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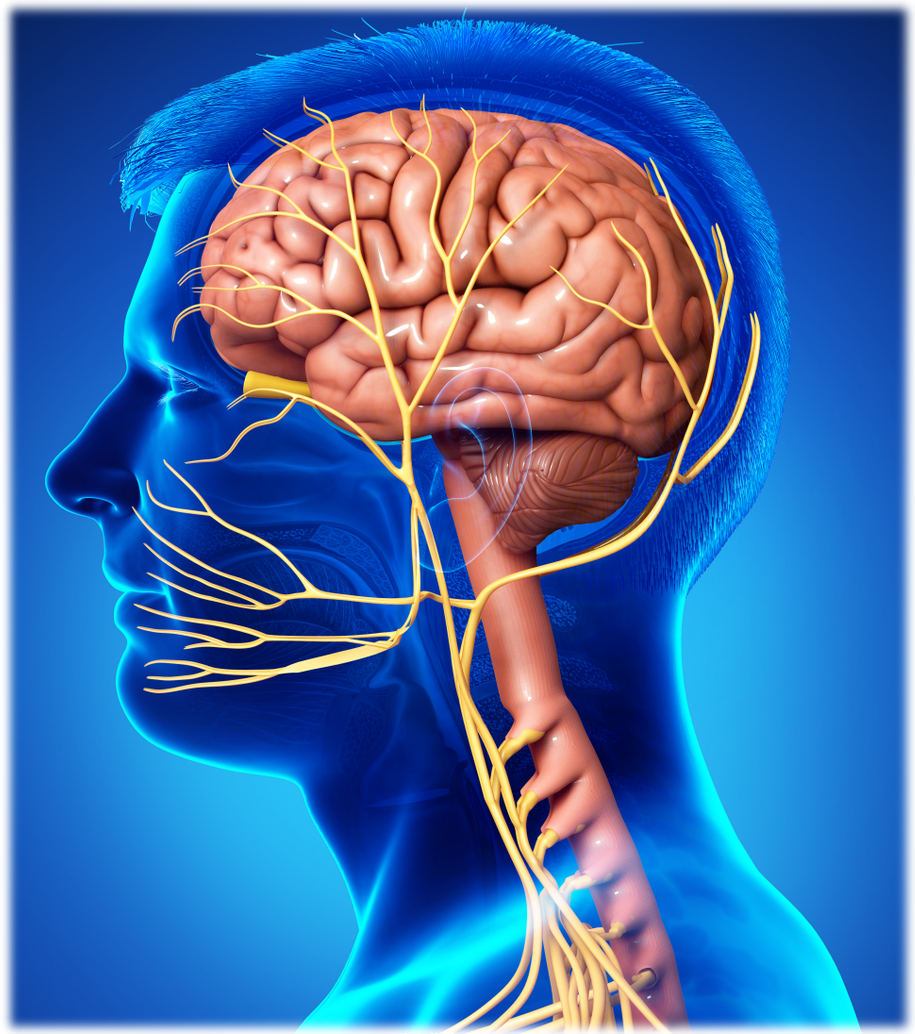
Restoring Control, Inspiring Success

The Power of the Vagus Nerve

The Polyvagal Theory: Manage Anxiety, Depression, Trauma & Autism Better



With

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Course Outline

- Basic Understanding of The Vagus/Polyvagal Theory

- Repairing the Social Engagement System

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Part 1

Basic Understanding of The Vagus Nerve: The Polyvagal Theory

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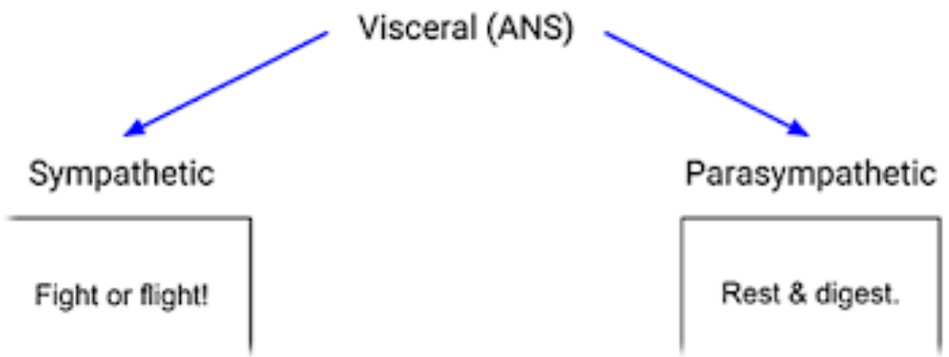
What is the Vagus Nerve? (Berthoud & Neuhuber 2000)

