

THE ANATOMY OF CALM

By Stephen Porges, Ph.D.



As a culture, we are endowed with the belief that anxiety, packed as it is with worry, is a condition that exists in our head. Decades of psychophysiological research have proved to me that, in fact, anxiety is in our body. It's even more accurate to say that it is in our nervous system. Like other animals, we humans

have a unified nervous system. The body and the brain talk to each other—because they regulate each other. That system of regulation offers a whole new understanding of how we become anxious, how we perpetuate and even justify anxiety, and how we can release it.



Our physiologic state influences how we react to the world and how we make our way through it. Unfortunately, it is nowhere accounted for in most models of mental health. My perspective differs from the prevailing model in psychology and psychiatry, which sees anxiety as a brain reaction, not a full-body phenomenon.

Psychology holds that through cognitive and behavioral technologies, anxiety can be tamed with language. But the evidence demonstrates that certain physiologic states bias us to negativity and others to optimism and social experience, and we need a toolkit that grapples with that fact first.



Anxiety, like other emotions, arises from different bodily states as the neural signals they give off work their way up through the brainstem, where control of our basic states resides. That information also gets relayed to higher levels in the brain, where we make meaning of it—what we call emotions.

Anxiety is the response of the body under threat. One of the first obligations of all organisms is to maintain a means of defense. The ability to detect danger is critical to defense, and acute threat reactions, in which we quickly mobilize resources, are life-sustaining.

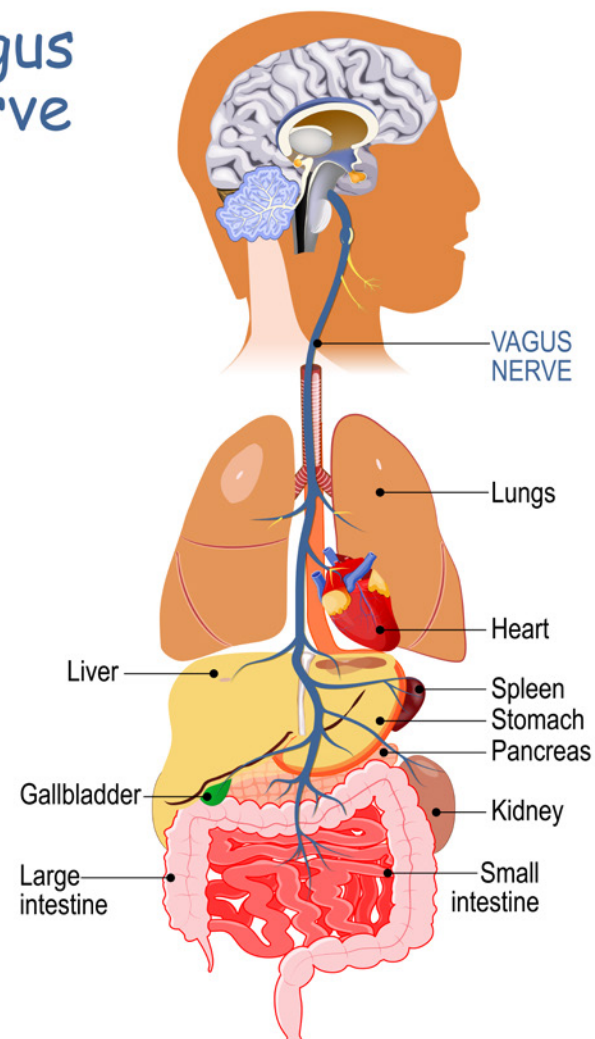
Chronic threats, however, impose high costs on our physiology, disrupting the homeostatic mechanism that allows us to grow and flourish, not only imperiling our health but constricting our range of experience and, especially, our ability to relate to other human beings.

Every single one of us contends with states of threat, which are our

responses to the uncertainty of survival. Threat can emanate from the external world or arise internally from memories. I devised the term *neuroception* to describe how—below the level of conscious awareness—neural circuits constantly monitor and assess internal and external risks, whether situations or people, as safe, dangerous, or life-threatening.



