

Social Connectedness as a Biological Imperative:
Understanding Trauma Through the Lens of the Polyvagal Theory

Stephen W. Porges, Ph.D.
Distinguished University Scientist
The Kinsey Institute
Indiana University Bloomington

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Neurobiology is our guide

- Helps identify environmental features that foster feelings of safety.
- Explains how feeling safe “optimizes” behavior by turning off defense and increasing social behaviors.
- Explains the positive and negative feelings and behaviors of both child and parent while interacting.

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“Safety” Optimizes the Human Experience

- Safety is based on social connectedness providing a “neural” expectancy, which promotes both mental and physical health.
- Being safe is not the equivalent of removing threat

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Connectedness:

A Mammalian Biological Imperative

- Connectedness is the ability to mutually (*synchronously, symbiotically, and reciprocally*) regulate physiological and behavioral state.
- Connectedness provides the neurobiological mechanism to link social behavior and both mental and physical health.

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Building “Blocks” of Healthy Relationships

Social Engagement

+

Social Bonding

Safety

→

Proximity

→

Contact

→

Bonds

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Co-regulation: Phase II

The importance of physical contact while immobilizing without fear

- Maintains a physiological state that supports health, growth, and restoration.
- Optimizes the ability to rest, relax, sleep, digest, and perform bodily processes.
- Enables feelings of trust, safety, and love.
- A challenge for mammals!

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Mammal-Reptile Interactions:
Immobilization without fear

- Reciprocity is missing!

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Acute Dis-Connectedness:
Disrupts opportunities to co-regulation

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**Trauma and Abuse Disrupt
Co-regulation and Connectedness**

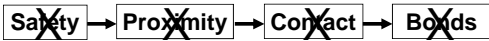
- Distorts social awareness
- Displaces social engagement behaviors with defensive reactions
 - fight/flight (aggressor)
 - immobilization and dissociation (victim)
- Interferes with healthful reciprocal “co-regulation” of state

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Features of Children with Behavioral/Educational Problems

Difficulties

1. Feeling “safe” with others
2. Being in physical proximity with others
3. Being touched or touching others
4. Establishing “trusting” social relationships



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Connectedness: A Biological Imperative

- The Polyvagal Theory explains how:
 - Social behaviors are “neural exercises” that promote neurophysiological states supporting mental and physical health.
 - Trauma and abuse lower the threshold to trigger the defensive behaviors (aggressor, victim) that disrupt connectedness and the ability to co-regulate.

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The Vagal Paradox

- Bradycardia are mediated by the vagus and a risk index (potentially lethal)
- Heart rate variability is primarily mediated by the vagus and a protective factor

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Vagal Paradox

- Not all vagal pathways support social communication, down regulate stress, and enhance resilience.
- There are vagal pathways that can be recruited for defense and are potentially lethal.

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The Polyvagal Theory

1. Evolution provides an organizing principle to understand neural regulation of the human autonomic nervous system as an enabler of social behavior.
2. Three neural circuits form a phylogenetically-ordered response hierarchy that regulate behavioral and physiological adaptation to safe, dangerous, and life threatening environments.
3. “Neuroception” of danger or safety or life threat trigger these adaptive neural circuits.

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Three Phylogenetic Stages of Neural Development of ANS

Stage 1: Primitive unmyelinated vagus (DVC)

- immobilization behaviors (i.e., fainting, shutdown, dissociation)

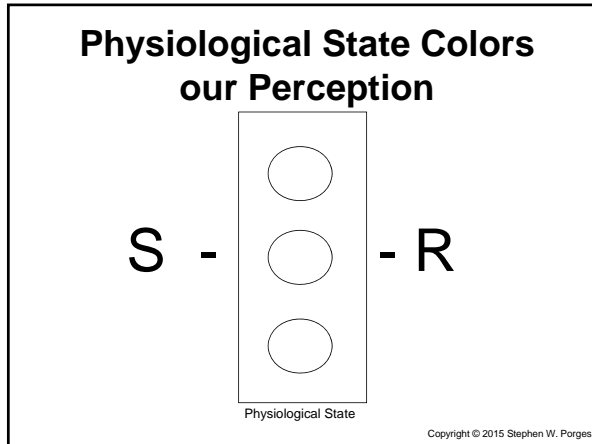
Stage 2: Sympathetic Nervous System (SNS)