- The vagus nerve is the primary neural pathway for the parasympathetic nervous system (our rest and digest pathway)
- It is one of the twelve cranial nerves (skull nerves) responsible for our basic survival, homeostasis and social engagement. The word "vagus" is a Latin word meaning 'wanderer'.
- The vagus nerve (cranial nerve 10 (CN X)) wanders through the body, linking together vital bodily systems and regions (such as, digestive system (stomach, liver, pancreas, small intestine and gall bladder), respiratory system (lungs and bronchioles), circulatory system (heart, arteries, coronary vessels) and eliminatory system (kidneys, large intestine and ureters).
- 80% of the nerve fibres of the vagus are sensory (bottom-up communication), while 20% are motor fibres (top-down communication)



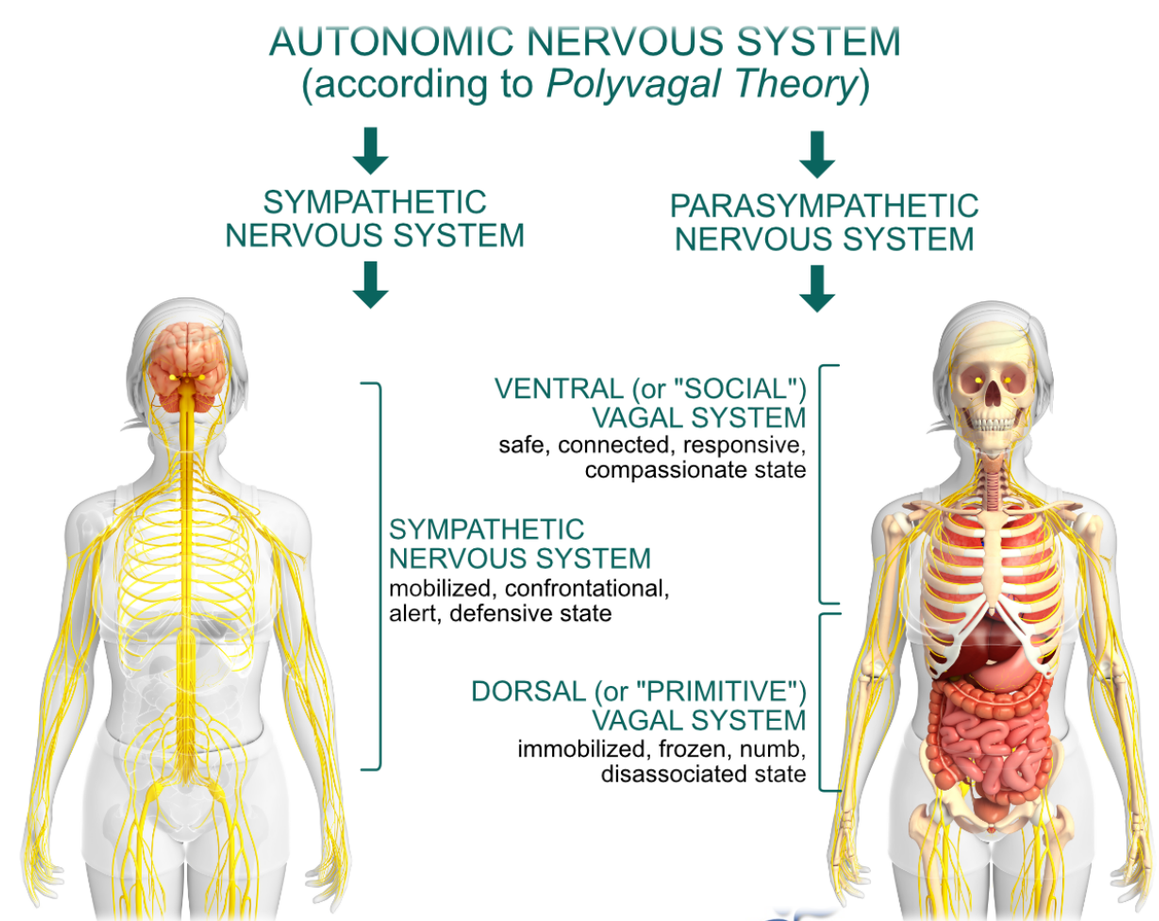
What Is Polyvagal Theory? (Porges 2011)

Polyvagal theory explains the multi-dimensional roles that the **vagus nerve** plays to enhance the survival of vertebrates, relative to the nature of the environmental factors (such as, safety, danger and life threat)

Polyvagal Theory and Survival Hierarchy
(Porges 1995)