Vagus nerve

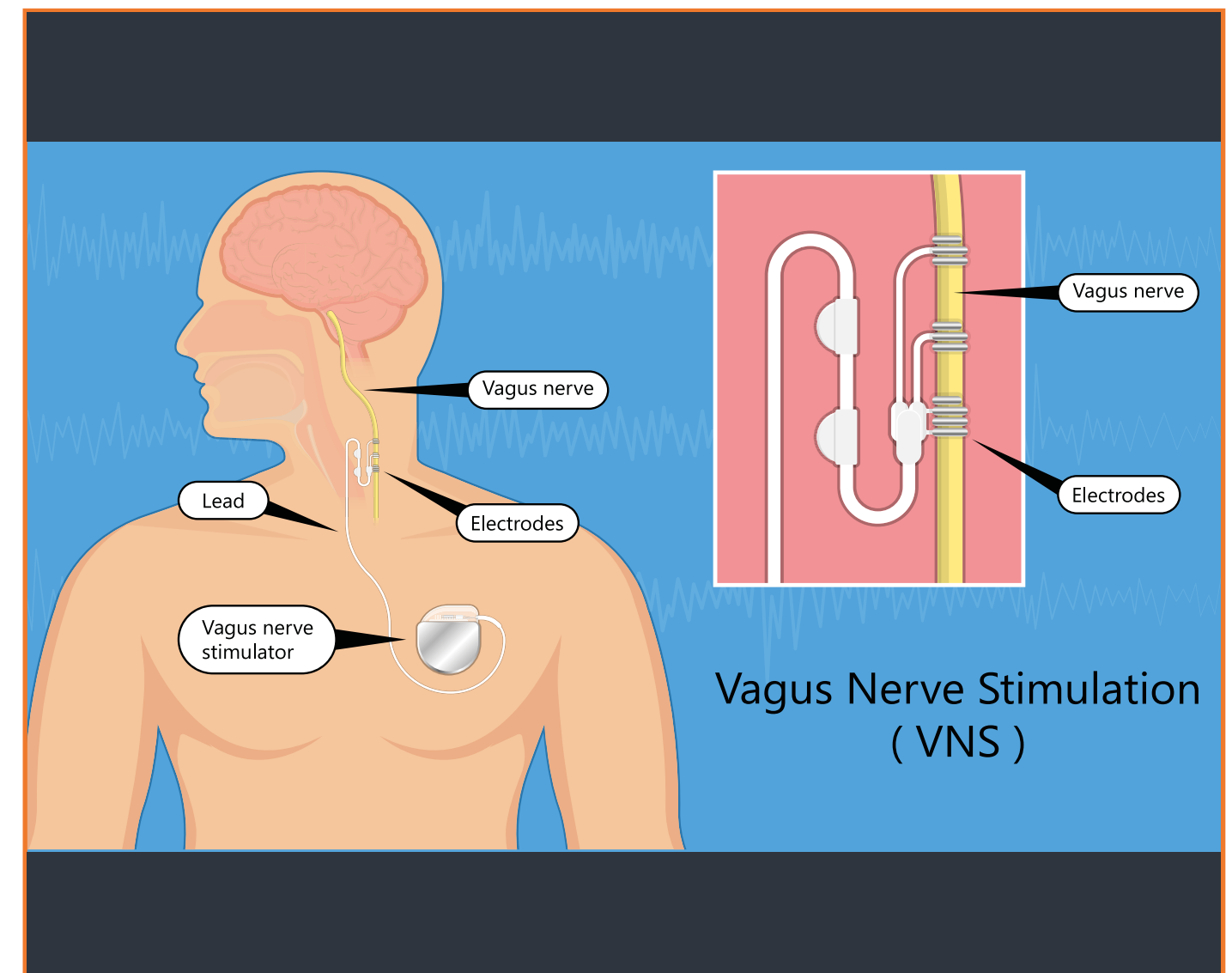


A potent mechanism that has the potential to down-regulate threat resides in the ventral portion of the brainstem, in an area known as the nucleus ambiguus, where the vagus nerve, the star player of the autonomic nervous system, originates.

Vagus means *wandering*, and the vagus nerve begins at the base of the brain, branches down to the heart, the lungs, and the digestive tract, with stops along the way at the larynx, the pharynx, and the diaphragm, before descending into the abdomen.

The branches of the vagus nerve enable the organs to adjust instantly to the demands of a person's surroundings. It is the duty of the vagus nerve to orchestrate bodily responses to keep you safe or prepare your body for

danger before you are even aware of it or have a chance to think about it. Most of the vagus is composed of sensory fibers that function as our surveillance system, informing the brain of the status of our visceral organs.