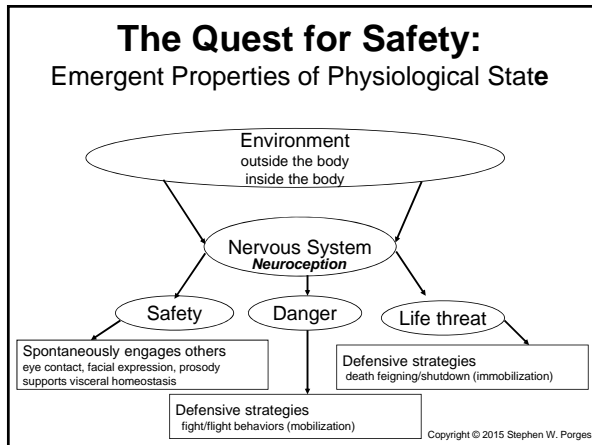
- “fight-flight” behaviors

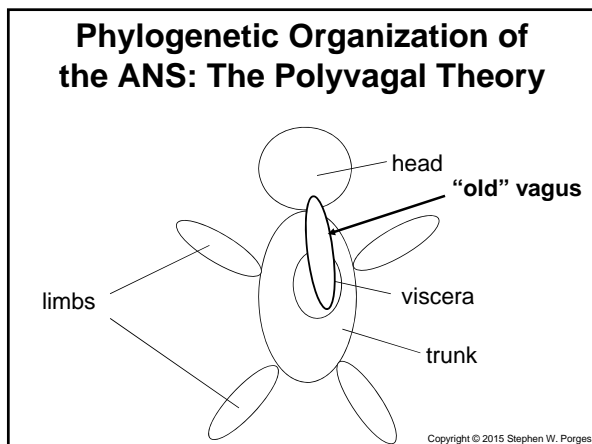
Stage 3: Myelinated mammalian vagus (VVC)

- social communication ↔ homeostasis
- enables social interactions to regulate physiology and promote health growth and restoration (balance between unmyelinated vagus and SNS)

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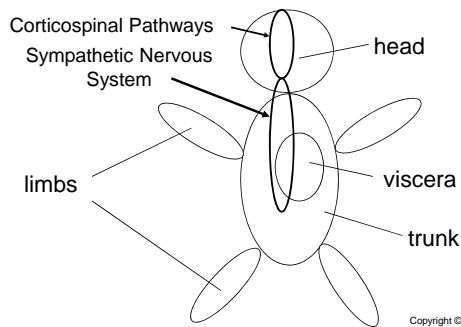




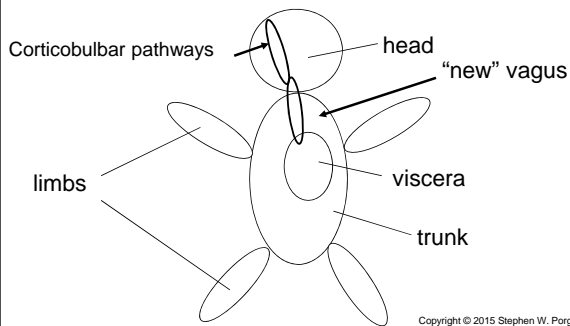
Immobilization With Fear:

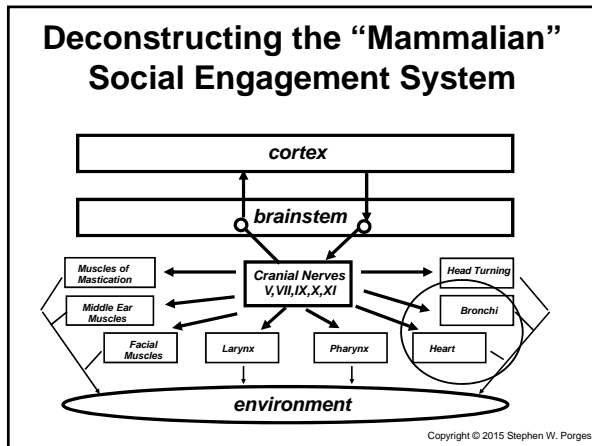
.... I read about the body immobilizing instead of fighting or fleeing. I am now 69 and when I was 18 I was nearly strangled and then sexually assaulted. Years later I was speaking with my daughter about this incident and she was disbelieving that I did what I did and that I froze. I felt so ashamed and judged. After reading your theory I cannot tell you how excited and vindicated I feel.. I am crying right now.
(personal communication, September 6, 2013)