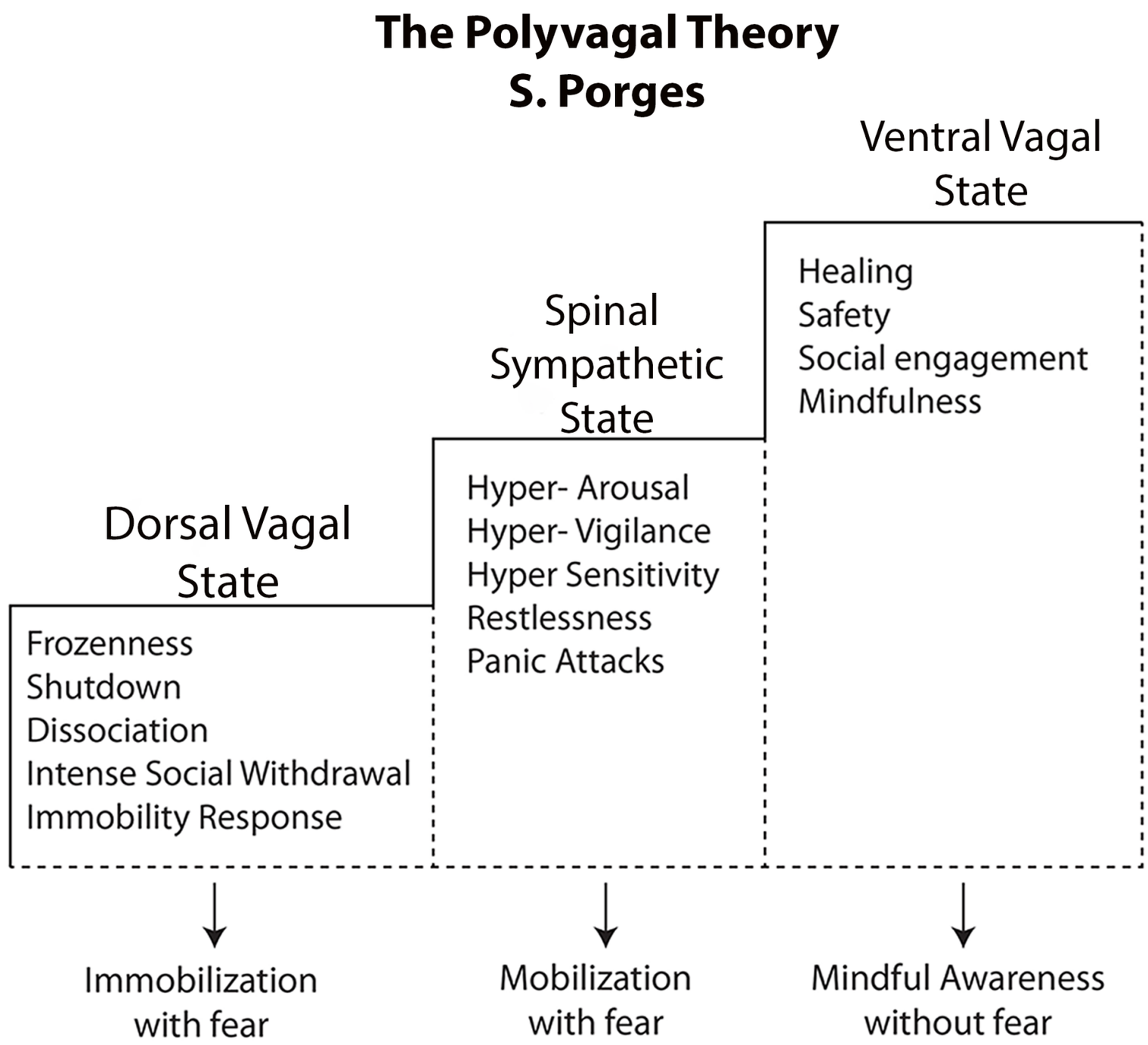
According to The Polyvagal Theory, the autonomic nervous system (ANS) can be divided into **three** hierarchical branches (as opposed to two branches proposed in the old ANS model):

- **ventral vagal branch** of the vagus nerve (mediates safety, healing, relaxation, social engagement, healthy curiosity, intimacy, healthy adventure, freedom)
- **spinal sympathetic branch** of the nervous system (mediates fight-or-flight, mobilisation with fear)
- **dorsal vagal branch** of the vagus nerve (mediates immobility, shutdown, numbness, frozenness, death feigning, fainting, depressive behaviour, dissociation, flat affect, gaze aversion, monotonic voice)



Polyvagal Theory and Survival Hierarchy

(Porges 1995)



THE POLYVAGAL THEORY

Visual Adaptation from the Work of Stephen Porges, MD.

