious awareness and the natural preference for positive emergence from self-organising functions to enable a non-equilibrious state to remain relatively stable, i.e., not rigid, nor chaotic, but sustainably flowing.



The storm on Jupiter does whatever it does, and complexity ensures that various changes occur at points of criticality. Whatever those changes are is unquestioned and unchallenged. The storm adapts and evolves. Brian and Jenny, on the other hand, do not want to accept whatever it is that happens. They have something in their humanness that determines whether an outcome or emergence is acceptable or not. Although Brian initially expressed his need for some simple pragmatic changes in behaviour, it was the development of his emotional connection to his daughter that made him feel that the therapy was beneficial. It was the lack of emotional connection (insecure attachment) that was the problem for Jenny. Issues of day-to-day behaviour seemed irrelevant or, at least, much less important. It was the therapist's early concern that the relationship would freeze in a Catch-22 where Jenny wouldn't change her behaviour until Brian repaired their emotional relationship and Brian wouldn't have feeling for Jenny if she was unable to do the things he wanted. Fortunately, this did not occur.

In a human system this is relevant. In an inanimate system there would simply be a chaotic explosion, or a slow rigid decay (entropy) and the situation would cease to exist. Humans do not accept that kind of destruction (even though it happens from time to time). Humans have innate desire for tomorrow to be a better day.

Snooks considers that this desire, amongst many other demands within a living system, drives the direction of development and

change through complex functions but with an inclination toward a beneficial outcome or, at least one that satisfies the demand of the time in a pleasing or acceptable way. Because the body has developed a large number of psycho-neuro-biological demands, there must be a non-conscious inclination to feel good and non-conscious mechanisms that can perceive that feeling. Similarly, this desire to feel good pervades our emotional motivation. Although clumsy and inadequate, the human predilection toward drugs and various other self and administered medications is, albeit dysfunctional, in order to feel better. Sadly, many of these actions have the opposite effect. The point here, however, is that feeling good is a central key to the acceptance of change.

What about the other side of the question – is there a tendency for living systems to move away from wellbeing and if so when and why? I don't believe there is enough information here to make a clear conclusion or estimation, but most therapists receive clients that seem to be spiralling toward an unpleasant disaster or have settled into a unpleasant homeostasis having lost the belief that things could ever get better. Brian and Jenny were certainly heading for some form of disaster. Maybe there is an indication that the preference for feeling better prevails in the fact that Brain and Jenny, and the many others that seek out therapy, are aware that something is wrong? They know that they need to do something to get things back on track, and they know that they have lost connection with whatever it

Feeling good is a central key to the acceptance of change

is within that they can use to help themselves. The problem might be that we have some emotional equivalent in living systems and human relationships to the gradual boiling of the frog – an insufficient sensitivity to slow changing circumstances leading to a point of inescapability from the destructive fields of chaos or rigidity? But I believe, based on many, many cases like Brian and Jenny, that complexity is true enough to be confident that even something set on a slow destructive path can receive a surprising and unexpected jolt that can save the frog from boiling.

CONCLUSIONS:

Can we have confidence that tomorrow can be a better day? I believe we have established some helpful support for having confidence in this. Certainly, the experience of Brian and Jenny as a representative or fractal example of similar experiences in all people is a positive start. That there are biological processes that continue below consciousness that clearly incline the body toward beneficial situations and environments is another positive contribution. That we are emotionally geared to enjoy our experience when our environment is safe and socially engaged makes us consciously aware of what to prefer in life. Theoretical efforts such as Dempster's sympoiesis and Snooks' demand-side dynamics not only present theories that seek to explain the belief that humans have an influence on events. What applies to Jupiter's storm is not the same as the possibility for health and happiness for Brian and Jenny.

If we assume a 'better day' to be the simple outcome of better health, better social engagement and a better capacity to survive and prosper, I suggest that we have established that tomorrow being a better day might be a reasonably predictable outcome in the context of certain conditions. A deeper examination of lifestyle practices that seem to include the ideal that tomorrow will be a better day such as Buddhism, positive/creative thinking, Suffism and perhaps people who have experienced near-death may contribute more weight. I suggest there may be much to learn from indigenous cultures which developed in times before the advent of the industrialised world and what some call 'modernity'. It is, perhaps, enough to simply believe that tomorrow will be a better day. That may be all that is necessary.

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OPINION

HOW WELL DOES CBT REALLY STAND UP TO PSYCHOANALYSIS?

MELISSA SANDERS

CBT (Cognitive Behavioral Therapy) teaches that emotions which may appear rational at first, such as a patient feeling depressed about the dreadful state of their life, are actually the result of irrational thinking, i.e., just because they lost their job doesn't mean everything will be catastrophic from here on out.

They simply need to determine and fix the negative thought patterns to feel better, rather than diving deep into the reasons behind why they feel this way. Symptoms such as anxiety and depression aren't significant clues to be analyzed over the course of years; they're unwanted intruders which need to be removed immediately.