Phylogenetic Organization of the ANS: The Polyvagal Theory



Phylogenetic Organization of the ANS: The Polyvagal Theory





- ### Deconstructing the “Mammalian” Social Engagement System
- Somatomotor component
 - Special visceral efferent pathways originating in source nuclei of cranial nerves V, VII, IX, X, & XI (branchiomotor, evolving from the ancient gill arches)
 - Viceromotor component
 - Supradiaphragmatic (myelinated) vagus originating in the nucleus ambiguus
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- ### The Face-Heart Connection:
- A Critical Component of a Social Engagement System
- At birth for mammals the bidirectional neural communication between the face and the heart forms the core of a Social Engagement System.
 - Metabolic demands, perceived danger, life threat, and illness retract the Social Engagement System resulting in a face that is not “social” and a physiological state (removal of the vagal brake on the heart) that promotes defensive behaviors.
 - The face reflects Polyvagal state.
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Social Engagement System:

Observable Deficits in Several Psychiatric Disorders

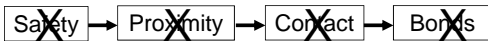
- Prosody
- Gaze
- Facial expressivity
- Mood and affect
- Posture during social engagement
- State regulation
- Sound hypersensitivities

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Features of Mental Health Problems

Difficulties in co-regulation

- Feeling “safe” with others
- Being in physical proximity with others
- Being touched or touching others
- Establishing “trusting” social relationships



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The Autonomic Nervous System:

A Polyvagal Perspective

- The autonomic nervous system “reacts” in a predictable hierarchical manner.
- The Polyvagal Theory uses evolution as an organizing principle to identify three neural ANS circuits, forming a phylogenetically-ordered response hierarchy, that regulate adaptation to safe, dangerous, and life threatening environments.
- “Neuroception” of danger or safety or life threat trigger these adaptive neural circuits

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Dissolution: Definition

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

John Hughlings Jackson

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Dissolution:

Polyvagal response strategies are phylogenetically ordered with newest components of the ANS responding first

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Polyvagal Theory:
Phylogenetic Stages of Neural Control

Stage	ANS Component	Emergent Behavioral Functions
III	Myelinated vagus <i>(VVC – ventral vagal complex)</i>	Social communication, self-soothing and calming, inhibit sympathetic-adrenal influences
II	Sympathetic-adrenal system <i>(SNS – sympathetic nervous system)</i>	Mobilization (active avoidance)
I	Unmyelinated vagus <i>(DVC – dorsal vagal complex)</i>	Immobilization (death feigning, passive avoidance)

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Polyvagal Theory:
A Phylogenetic Hierarchy of Response Strategies

Structure	Function	VVC	SNS	DVC
Head	Communication	+		
Limbs	Mobilization		+	
Viscera	Immobilization			+

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Dissolution:
Polyvagal Response Strategies

- Removal of VVC Tone
- Increase in Sympathetic Tone
- Surge in DVC Tone

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Immobilization?

- Immobilization as a facilitator of health and restoration
- Immobilization as a defense strategy
- Forced immobilization (restraint) is a frequent feature of trauma and chronic abuse

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Autonomic Nervous System (ANS):

- What components of the ANS are involved in mediating social behavior?
 - Social engagement behaviors
 - Immobilization without fear
- What components of the ANS are involved in mediating defense?
 - Fight/flight
 - Immobilization with fear

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Safety:

Neural and Cultural Definitions

The social, cultural, and legal definitions and expectations of safety and risk often have little to do with how our nervous system reacts!

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Detecting Safety:

Neuroception

- The nervous system's detection of risk in others – *without awareness*.
- Can dampen defensive systems and facilitate social behavior (safety).
- Can promote defensive strategies of mobilization (fight/flight) or immobilization (shutdown, dissociation).
- Triggers of “defense” are often related to a history of physical restraint or social isolation.

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Neuroception

- How are the adaptive defensive systems (flight, fight, and freeze), mediated by the amygdala and other limbic structures, inhibited to promote the positive spontaneous social behavior associated with the Social Engagement System?
- Where in the nervous system are the feature detectors that determine safety?

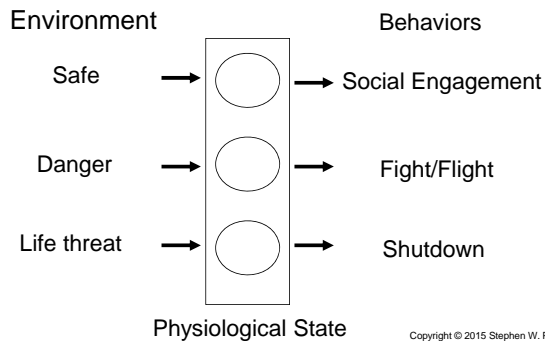
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Neuroception:

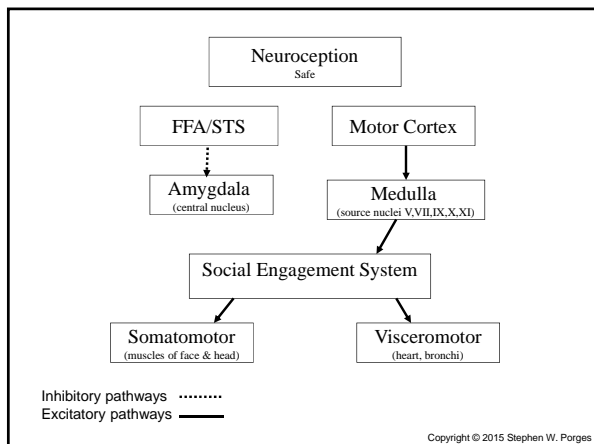
- Implicit feelings confront cognitive awareness and influence personal narrative.
- We often are not aware of the features that trigger a sense of safety or danger?
- But we are ALWAYS aware of our bodily responses!

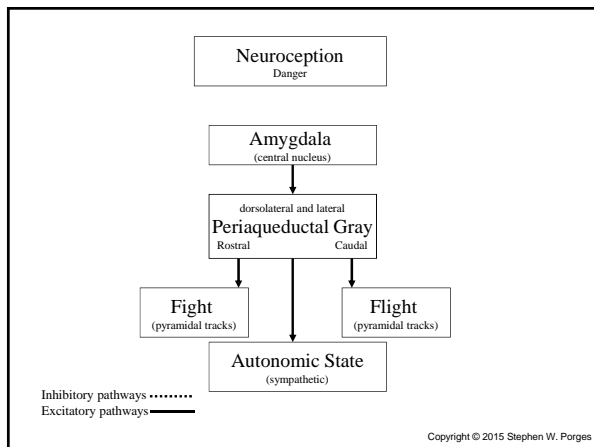
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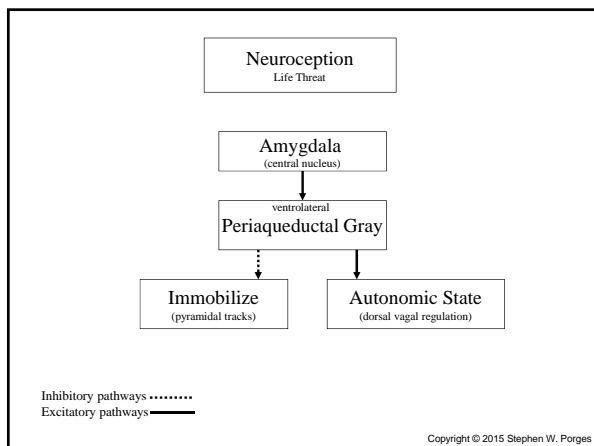
Neuroception

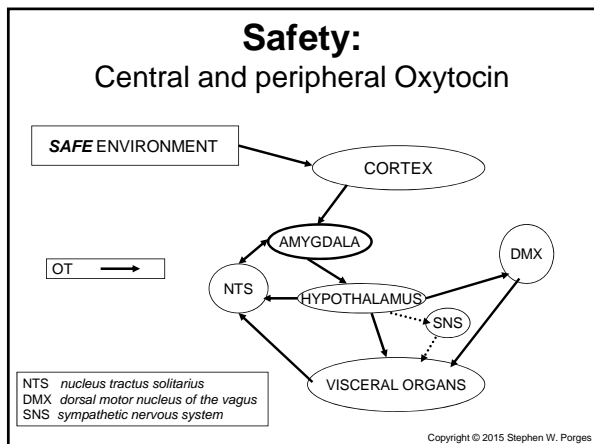


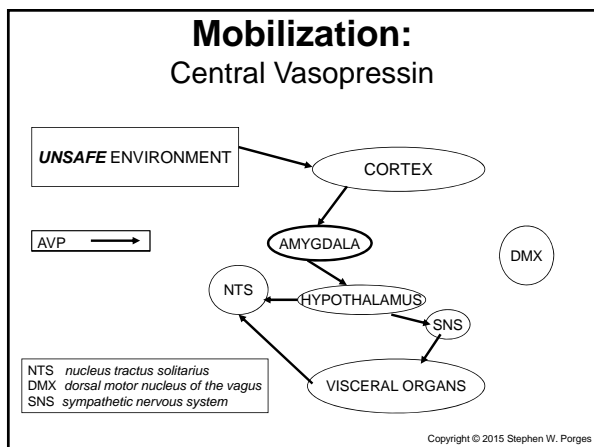
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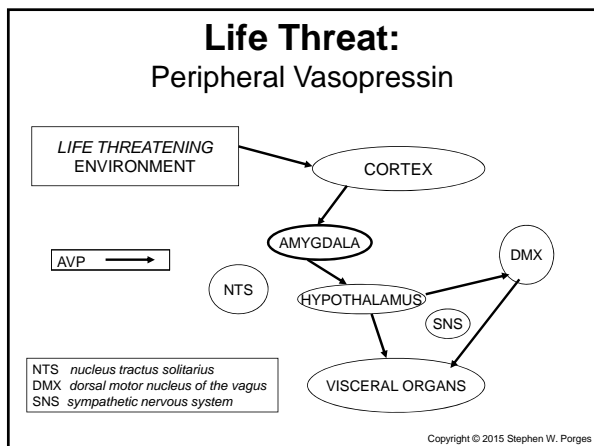


