

The Polyvagal Theory – compared with the old idea of stress/relaxation.

Polyvagal. “Poly” means more than one. *Vagal* refers to the 10th cranial nerve.

The old interpretation of the Autonomic Nervous System was that it was in two parts.

Sympathetic Nervous System was for mobilization in the face of danger and it expressed itself in fight/flight.

The parasympathetic Nervous System was for immobilization, rest and restoring the body.

The Polyvagal Theory says that there are 3 parts to the autonomic nervous system with 3 different survival functions.

The sympathetic is the same mobilization into fight/flight.

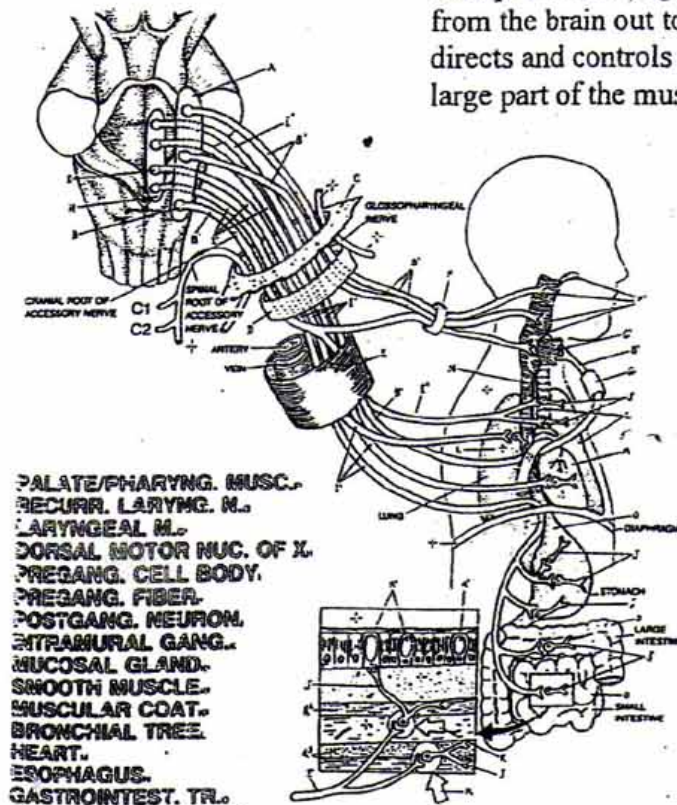
The vagal nerve, also called the 10th cranial nerve, has 2 branches.

The one is primarily motor and is active when we digest food. This is called the *Dorsal Vagal System* (DVS).

Dorsal means on the back of the body. The Dorsal Vagal System exits a part of the brain stem from the back (posterior).

VAGUS (X) NERVE: MOTOR COMPONENT.

This part of the vagal nerve is efferent and sends signals from the brain out to the body. When it is a *motor nerve*, it directs and controls muscular activity. Here it controls a large part of the muscles of the digestive tract.



NUCLEUS AMBIGUUS.
CELL BODY.
SPEC. VISC. EFF. FIBER.
JUGULAR FORAMEN.
VAGUS NERVE.
CAROTID SHEATH.
PHARYNG. PLEXUS.

in the old model of the autonomic nervous system, the other part of the vagal nerve has been overlooked when thinking of vagal function. This branch functions primarily in activities of sensing and gathering information.

This other part of the vagal nerve exits the brain stem at the front (anterior) and is called the *Ventral Vagal System*