When you consider CBT in this light, it's easy to see why it is so popular amongst therapists and patients. Who wouldn't support a fast and affordable form of therapy with countless studies proving it works for all kinds of behavioral disorders?

In a world in which more people are opening-up about their problems and seeking counseling, an effective form of therapy which delivers successful results quickly and en masse should be welcomed with open arms.

But is CBT as good as the studies suggest? Could its resounding success be its downfall?

HOW TRULY EFFECTIVE IS CBT?

There has been extensive research demonstrating the effectiveness of CBT at treating a wide range of disorders and problems including anxiety, depression, substance abuse, marital conflict, eating disorders and severe mental illness. Studies unanimously show that it is equally or more powerful than other types of psychological therapy and psychiatric medications.

Here are some examples:

Erik Hedman et al. (2016), from the Karolinska Institutet, Sweden, showed that 50-75% of patients suffering from SAD (Social Anxiety Disorder) who received CBT experienced relief from their symptoms and were able to over-

come their anxiety.

The Cognitive Behavioral Therapy clinic of Los Angeles analyzed the research literature that compared receiving traditional talk therapy or medication for panic attacks, generalized anxiety, posttraumatic stress disorders or OCD. Their research (CBT, n.d.) showed that many more patients respond positively to CBT — sometimes as many as double.

Research published in The Lancet Psychiatry by Dr Nicola Wiles et al., (2016), determined that patients who receive CBT in addition to usual care, which includes antidepressants, report at least a 50% reduction in their symptoms, compared to the 27% experienced in patients who continued with their usual care alone.

ONLINE VS FACE-TO-FACE THERAPY

The results are equally as promising for ICBT (Internet-Based Cognitive Behavioral Therapy) as they are for traditional face-to-face counseling (Aminoff et al., 2021; Karyotaki et al., 2021). And with the recent pandemic and online-centric lifestyles encouraging many to consider online counseling over in-person counseling, this can only be good news.

A Dutch study of 3,876 people (Karyotaki et al., 2017) showed that self-guided online CBT was dramatically more effective at lowering depression symptoms in comparison to in-person treatment. Other investigations (Ruwaard et al., 2011) show that the treatment adherence of ICBT is significantly high at 82%.

With the great success of online self-guided therapy, does a therapist even need to get involved at all?

Could the answer to common mental health disorders truly be something as basic as identifying unhelpful thoughts or changing the way patients speak to themselves? Could CBT really be so simple that patients could receive it from a smart device instead of a human therapist?

DANGERS OF CBT'S SUCCESS

During the last few decades, psychology has become much more evidence-based, with an increase of attention in the media on adopting CBT over other forms of treatment. In response, therapists trained in traditional therapies, such as psychoanalysis, have argued against the more modern therapy, claiming it to oversimplify complex problems and prioritizing quick

fixes over long-term solutions.

There is undoubtedly some truth to these claims.

SHORT-TERM THERAPY, SHORT-TERM SOLUTIONS?

While CBT is certainly effective, the longevity of its effects are not as promising. Most CBT plans last less than six months, compared to other forms of psychotherapy which can last years.

When you ask patients how they're feeling immediately after their treatment plan ends, CBT looks reliably convincing. However, months or years later, the instant benefits patients received from the popular form of counseling have often faded (Johnson & Friborg, 2015), while the results of psychoanalytic therapies remain or have even increased.

This suggests that other forms of therapy may help by restructuring patients' personalities in a long-lasting way, while CBT simply helps patients manage their moods on demand.

A UK study conducted at the Tavistock clinic (Fonagy et al., 2015) supports these conclusions. The study determined that chronically depressed patients who received psychoanalytic therapy had a 40% better chance of going into partial remission during each six-month period of research than patients receiving other forms of psychotherapy, including CBT.

Does this mean that while CBT does work, its effects are only ever short-lived?

LACK OF PERSONAL CONNECTION

Unlike psychoanalysis and other types of talking therapy, CBT lacks an honest, open connection between patient and therapist which many believe to be essential to successful counseling.

A provoking story of a woman taken from a famous piece in the Guardian (Burkeman, 2016) highlights the importance a genuine human connection plays in people who are the most mentally vulnerable:

Around ten years ago, Rachel went to the NHS (National Health Service) for help with depression following the birth of her first child. At the time, CBT was the dominant form of therapy in the UK for depression.

Rachel sat through a group PowerPoint presentation with five steps to "improve your mood", after which she received some CBT from a therapist and several sessions from a computer.

"I don't think anything has ever made me feel as lonely and isolated as having a computer program ask me how I felt on a scale of one to five, and – after I'd clicked the sad emoticon on the screen – telling me it was 'sorry to hear that' in a prerecorded voice," Rachel recalled.

"I may be mentally ill," Rachel said, "but I do know that a computer does not feel bad for me."

From an outsider's point of view, it's clear to see that she was craving a genuine human connection which she wasn't receiving. She needed to feel like she mattered in the mind of another person, even if just for a few minutes each week.