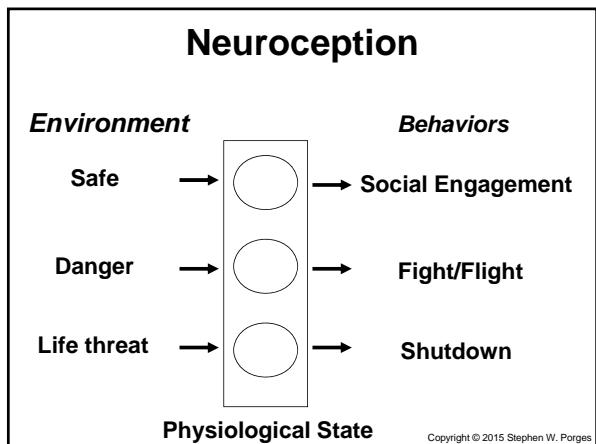


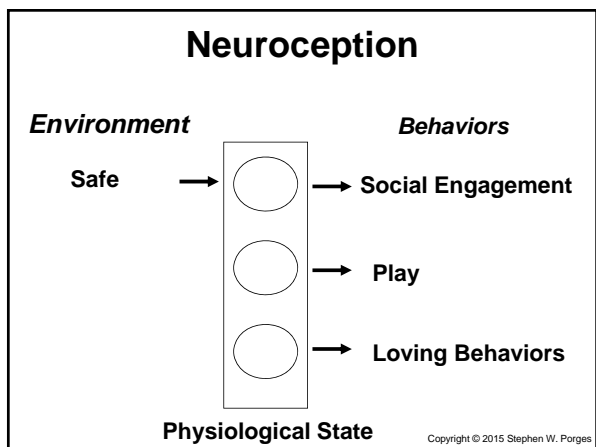


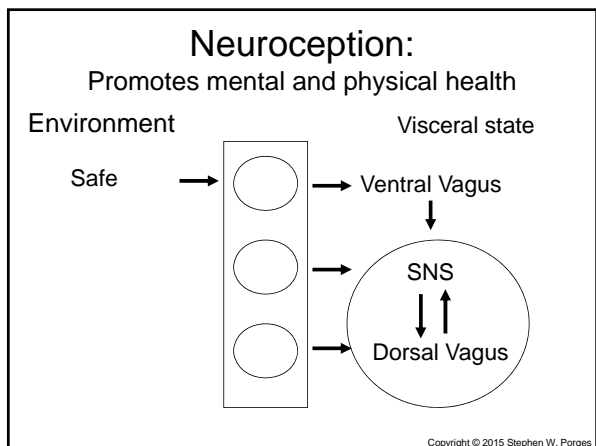












Feature Detectors:

The Role of Face ↔ Face Interactions

- How do we “feel” when there is a violation of the face ↔ face interactions?
- Does a violation displace spontaneous social engagement behaviors with defensive reactions?

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Intuitive Neuroception:

The “magic” of David Blaine

“ A strong and effective way to distract somebody is to directly engage the person, with eye contact or other interaction”

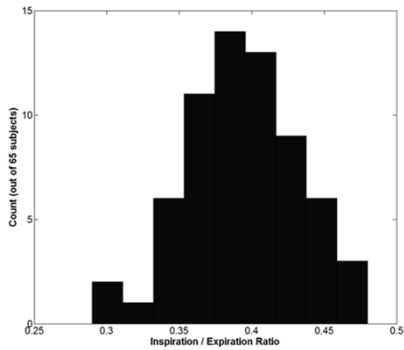
August 12, 2008 New York Times

Evolution and the Diaphragm

- Mammals are the only vertebrates with a true diaphragm.
- The diaphragm is a muscle that separates the body cavity into two sections.
 - Above the diaphragm: Heart and lungs
 - Below the diaphragm: Liver, kidneys, stomach, intestines, etc

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Breathing is Asymmetrical



Breathing Exercises: Triggering Neural Regulation of State

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Wind Instruments and Pranayama Yoga: Common Features