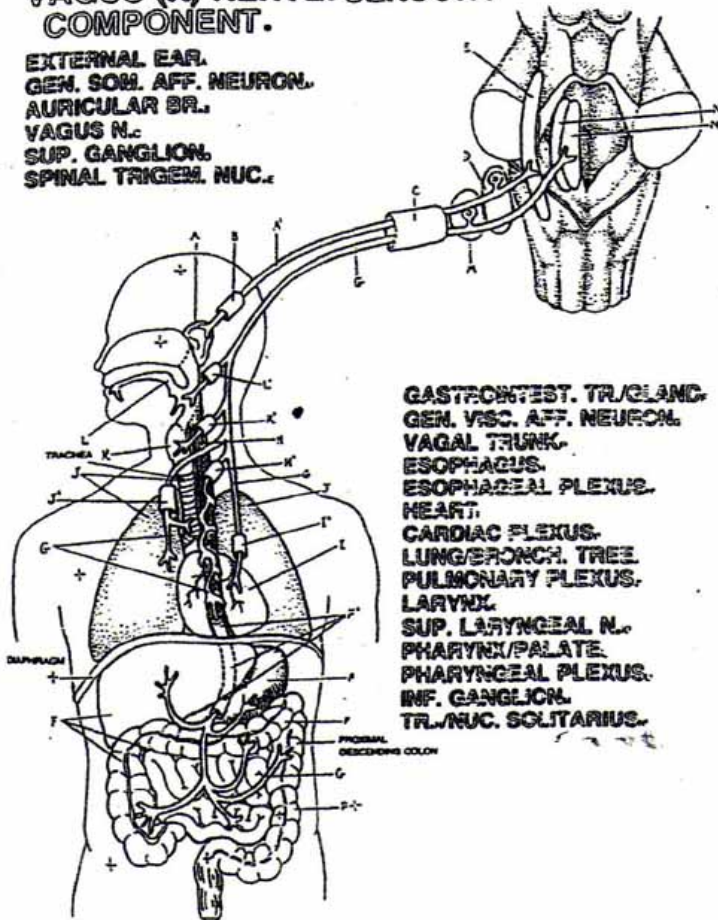
The VVS goes to the ear, the palate, esophagus, bronchia, trachea, lungs and heart.

Stephen Porges stimulated the muscles of the ear with specially computer-distorted music to effect the VVS. He was able to use this approach to help people with autism to be restored to normal emotional behavior.

We will in our hands-on section work on these structures to change the input from these organs via the Ventral Vagal System.

VAGUS (X) NERVE: SENSORY COMPONENT.

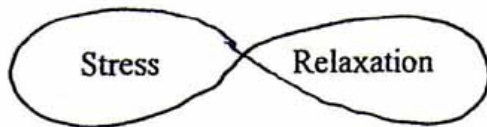
EXTERNAL EAR.
GEN. SOM. AFF. NEURON.
AURICULAR BR.
VAGUS N.
SUP. GANGLION.
SPINAL TRIGEM. NUC.



GASTROTEST. TR./GLAND.
GEN. VISC. AFF. NEURON.
VAGAL TRUNK.
ESOPHAGUS.
ESOPHAGEAL PLEXUS.
HEART.
CARDIAC PLEXUS.
LUNG/BRONCH. TREE.
PULMONARY PLEXUS.
LARYNX.
SUP. LARYNGEAL N.
PHARYNX/PALATE.
PHARYNGEAL PLEXUS.
INF. GANGLION.
TR./NUC. SOLITARIUS.

The old model with only stress/relaxation only took account of one part of the vagal nerve, the DVS which helped us with immobilization and digestion. This was the parasympathetic branch.

In the old model, there were only two possibilities: stress or relaxation. (The stress response involves the sympathetic part of the autonomic nervous system.) But Stephen Porges model gives us the possibility for 3 levels. Instead of showing the two parts in a balanced model,



Stephen's model organizes the autonomic function into a hierarchical model with three parts.

Social Engagement

Stress - sympathetic

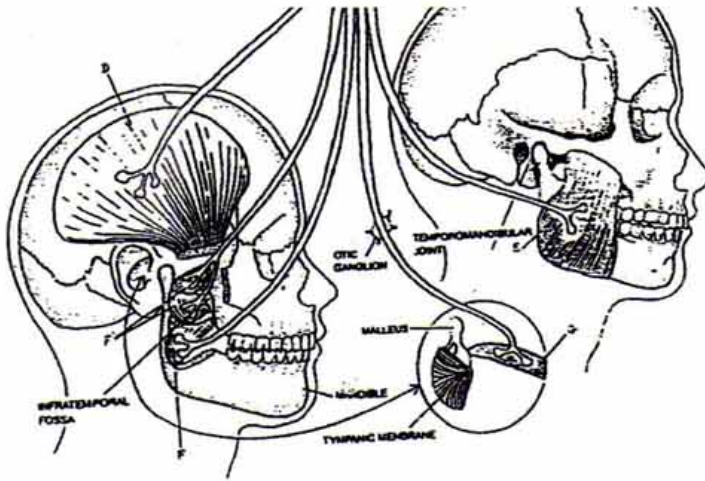
Immobilization - parasympathetic

The vagal nerve functions together with 4 other cranial nerves in what he calls the ***social engagement system***.