The simplicity in which CBT views mental disorders and the importance it plays on resolving them quickly often means the crucial connection between patient and therapist is pushed to one side in favor of tangible results.

CBT VS PSYCHOANALYSIS

For years there's been something of a battle between modern cognitive behavioral therapy and the classic psychoanalysis developed by Freud. Despite both being used to treat the same mental illnesses, they're strikingly different in their approaches.

CBT views painful emotions as something to be eliminated or, failing that, made tolerable. In this light, it's far more important to get rid of the feeling than to determine where it came

from.

While CBT doesn't claim that happiness is something which can easily be achieved, it does break the process of achieving it into something simple. Distress is caused by irrational beliefs and the patient has the power to take control of those beliefs and change them.

Psychoanalysis claims things are much more complex. Before pain can be successfully removed, it needs to be understood. And happiness is something complicated which everyone may not be able to achieve.

Freud's therapy teaches that we don't really understand our minds and often have powerful motives to keep it that way. We view the world influenced by our early relationships, we want contradictory things and we're closed to change because it takes time and work.

To many therapists, psychoanalysis has a much more romantic appeal than CBT. But preference for psychoanalysis amongst therapists is redundant when countless studies appear to confirm the superiority of CBT.

Does CBT have something of a placebo effect, making it only successful as long as therapists and patients believe it to be a miracle cure-all? Maybe it's not only the high volume of research supporting CBT which is so convincing, but the lack of in-depth studies done on the effects of psychoanalysis.

Researchers from Tavistock clinic in London conducted the first rigorous NHS study (Fonagy et al., 2015) on the effects of long-term psychoanalysis for chronic depression. Severely depressed patients saw much better results from 18 months of analysis than CBT. Two years after

treatment, 44% of patients who received psychoanalysis were no longer clinically depressed, in comparison to just 10% of patients who received CBT.

The major downfall of psychoanalysis is that the therapist is always playing a guessing game, trying to find proof of their beliefs — whether it's there or not. Psychoanalysis teaches that our lives are governed by unconscious forces which speak to us through dreams, slips of the tongue and what irritates us about others.

However, this foundation makes psychoanalysis completely unfalsifiable. You could argue that if your patient denies hating their father, it's definitive proof that they're desperate not to admit their hatred.

Albert Ellis, the creator of REBT who had originally trained as a psychoanalyst gave his opinion on psychoanalysis during an interview with the Washington Post (Schudel, 2007).

"As I see it, psychoanalysis gives clients a cop-out. They don't have to change their ways … they get to talk about themselves for 10 years, blaming their parents and waiting for magic-bullet insights."

The reason there's so little research into psychoanalysis is partly the fault of psychoanalysts. In the early days of the therapy, they often formed exclusive private bodies and had very limited interaction with university experimenters. Because of this, studies into cognitive therapies got a major head start. It wasn't until the 1990s that studies into psychoanalytic techniques began to suggest that cognitive approaches may be flawed.

A 2004 meta-analysis (Leichsenring et al.,

2004) revealed that short-term psychoanalysis were just as good as other techniques for improving a number of mental health issues, leaving patients better off than 92% of all patients prior to receiving therapy.

Two years later, a study of 1,400 people (Abbass et al., 2006) suffering from anxiety, depression and related disorders also favored short-term psychodynamic therapy.

Then again in 2008, a study of patients (Batemenan & Fofarty, 2008) suffering from borderline personality disorder concluded that only 13% of patients still experienced BPD symptoms five years after treatment ended, compared to just 87% of patients who had received other forms of therapy.

WHEN SOMETHING SOUNDS TOO GOOD TO BE TRUE…

Cognitive behavioral therapy is an effective treatment for numerous mental disorders, but it's not the sole solution to every patient's problem. While it's often successful in patients suffering from depression and anxiety, studies show (Hofman et al., 2012) that there are much better alternatives for other illnesses, such as bipolar, eating and personality disorders.

Despite CBT currently being considered the gold standard of talk therapy, it's essential to explore all options before organizing a therapy plan for your patient. Other types of talking treatment, such as psychoanalysis or dialectical behavioral therapy (Linehan, 1993) may prove to be more effective and get your patient stronger, longer-lasting results. Even simple solutions such as antidepressants can be remarkably effective when taken properly.

You may have heard some or all of this before, but it can be easy to forget when giants such as the World Health Organization and the National Institute of Mental Health fully support CBT. In my view, and the view of many others (Beutler et al., 2016), therapists need to determine the course of treatment on an individual basis, taking into consideration the person sitting in front of you, their problems and their disorder. You can't paint everyone with the same CBT brush just because the industry worships it and your patient wants what they hope is a quick fix.

BIO

Melissa Sanders, MS, LMFT, is a practicing therapist in California, USA. She has also received special certifications after working with inpatient and outpatient hospital treatment centers, children and school mental health services and providing therapeutic services to multiple jail correctional facilities. Her theoretical approached include Cognitive behavioral therapy (CBT), Dialectical Behavioral Therapy (DBT), and Solution-Focused therapy.

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