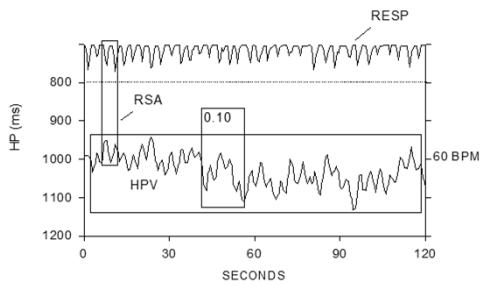
- Pranayama yoga is yoga of the Social Engagement System
- Exercising the Social Engagement system
 - Striated muscles of the face to play and listen (embouchure, middle ear muscles)
 - Respiratory-heart rate regulation (diaphragmatic breathing)

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The Vagal Brake: Model of Self-Regulation

Breathing: A neural exercise of
the vagal brake

Respiratory-Heart Rate Rhythms



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The Vagal Brake: Model of Self-Regulation

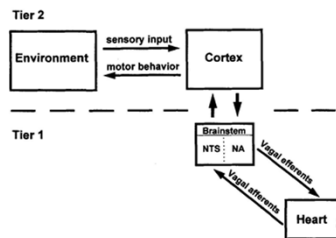


Fig. 4. Schematic representation of a two-tiered negative feedback model. The two-tiered model provides a theoretical framework to explain the operations of the vagal brake in response to environmental challenges (e.g., social interactions). Note the bidirectional communication between cortical and brainstem structures.

Porges et al. (1996) *Developmental Psychobiology*

The Vagal Brake

Difficulties with the vagal brake associated with clinical disorders.

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State Regulation Disorders

Core features of several psychiatric diagnoses and behavioral disorders

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State Regulation Disorders

- Are there individuals who have great difficulties regulating state, especially in presence of others?
- What diagnoses are associated with these features?
- What psychological constructs are associated with these features?

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State Regulation Disorders

- Are these difficulties indexed by a compromised social engagement system including depressed vagal regulation of the heart?

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State Regulation Disorders

- What is the role of the social engagement system in the “expression” of state regulation disorders?
- How can this knowledge inform clinical practice?

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Violation of Face ↔ Face: Impact on neuroception?

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Violation of Face↔Face:

An experimental manipulation

The Face-to Face Still Face Procedure (Tronick, Als, Adamson, Wise, & Brazelton, 1978)

3 Phases:

- 2 minutes Social Play
- 2 minutes Still Face
- 2 minutes Reunion Play

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Biological Rudeness

- **Violation of a “neural” expectancy**
- **Lack of reciprocity (poor attunement)**
- **Is this a feature of several psychiatric disorders?**

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Feature Detectors:

Safety, Danger, and Life Threat

- The importance of face↔face interactions, vocalizations, body posture, and gestures
 - Cues of safety or danger
 - Efficient strategy to co-regulate physiological state

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Faulty Neuroception

Challenges may:

- Shift physiological and behavioral state
- Distort social awareness
- Displace spontaneous social behaviors with asocial behavior or defensive reactions

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Faulty Neuroception

Challenges may:

- Maintain social behaviors in an environment in which defensive strategies would be more adaptive

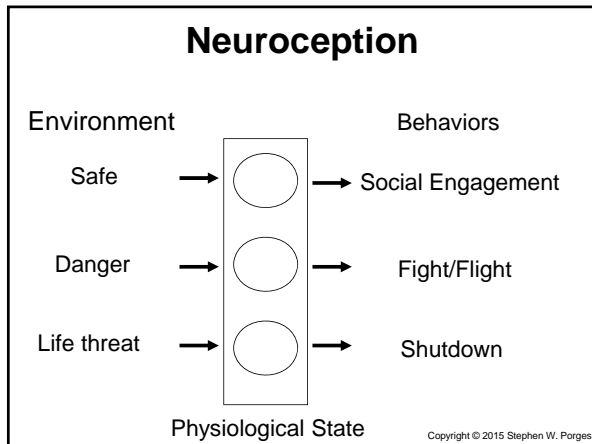
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Faulty Neuroception

Challenges may:

- Shift physiological and behavioral state
- Distort social awareness
- Displace spontaneous social behaviors with asocial behavior or defensive reactions

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Play

- Play is a “neural exercise” that enables the co-regulation of physiological state to promote neurophysiological states that support mental and physical health.