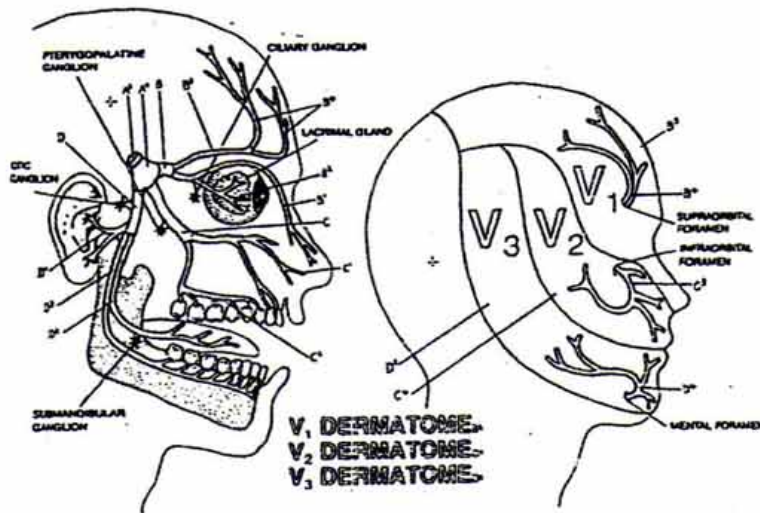
The 4 other nerves are cranial nerves V, VII, IX and XI.

The ***trigeminal nerve*** is the fifth cranial nerve, C.N. V. It has two divisions.

One is motor nerve to the 4 major muscles of mastication (chewing). But although not usually emphasized, it also is motor nerve for two other muscles under the jaw (mylohyoid and the anterior body of the digastric muscle). Massage of these muscles is proving to have a positive and interesting effect on the functioning of the autonomic nervous system as well as drainage of the middle ear.



The other part of C.N. V has 3 branches that sense three areas of the skin of the face.



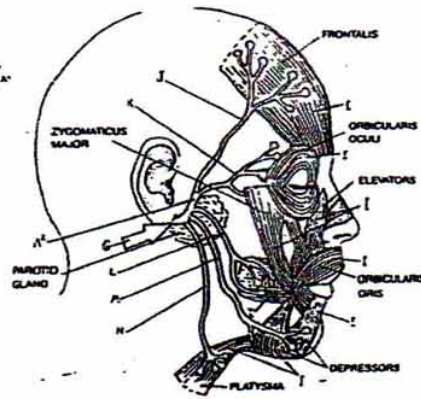
The *facial nerve* is the seventh cranial nerve, C.N. VII. It both is both a motor nerve and a sensing nerve.

The motor function moves the muscles of the face. This area of the body has derived from the same embryonic center in people which is like the embryonic center in fish which develop into the the gills. The human foetus has gills that develop in the first few weeks of life – they evolve away from gill-like structure by the 3rd-4th week.

The muscles of the face make up our organ of expression.

The muscles of the face are organized around the functions of opening and closing the openings of the mouth, nostrils, eyes and ears.

**MOTOR NUC./MOTOR ROOT.
FACIAL NERVE
RETIC. FORM./NEURON
CORTICOCELLULAR TR.
COLLATERAL
INT. AUDITORY MEATUS
FACIAL CANAL
GENICULATE GANGLION
STYLOMASTOID FORAMEN
EFFECTORS AND NERVES
STAPEDIUS 5. NERVE
FACIAL MUSCLES
TEMPORAL BR. VII
ZYGOMATIC BR. VII
BUCCAL BR. VII
MARG. MANDIB. BR. VII
CERVICAL BR. VII**



When we talk with someone and look in their eyes, our face mirrors the movements of expression of the person that we are looking at. These micro-movements that mirror their expression are unconscious.