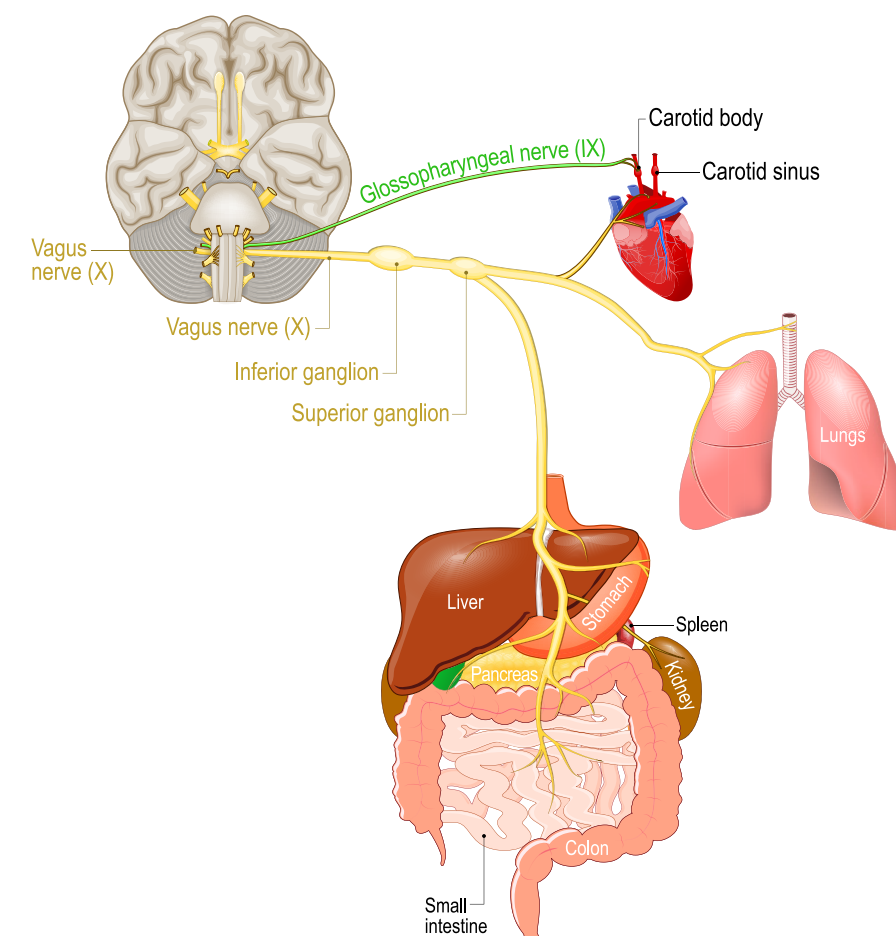


In our evolutionary journey to becoming social mammals, the basic reptilian structures underwent modification. In order for animals to become social, there had to be a way to turn off threat reactions—animals had to be able to cue one another that they were safe enough to come close to.

As distinct from reptiles, mammals have neuroception not only of threat but also of safety. The vagus nerve responds to cues of safety—detected by higher brain structures—which bring on enough calm to open you up to socially engage with others.



The vagus nerve



Because information flows both to and from the brain via vagal pathways, the vagus nerve can be thought of as a major mind-body highway. Through the vagus nerve, you react to signals in your environment in ways that calm, alarm, or

dysregulate the body, and these states in turn create emotional experience and play out in behavior. It has taken me decades to define how the vagal pathways operate and the control they exert—summed up in what I call polyvagal theory.

Polyvagal Theory explains the interconnectedness of body reactivity, cognitive and emotional function, and social behavior. It reveals that we humans are meant to regulate each other, that proximity, social interaction, and intonation of voice are all powerful neural signals.

As states of visceral calm get transmitted up to the brainstem, the information is also relayed to more highly evolved brain structures, allowing full access to the brain's talents and means

of expression and enabling social interaction — which has the effect of perpetuating the state of neural calm.

But in potential danger states — such as completely novel environments — those higher systems turn off; we don't have access to problem-solving skills, to powers of creativity, to our full intelligence. We become vigilant and defensive. The vagal circuitry narrows our focus, mobilizes our resources, and prepares us to fight or flee, tripping the so-called stress response.