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Principles to Establish Relationships (therapy) are Similar to Play

- Reciprocity
- Movement and inhibition of movement
- Face-to-face interactions and/or prosodic vocalizations to dampen potential defensive reactions to movements, proximity, and touch
- Play (therapy) as a neural exercise

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Does Therapy Trigger “Safety”

- Face ↔ face social engagement
 - Facial expression and gaze
 - Prosodic features of vocalizations
- Reciprocity
 - Facial expression
 - Vocalizing and listening

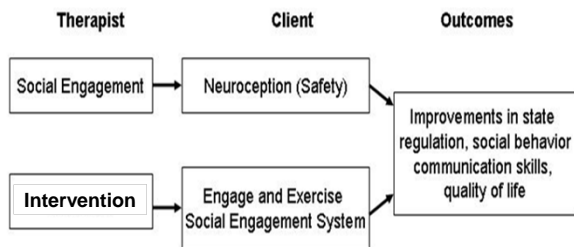
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Products of Successful Therapy

- Safe to cuddle and immobilize in the arms another
- No longer vigilant about activity from behind

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Therapeutic Model



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Therapeutic Presence

Journal of Psychotherapy Integration
2015, Volume 25(1), 1-10

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1075-7470/15/\$12.00 DOI: 10.1037/xap0000011

Therapeutic Presence: Neurophysiological Mechanisms Mediating Feeling Safe in Therapeutic Relationships

Shari M. Geller
Toronto, Ontario, Canada, York University,
and University of Toronto

Stephen W. Porges
University of North Carolina at Chapel Hill
and University of Toronto

Therapeutic presence involves therapists using their whole self to be both fully engaged and receptively attuned in the moment, with and for the client, to promote effective therapy. In this paper, we present a biobehavioral explanation of how therapeutic presence can facilitate a sense of safety in both therapist and client, to deepen the therapeutic relationship and promote effective therapy. The polyvagal theory is used as a guide to explain how specific features of therapeutic presence trigger a neurophysiological state in both client and therapist within which both perceive and experience feelings of safety. The polyvagal theory proposes that a state of safety is mediated by neuroception, a social process that may occur without awareness, which constantly evaluates risk and triggers adaptive physiological responses that respond to features of safety, danger, or life threat. According to the theory, when safety is communicated via expressed markers of social engagement (e.g., facial expressions, gestures, and prosodic vocalizations), defensiveness is down-regulated. Cultivating presence and engaging in present-centered relationships can therefore facilitate effective therapy by having both client and therapist enter a physiological state that supports feelings of safety, positive therapeutic relationships, and optimal conditions for growth and change.

Keywords: therapeutic presence, therapeutic alliance, neuroception, polyvagal theory, safety

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Connectedness is Dependent on Safety

Feeling safe is a necessary prerequisite before strong social relationships can be established and before social support can be effective in “healing” physical and mental illnesses.

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Connectedness is Dependent on Safety

Feeling safe is a necessary prerequisite before strong social relationships can be established and before social support can be effective in “healing” physical and mental illnesses.

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Interpersonal Features of Therapy

- The importance of face-to-face interactions
- Cooperative and contingent behaviors between client and therapist

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Impact of Society and Culture

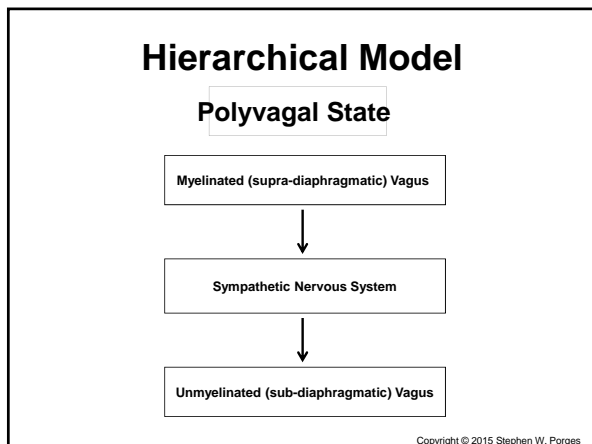
- Does our culture dampen access to our Social Engagement System?
- Do we have sufficient opportunities to exercise our social engagement system?
- What is the impact of email, texting, and other “virtual” social interactions on our “social engagement system?”

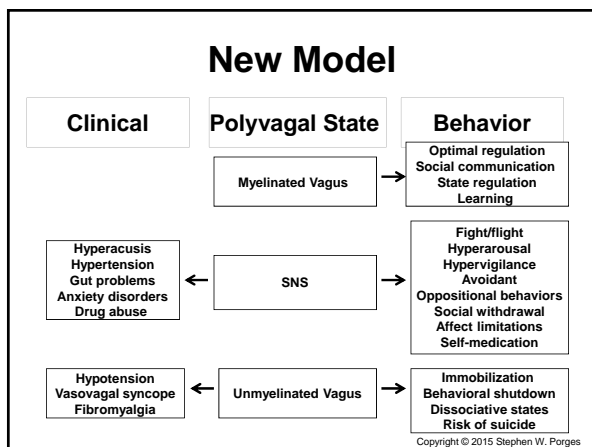
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A New Paradigm?

