

Polyvagal Theory: A Neuroscience Explaining Reactions to Safety and Threat

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**Orienting in a defensive world: Mammalian
modifications of our evolutionary heritage.
A Polyvagal Theory**

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Polyvagal Theory

- Physiological (autonomic) state influences how we respond to the environment.
- Mammals (not their reptilian ancestors) respond to cues of safety and turn off threat reactions and calm.

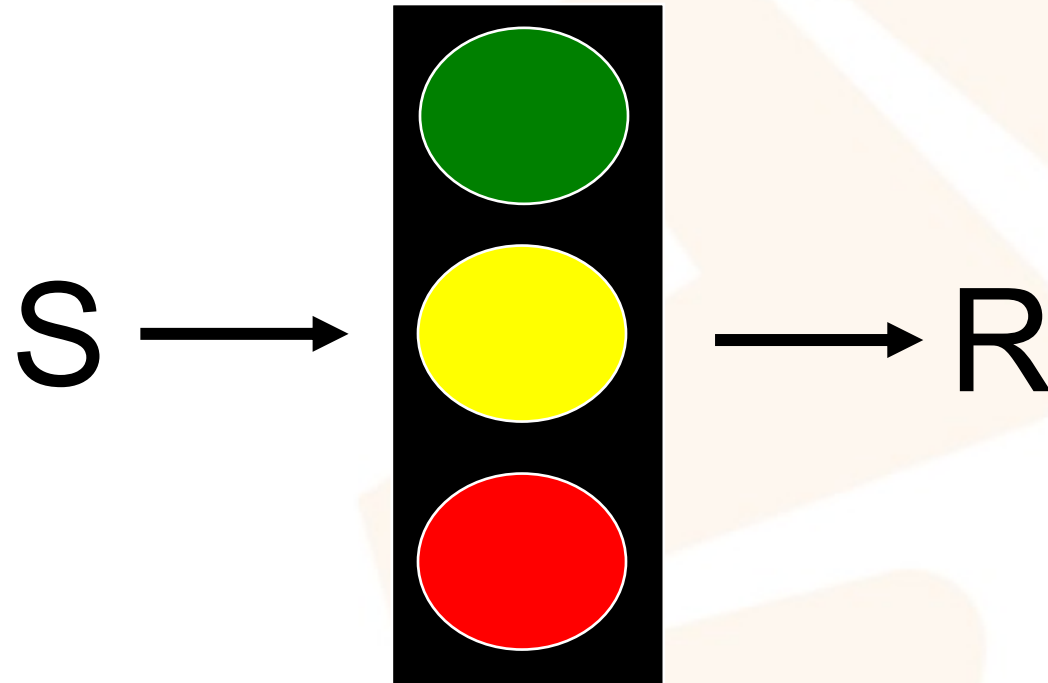
Polyvagal Theory: Basic Principles

A New Vocabulary

1. ANS is an intervening variable
2. ANS changed during evolution
3. The Social Engagement System links regulation of the muscles of the face and head with vagal regulation of the heart (vagal brake)
4. ANS functions in a hierarchical manner paralleling evolution
5. ANS shifts 'state' consistent with evolution in reverse or dissolution
6. Neuroception
7. Reciprocity, co-regulation, and connectedness (biological imperative)
8. Trauma re-tunes autonomic state compromising the ability to feel safe enough to connect with others.