If the danger is so overwhelming that there is no escape or there is a feeling of being trapped, a third circuit of vagal operations engineers a shutdown. In this state of numbness, social contact becomes an intrusion and is aversive. None of the bodily responses are voluntary, and often people are not aware of what triggered them—although they are likely aware that their heart is pounding or their body is trembling.



As a social species, we evolved to neurally regulate and be regulated by those around us. Such co-regulation is perhaps most obvious in early life, when infant caregiving audibly modulates the baby's state. Think of a mother singing to her crying baby. Vocalizations are a way of broadcasting physiologic state. Universally, low growl sounds are understood as threat signals. Through evolution from reptiles to mammals, the middle-ear bones broke off the jawbone and enabled the hearing of a frequency band that became the channel for social communication. Prosodic voices are in that bandwidth.



How much co-regulation people need varies significantly among individuals. But it is completely mistaken to think that we can manage threat states by ourselves. Sociality is a potent neurophysiological modulator. It's not just nice to be friendly—our nervous system requires it.

We can quantify its impact. And we can apply it as an intervention.

People go a long way to make meaning of the agitated physiologic state we call anxiety. There's a package of negative emotions that get stirred by it.



Using higher brain structures—memory, associations, previous learning, contextual learning—we create narratives of worry that attribute the driving force to something external and that literally keep us in this state. Most people find it difficult to separate the worry from the physical disturbance, but it's possible: Worry is a personal narrative we create in a state of threat to justify why we feel bad.

Polyvagal Theory not only explains anxiety as a

physiologic state of threat, it also opens a portal of intervention. Applying specific maneuvers affecting vagal pathways, we can use the nervous system to reset physiologic state. Independent of the threshold of reactivity that pitches a person into alarm mode, it is possible to re-educate the nervous system with cues of safety. Removal of the threat isn't a bad tactic, but it is not all the nervous system demands; it also needs cues of safety. Shift state and you change the character of experience.



The most direct way to access the neural pathway that turns off threat is through breathing—exhaling slowly. Our evolutionary journey endowed us with a gift—the ability to extend exhalation. This not only enables us to regulate our state, it also underlies the ability to speak. Neurophysiologically powerful, it acts on fibers of the ventral vagus nerve ferrying signals

between visceral organs and the brainstem, where autonomic control of body organs originates. Extending the duration of phrases—even humming and gum-chewing—stimulates the nerve fibers of the muscles of the face, head, and oral cavity and opens the social engagement system, enabling people to respond reciprocally to the invitations of others.

Gaining control of physiologic state through breathing is why some people turn to yoga and meditation. Singing uses the same neurophysiological structures of breathing and facial muscles as the social engagement system. Playing a wind instrument gives you no choice but to exhale slowly. But most anxious people feed the physiologic state of threat by making slow inhalations and rapid exhalations.

Even CBT has breathing components. Breathing sets the stage for the cognitive work. If you shift a person's state into calm, then cognitive and behavioral therapies can be extraordinarily efficient. But if physiology isn't supporting calmness, they can't work. A person is too tightly wrapped in a state of defense.



The job of a therapist is to co-regulate a patient. An individual in a state of chronic threat is not capable of dialogue, not responsive to any form of co-regulation. The person expresses negativity—a reliable indicator of physiologic state. While breathing quickly shifts physiologic state from the bottom up, it is also possible

to change state from the top down. The anxious person can be asked, What puts a smile on your face? Was there a time when you felt safe, comfortable, secure? Was there a time you enjoyed getting up in the morning? Tell me about that. That exchange initiates a shift of physiologic state.



Once the internal neural dialogue is shifted from threat/defense to safety, physiology shifts, and many systems of the body are downregulated.

Cascades of chemical communication dampen down, including cortisol release. Cues of safety coming through the ventral vagus circuit—familiar faces, intonation of voice—shut off the defensive systems. The shift is immediate and global;

no rewiring is required. The body goes into homeostatic mode, with use of resources for restoration and repair.

Shifting physiologic state restores access to your whole self. Memory and higher capacities are available. You become cognitively present to solve problems. The social engagement system becomes a portal to gaining back our human heritage.

- First published by Dr. Stephen Porges in Psychology Today .

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