Every Human Has 3 Evolutionary Responses to Environmental Factors

(Porges 1995)

VENTRAL VAGAL STATE:

Natural State: healing, spontaneous social engagement, intimacy, relaxation, security, healthy curiosity, freedom

SPINAL SYMPATHETIC STATE:

Stress & Anxiety State: fight or flight, mobilisation with fear, anxious somatic symptoms (hyperarousal, palpitations, nausea, short breath, tingling, hypervigilance, etc.)

DORSAL VAGAL STATE

Trauma State: immobilisation with fear, withdrawal, frozenness, numbness, social disengagement, helplessness, dissociation, and depression

HEALING MOVEMENT

INCREASED STRESS

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Polyvagal Theory and Survival Hierarchy

(Porges 1995)

Vagal Neuro-Regulatory Systems for Safety and Defence

(Adapted From The Polyvagal Theory Developed By Prof. Stephen Porges)

The vagus nerve is the primary neural fibre for the parasympathetic nervous system. It is heavily involved in the recruitment of the neural circuits for defence and safety.

(Downregulation)
***Neuroception of Defence Tragectory

(Upregulation)
***Neuroception of Safety Tragectory

TRAUMATIC STATE

HEALING STATE

Immobilisation with fear	Mobilisation with fear	Mindfulness in safety
Life-Threat (Immobilisation defence system)	Danger (Mobilisation defence system)	Safety (Social engagement system)
Dorsal Vagal Pathway	Spinal Sympathethic Pathway	Ventral Vagal Pathway
(Sub-Diaphramatic Level) Unmyelinated Vegetative Vagus	Fight/Flight Response	(Supra-Diaphramatic Level) Myelinated Smart Vagus
*Immobilisation *Dissociation *Frozenness *Total collapse *Social withdrawal *Depression	*Hyperarousal *Hypervigilance *Hypersensitivity *Palpitations *Tingling *Dizzyness *Nausea *Panic Reactions	*Healing *Mindful Awareness *Gratitude *Relaxation *Appreciation *Openness *Cooperation *Coherence *Spontaneous Social Engagement

***Neuroception is the process by which the nervous system evaluates risks or safety and adapts the body accordingly without the participation of conscious awareness.