Physiological State

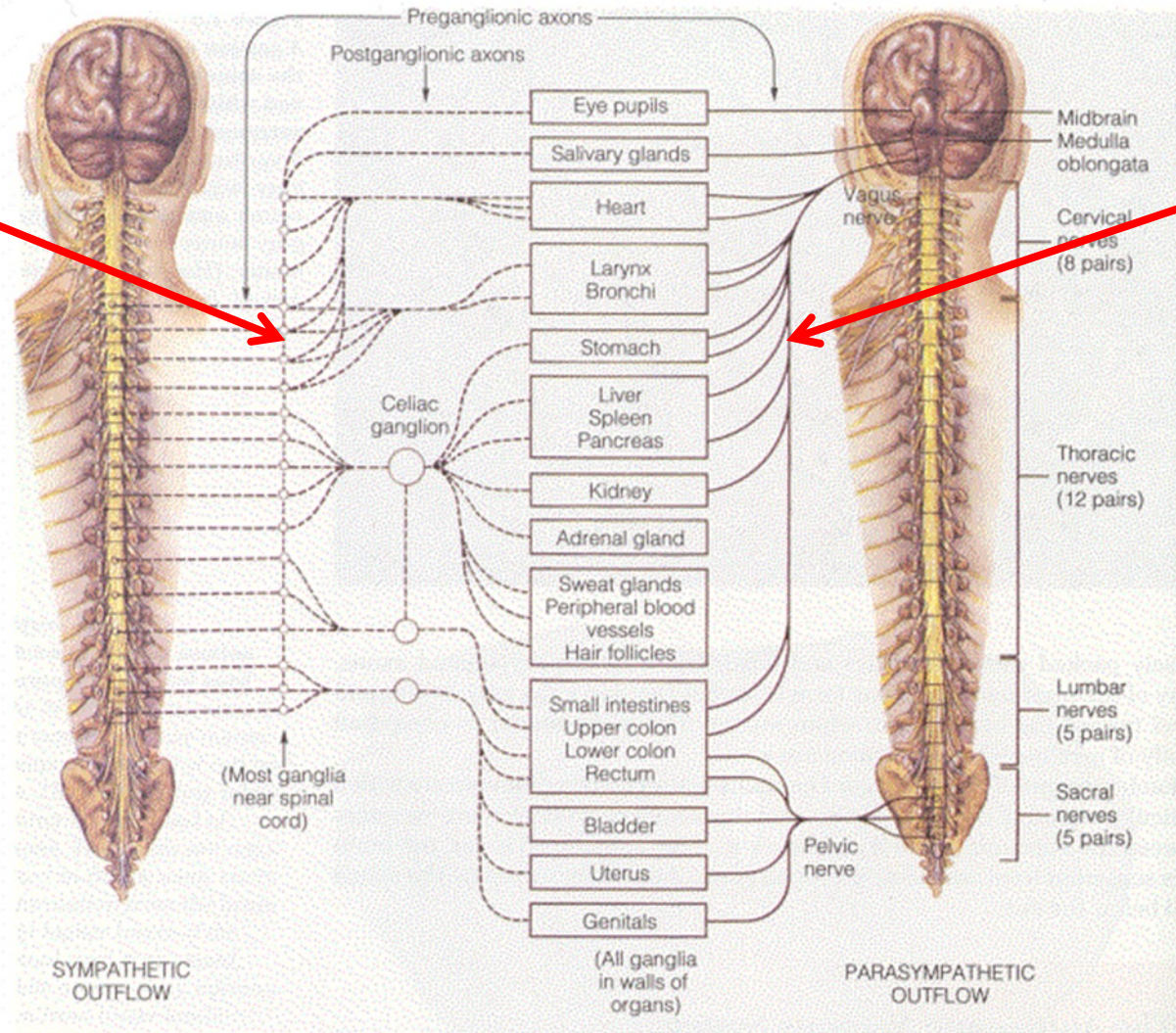
A Re-tunable Intervening Variable



Physiological State

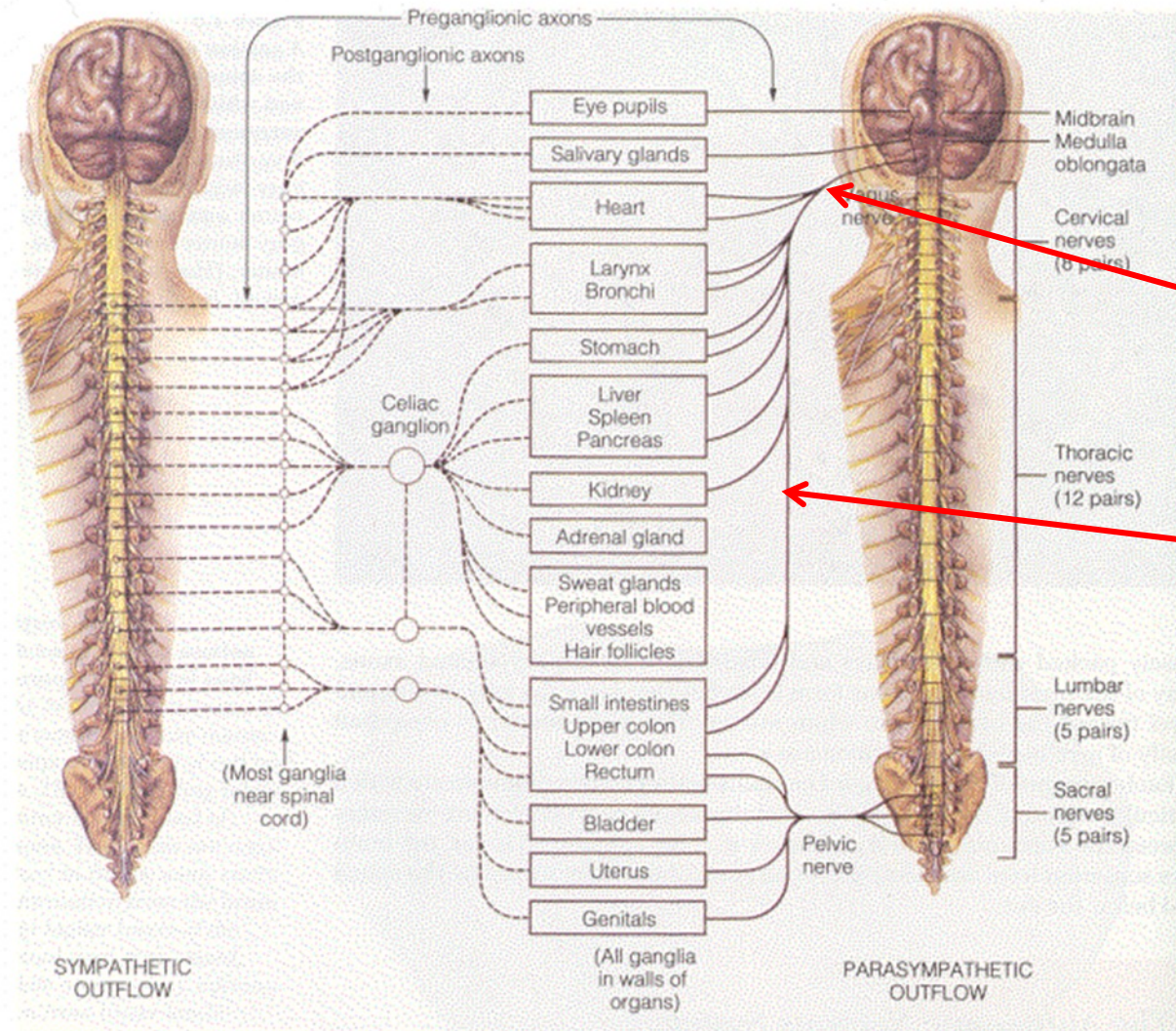
The Autonomic Nervous System: A Paired Antagonism Perspective

Sympathetic
Nervous System



Vagus
(Parasympathetic
Nervous System)