- If social behaviors are not learned, are they emergent properties of specific neurophysiological states?
- Could intervention strategies be focused on manipulating or supporting the neurophysiological states (e.g., engaging and exercising feedback loops) from which social behavior would spontaneously occur?

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- ### Polyvagal Syndrome?
- Lack of prosody
 - Poor face ⇄ face gaze
 - Flat affect (facial expressivity)
 - Sound hypersensitivities
 - Inappropriate posture during social engagement
 - Poor mood and affect
 - Atypical state regulation
 - Low threshold to become fight/flight
 - Low threshold to be dissociative
 - Lower gut problems
 - Fibromyalgia
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Polyvagal Syndrome?

- Special visceral efferents
 - Lack of prosody (IX,X)
 - Poor face↔face gaze (VII)
 - Flat facial expressivity (VII)
 - Sound hypersensitivities (V, VII)
 - Inappropriate posture during social engagement (XI)
- Vagal regulation
 - Poor mood and affect
 - Atypical state regulation
 - Low threshold to become fight/flight
 - Low threshold to be dissociative
 - Lower gut problems
 - Fibromyalgia

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Polyvagal Syndrome?

Stage I (dampened Social Engagement System)

- Blunted affect
- Lack of prosody
- Poor face↔face gaze
- Flat facial expressivity – especially upper face
- Sound hypersensitivities
- Inappropriate posture during social engagement
- Poor mood and affect
- Atypical state regulation (difficulties self-regulating and co-regulating)

Stage II (highly mobilized and reactive)

- Low threshold to fight/flight
- Atypical state regulation (varies between apparently calm and reactive)

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Polyvagal Syndrome?

Stage III (vulnerable to shutdown and dissociation)

- Atypical state regulation (varies between highly mobilized and shutdown)
- Low threshold to immobilize and become dissociative
- Lower gut problems
- Fibromyalgia

Stage IV (chronic shutdown and dissociative)

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Impact of Society and Culture

Does our culture dampen access to our Social Engagement System?
Do we have sufficient opportunities to exercise our social engagement system?
What is the impact of email, texting, and other “virtual” social interactions on our “social engagement system?”

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Principles and summary

- Neuroception
 - Evaluates intentionality of voice, movements, and face)
 - Seeing
 - Hearing
 - Feeling
- Role of the social engagement system
 - Expressive
 - Receptive
 - Modulating physiological state
- Principles of play
 - Interface between interface with the social engagement and mobilization systems

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Neural Basis for Establishing Safe Relationships

- Our nervous system is continuously evaluating risk in the environment.
- The human nervous system evolved to shift efficiently between conditions of safety and danger using elements of the social engagement system (e.g., face-to-face).
- Intimacy requires the co-opting of ancient neurobiological immobilizing mechanisms with social engagement strategies that enable individuals to feel safe and to immobilize without fear.

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Summary

- Life threat triggers a very ancient neural circuit that severely limits social engagement behaviors and may distort neuroception resulting in a detection of risk when there is no apparent risk.
- Attempts to socially engage a traumatized individual, rather than calming, may result in defensive strategies of rage and anger.
- Treatment of trauma may require a new model distinct from the traditional strategies of face-to-face dialog.

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The Look of Love*

(Inferring Polyvagal state from the face)

*The look of love is in your eyes
 The look your smile can't disguise
 The look of love is saying so much more
 Than just the words could ever say
 And what my heart has heard
 well it takes my breath away*

*I can hardly wait to hold you
 Feel my arms around you*



*Burt Bacharach & Hal David

The Look of Love*

*The look of love is in your eyes
 The look your smile can't disguise
 The look of love is saying so much more
 Than just the words could ever say
 And what my heart has heard
 well it takes my breath away*

*I can hardly wait to hold you
 Feel my arms around you*

*Burt Bacharach & Hal David

**The Look of Love:
A Polyvagal Perspective**

The look of love is in your eyes
[gaze- orbicularis oculi]

The look your smile can't disguise
[facial muscles]

The look of love is saying so much more
[facial, neck, lip muscles]

Than just the words could ever say
[prosody]

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**The Look of Love:
A Polyvagal Perspective**

And what my heart has heard
[vagal regulation of the heart, middle ear
muscles, face-heart connection]

well it takes my breath away
[vagal regulation of the bronchi]

I can hardly wait to hold you
Feel my arms around you
[immobilization without fear (not restraint)]

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Additional Information

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