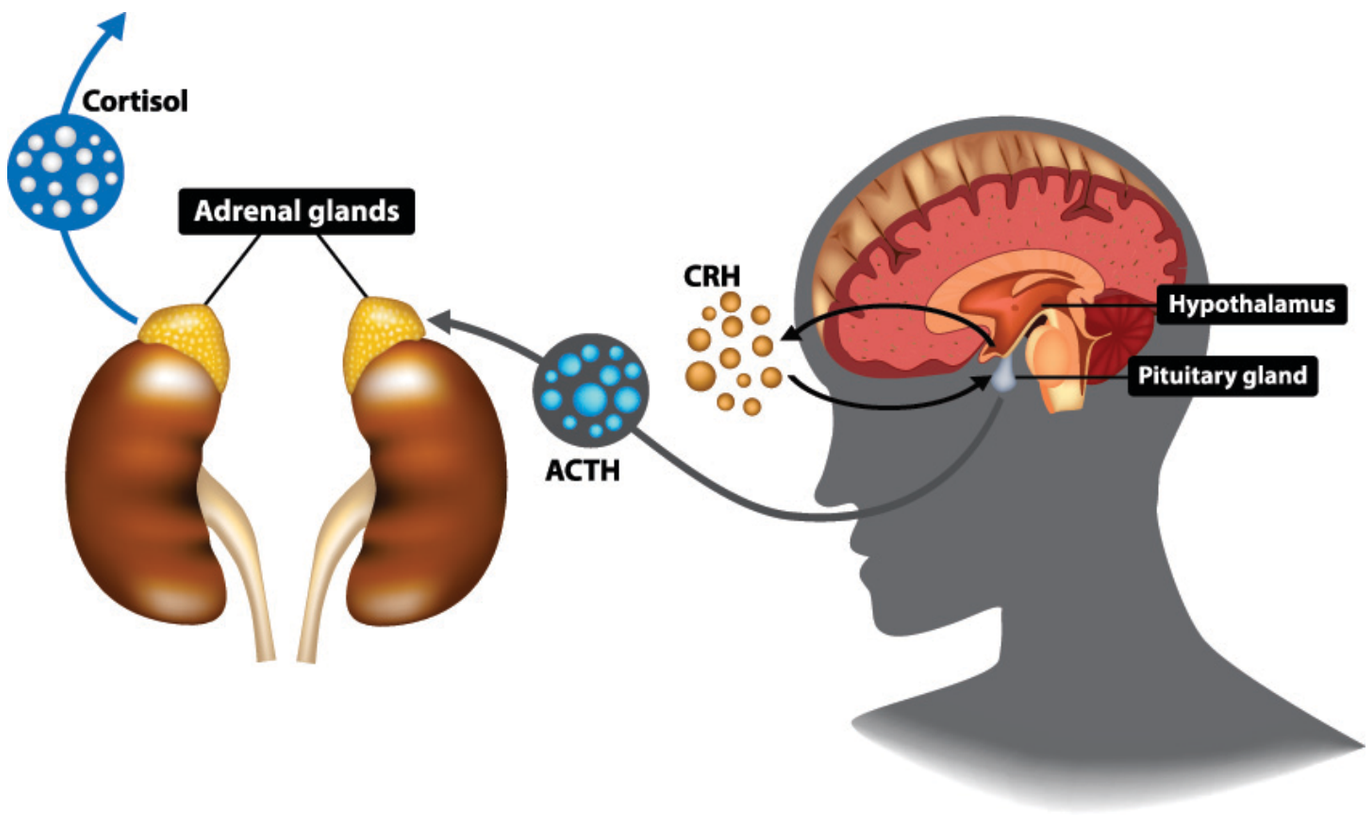
Part 2

Repairing the Social Engagement System - From Dorsal to Ventral

The Social Engagement System (Safety)

(Porges 2011)

- There are five cranial nerves originated from the brain stem which are necessary for **social engagement** (CN V, VII, IX, X, and XI), all of which are affected in trauma-related anxiety disorders.
- The social engagement system (safety) is activated by the myelinated (smart) vagus, which inhibits the sympathetic (fight/flight) influences to the heart. It also inhibits the hypothalamic-pituitary-adrenal (HPA) axis (stress pathway)



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The 5 Cranial Nerves (Social Engagement System) And Their Functions

(Porges et al 2014; Coleman & Gillberg 1985; Hayes & Gordon 1977; Mundy 1995; Kenneth W.H. 1990)

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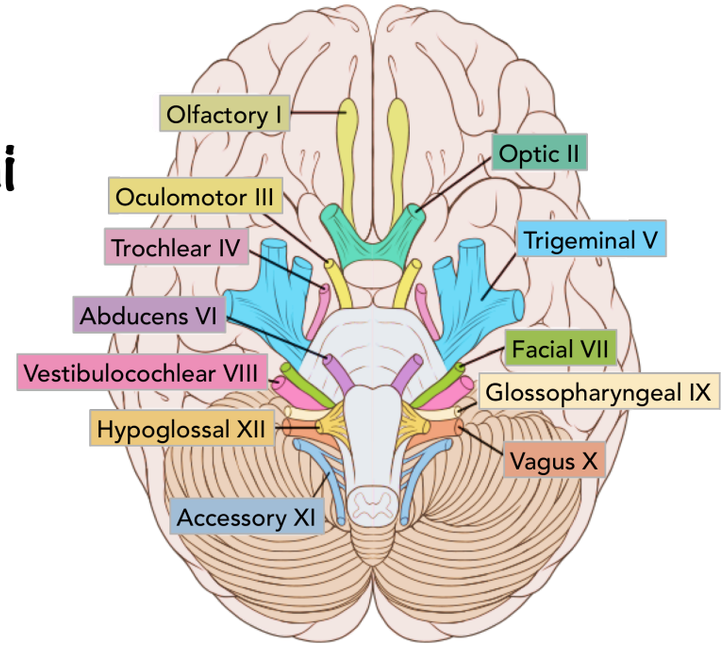