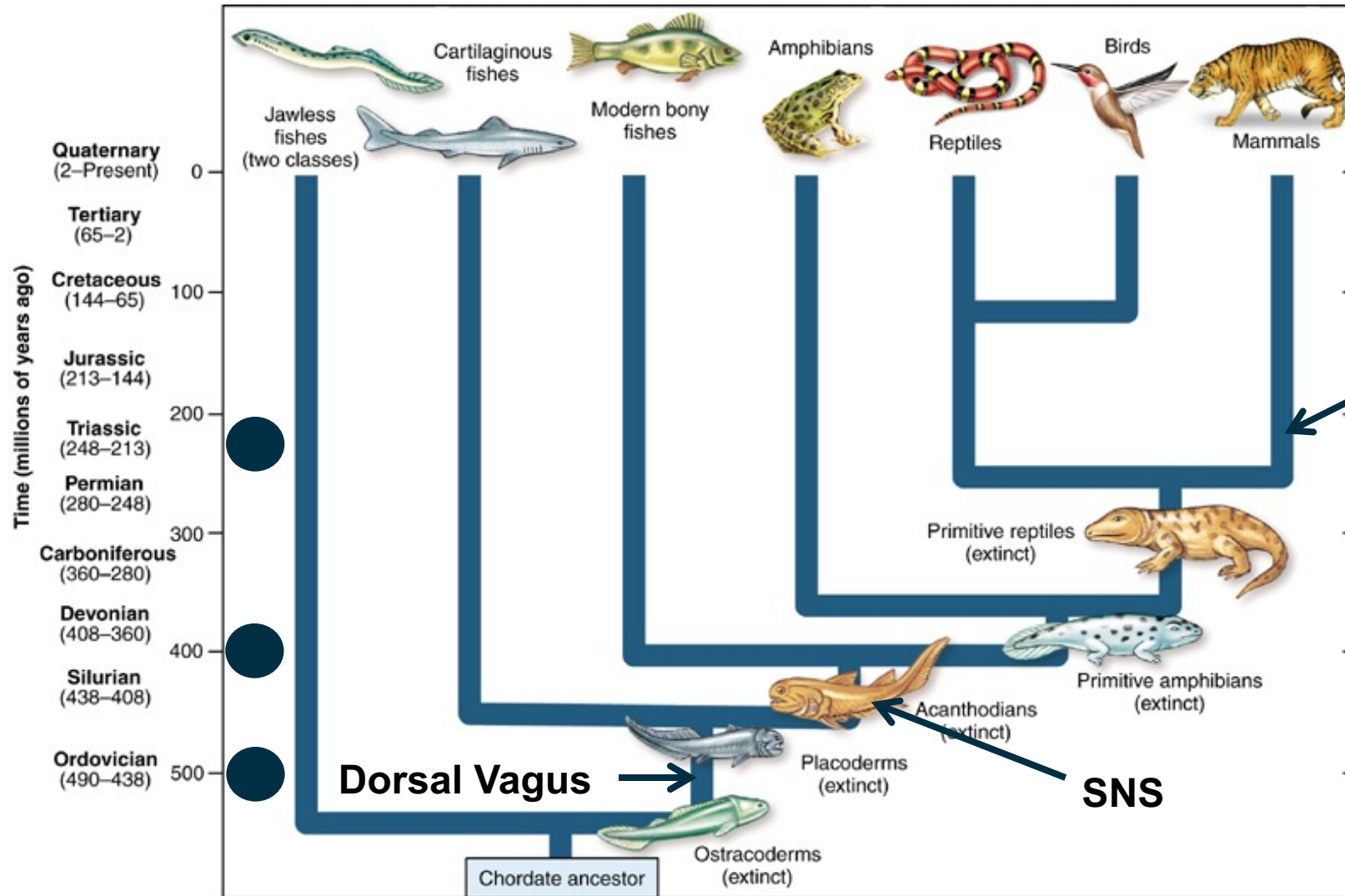
The Autonomic Nervous System: A Paired Antagonism Perspective



Ventral
Supra-diaphragmatic
(myelinated) vagus

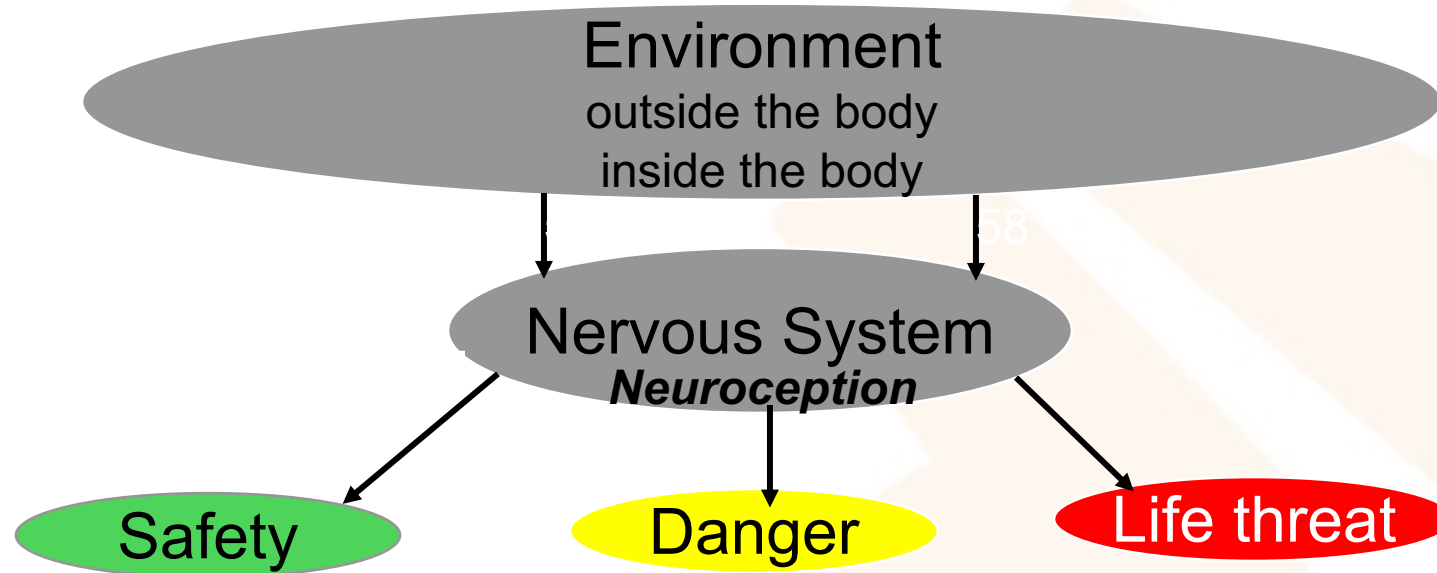
Dorsal
Sub-diaphragmatic
(unmyelinated) vagus