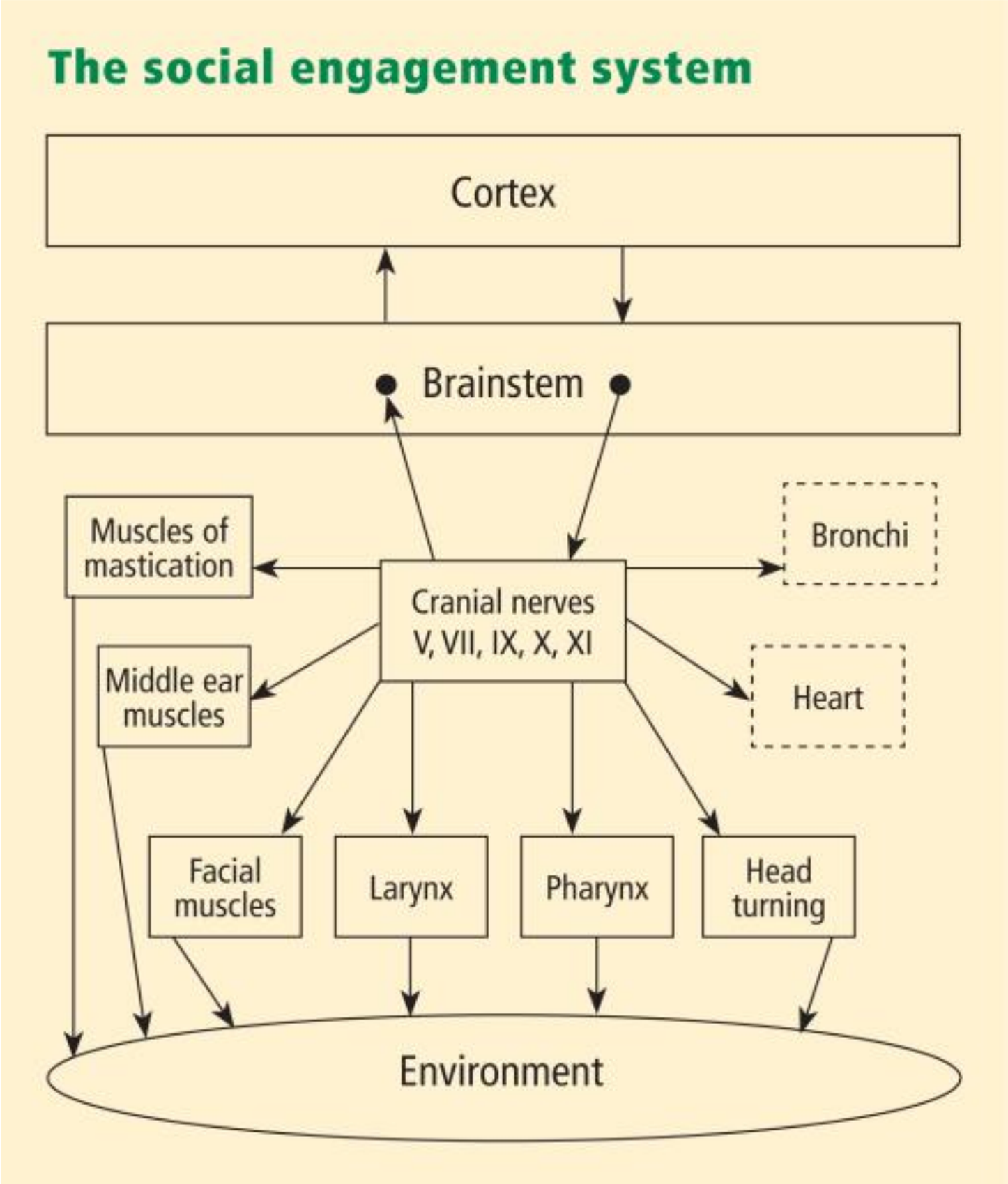
- **Cranial nerve 5 (CN V): Trigeminal nerve** - Biting, helps us control facial sensations and motor functions. It is also involved in hearing (tensor tympani muscle). It is the largest of the cranial nerves.

- **Cranial nerve 7 (CN VII): Facial nerve** - Chewing, helps us control some facial muscles and the secretion of saliva. It is also involved in hearing (it supplies the stapedius muscles - the smallest muscle in the body). The stapedius muscle protects the inner ear from high noise levels, primarily the volume of one's own voice