Evolutionary Journey to Sociality



**Ventral Vagus
Ventral Vagal Complex**

The Quest for Safety: Emergent Properties of Physiological State



Spontaneously engages others
eye contact, facial expression, prosody
supports visceral homeostasis

Defensive strategies
fight/flight behaviors (mobilization)

Defensive strategies
death feigning/shutdown (immobilization)

The Face-Heart Connection: Social Engagement System

- At birth mammals have bidirectional neural communication between the face and the heart (suck-swallow-breathe-vocalize), which 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 and voice reflect Polyvagal state.

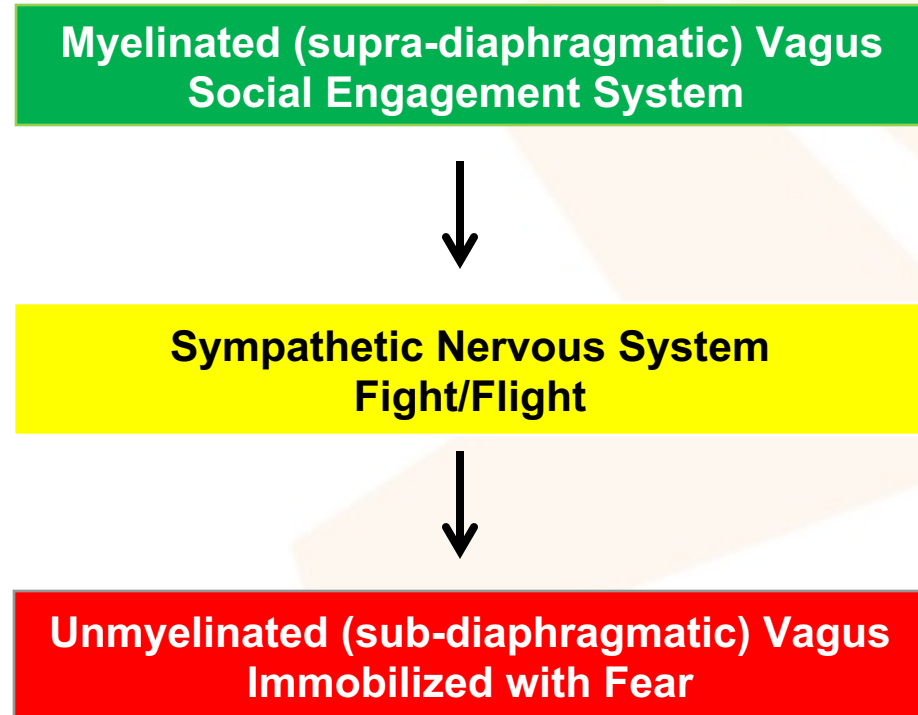
Social Engagement System

Observable Deficits in Several Psychopathologies

- Lack of prosody
- Poor eye contact and difficulties in social communication
- Blunted facial expressivity
- Difficulties in behavioral state regulation (hypervigilant, anxious, distractible, impulsive, tantrums, hypoarousal)
- Difficulties in listening, following verbal commands, speech-language delays
- Sound sensitivities
- Oral motor defensiveness (e.g., ingestive behaviors)

Hierarchical Model of Autonomic State

Newer Circuits Inhibit Older Circuits



Ventral Vagal Pathways Inhibit Threat Reactions

- The Social Engagement System (ventral vagus) functionally choreographs the SNS and DVC to support health, growth and restoration (i.e., homeostatic functions).

Trauma and Stress Trigger Dissolution: Evolution in Reverse

**Myelinated (supra-diaphragmatic) Vagus
Social Engagement System**



**Sympathetic Nervous System
Fight/Flight**



**Unmyelinated (sub-diaphragmatic) Vagus
Immobilized with Fear**

Dissolution or Evolution in Reverse

Predictable Reactions to Threat

- The ANS reacts to challenges in a phylogenetically ordered response hierarchy with newest components of the ANS responding first (Polyvagal Theory) consistent with the Jacksonian principle of dissolution (Jackson, 1884).

Adaptive Consequences of a Defensive State

Health Consequences

- Disrupts vagal regulation
- Increases sympathetic excitation
- Inflammatory
- Hypersensitive
- Asocial

Neuroception: A Mechanism to Shift ANS State

Unconscious Evaluation and Detection of Risk

- The nervous system 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).

Neuroception

Our Personal TSA Agent

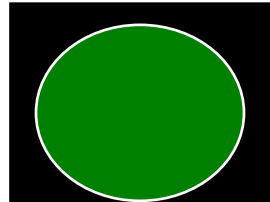


Neuroception

Environment

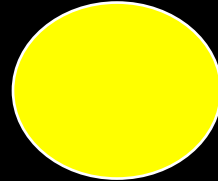
Behavior

Safe



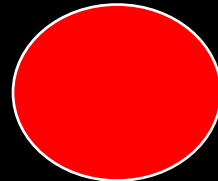
Social Engagement

Danger



Fight/Flight

Life Threat



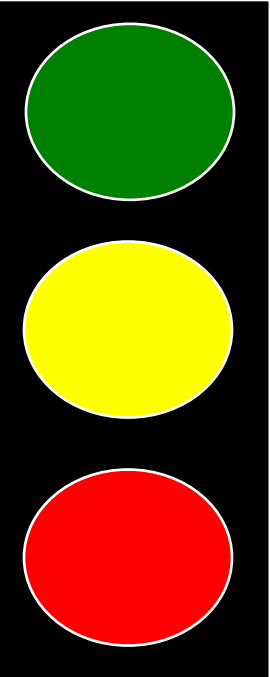
Shutdown

Physiological State

Neuroception

Environment

Safe



Behavior

Social Engagement



Play



Intimacy



Physiological State

Connectedness: A Biological Imperative

Co-regulation

- To connect with others, mammals need to signal that they are safe to approach or to be approached.
- Connectedness enables co-regulation and supports the ventral vagal complex (Social Engagement System).

Face to Face Interactions Regulate State



Trauma Retunes the Autonomic Nervous System: Chronic Disruption of Connectedness

- Shifts ANS state
- Distorts social awareness
- Displaces social engagement behaviors with defensive reactions (i.e., dissolution)
 - fight/flight
 - immobilization (dissociation)
- Interferes with healthful reciprocal “co-regulation” of state
- Disrupts neurophysiological regulation

Neuroception of Safety Retunes ANS

The Basis of Polyvagal-Informed Therapies

- Cues of safety calm physiological state (enhancing ventral vagal pathways and the Social Engagement System) and promote spontaneous social engagement.
- Neural portals that enable cues of safety to calm physiological state and promote spontaneous social engagement (i.e., neuroception) provide insight into developing therapeutic strategies.
- Feeling safe optimizes homeostasis, while being threatened compromises homeostasis.
- Feeling Safe is the Treatment!

Additional Information

PVI

polyvagal institute

the art and science of human connection

[POLYVAGALINSTITUTE.ORG](https://polyvagal.org)

- stephenporges.com