- **Cranial nerve 9 (CN IX): Glossopharyngeal nerve** | Swallowing

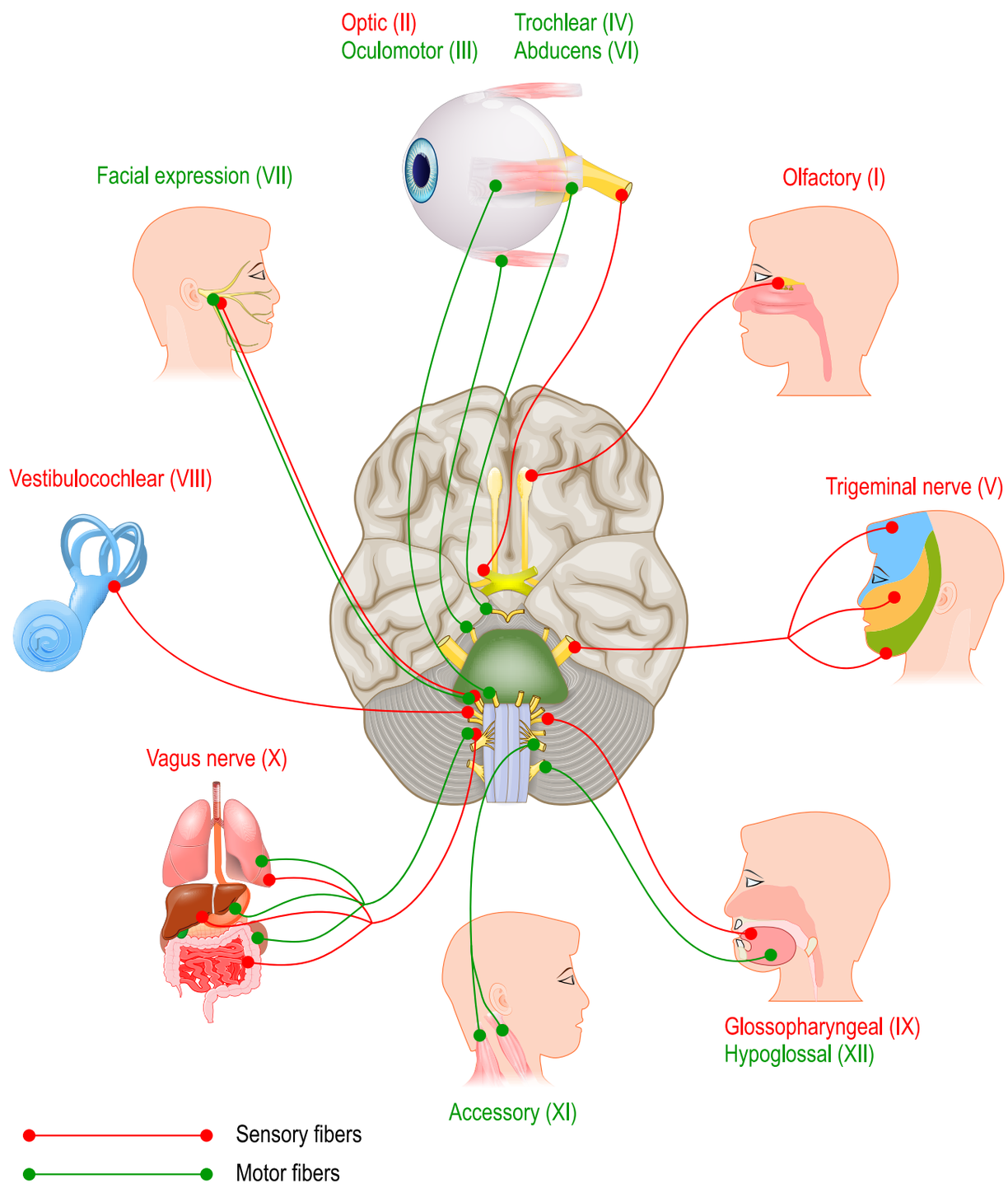
- **Cranial nerve 10 (CN X): Vagus nerve** - Homeostasis, social engagement - helping us regulate the heart, bronchi, stomach function, digestive glands, oesophagus, liver, gall bladder and most of the pharyngeal muscles. Out of all of the cranial nerves, the vagus nerve has the longest pathway. It extends from your head all the way into your abdomen. It originates in the part of your brainstem called the medulla.

- **Cranial nerve 11 (CN XI): Spinal accessary nerve** - Helping to turn and nod the head in order to ensure visual flexibility, awareness and social connection. It supplies the trapezius and sternocleidomastoid muscles



Porges, S.W (2004)

Cranial nerves



Kandel, Eric R. (2013)

Daily Exercises to Strengthen the Vagus Nerve for Anxiety, Trauma & Autism Management

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- **The Basic Exercise** (Rosenberg, S. 2017):

- Test first. Rotate your neck to the right and stop at the point of resistance, rotating your neck as far as it can comfortably go. Notice any strain or pain that may occur. Rotate your neck back to the centre. Now, rotate your head to the left as far as it can comfortably go and also notice any pain or strain that you may feel. Notice how far both sides are able to rotate.

- After completing this activity, do the above test again to see if there is any improvement in the range of your neck rotation and in your strain, stiffness or pain.

- Basic Exercise: lie comfortably on your back or sit up with your spine upright and in line with your head. Weave the fingers of both hands together and place them tightly behind the back of your head. You should feel the hardness of the back of your head with your fingers.

- Keep your head straight ahead and still in line with your spine. Now moving only your eyes, look to the right as though you are gazing at the tip of your right elbow.

- Stay in this position for about thirty to sixty seconds until there is a sign of release from the autonomic nervous system in a form of a sigh, yawn or swallow.

- Move your eyes back to looking straight ahead. Now, it's time to do the left side while maintaining a still with weaved fingers tight to the back of your head. Look at the top of your left elbow until you notice a yawn, sigh or swallow.

- Now that you have completed the Basic Exercise, take your hands away from the back of your head and test if there has been any improvement in the mobility of your neck.

- Repeat this exercise daily to ensure that you are constantly in ventral dorsal state of healing and social engagement.

Other Ways to Stimulating the Vagus

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Stimulating the Vagus Nerve

Movement: e.g.; walking, jogging, yoga, tai chi and other Eastern disciplines that use bodily movements and coordinations. Mindful movements stimulate the vagus.

Breathing exercises: e.g., meditation, mindfulness and other breathing techniques. The breathing should be deep and slow, and the exhalation longer than the inhalation. Expanding your diaphragm as you inhale and aim for around six breaths per minute.

Good and balanced nutrition: There is a strong connection between the digestive system and the vagus. Eat a balanced diet that include **probiotic** and **prebiotic** (also strengthen the immune system and ease depressive symptoms), while cutting down on simple sugar and high density carbs. Eating fibre stimulates the vagus impulses to the brain.

Laughter: Having a good laugh boosts your mood, strengthens your immune system and stimulates the vagus nerve.

Singing/chanting: Loud singing activates the vagal break on the heart's pace maker (sinoatrial node) which triggers a parasympathetic response.

Massage: body/foot/head massage also stimulates the vagus and activates oxytocin which inhibits the release of stress chemicals.

Other ways to stimulate the vagus nerve include; playing wind instruments, dancing, cold water face immersion, loud gargling with water, filling the mouth with saliva, positive affirmations, positive social connection, intermittent fasting, prayer, seafood (EPA and DHA), sleep, laying on your right side, acupuncture, sun exposure.

Testing for Ventral Vagal Dysfunction

(Rosenberg S. 2017)

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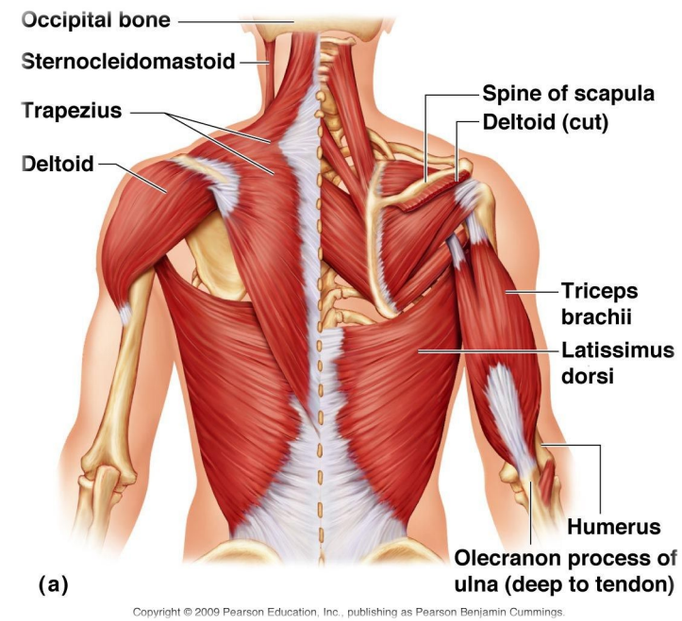
• The Wrist Pulse Test

- Track your index finger down to your wrist.

- Now be mindfully aware of your pulses.
- Take a deep breath and pay attention to the time-interval between pulses as you breathe in and out.
- Good ventral vagal function requires longer time-intervals between pulses on the outbreaths than on the inbreaths.
- The variance in time between the beats should be faster and stronger on the inbreath than on the oubreath.
- Doing basic exercise regularly can help restore healthy ventral vagal function.

• The Trap Squeeze Test

- Squeeze lightly and slowly, using your thumb and your first finger, the muscle on the top of the shoulder (trapezius muscle) on each side.
- Compare the tonus of the muscles on both sides. Do they feel the same or is one side harder than the other?
- A good ventral vagal state requires both of them to be reasonably soft and elastic, and not be chronically tense or flaccid.
- If one side is harder than the other, this may suggest ventral vagal dysfunction.



- Now, squeeze lightly and hold the side that is harder for about 10-20 seconds until you yawn, swallow or sigh. Basic exercise can also help to restore full vagal functions.
- The trap squeeze test is also helpful in neck and shoulder problems (including forward head posture (FHP)) as neck and shoulder muscles (trapezius and sternocleidomastoid) are innervated by the CN XI (spinal accessary nerve)
- The trap squeeze test takes a few seconds to complete and is suitable for use on children and people on the autism spectrum.

Q&A Session

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"There are no constraints on the human mind, no walls around the human spirit, no barriers to our progress except those we ourselves erect."

—Ronald Reagan, 40th U.S President