When these facial muscles tighten and relax, they pull the skin into different forms. I believe that the sensory part of the fifth cranial nerve picks up the changes in the skin, they report back to centers of the brain. We become aware of the emotions the other person is feeling.

When people are not functioning naturally in their C.N. V and C.N. VII, they do not pick up these cues. Others people cannot read their emotions and they themselves are insensitive to the emotions of others.

One sign of dysfunction in the social engagement system is a lack of natural facial expression, subtly changing from moment to moment. The face is stiff in the area between the eyes and the upper lip.

A socially disengaged person might be a “flasher” – they voluntarily smile, wink and tighten their brow to communicate rapport, but these gestures are an afterthought, are voluntary or habitual, and do not display the subtlety of the involuntary movements.

In fact, studies of the physiology of emotion show that the first event is a change in facial expression. Afterwards comes the thought that we mistakenly believe we react to. Then comes the feeling. The idea of expressing an emotion

is absurd, since normally the expression comes before the conscious awareness of what it is that we want to express.

It is only in the case of emotional flashers that the sign of emotion comes after the thought. Their facial expression is coming from another center in the brain, the thinking center at the front of the brain.

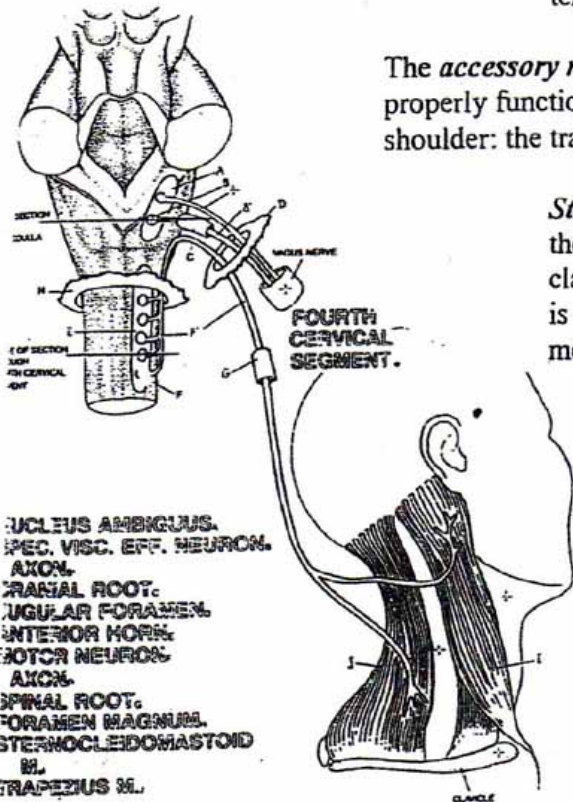
The *Glossopharyngeal nerve* is the ninth cranial nerve, C.N. IX.

Glosso means tongue. *Pharyngeal* mean the area of the throat before it splits into the trachea (windpipe) and esophagus (spiserør)

This nerve also has 2 components, one motor and one sensory. In terms of social engagement, it has a lot to do with swallowing (eating), speaking and singing.

People with dysfunctional social engagement systems often have irritating voices – either aggressive (fight), weak and tentative (fear), or lacking force and energy (depressed).

The *accessory nerve* is the eleventh cranial nerve, C.N. XI and when it is properly functioning, there is a normal tone in two muscles of the shoulder: the trapezius and the sternocleidomastoid muscle.



Sterno means chest and one leg of the muscle attaches to the top of the sternum (breast bone). *Cleido* refers to the clavicle, collar bone, where the other leg attaches. *Mastoid* is on the temporal bone behind the ear where the two legs merge at the side of the skull.

These two muscles allow us to turn our head from side to side. This is important in our social function, for example when we sit at a table with many people and look first at one and then at another.

Symptoms from chronic tension in one or both of these muscles include tension headaches, migraine (severe tension headaches), dizziness, shoulder/elbow/and wrist problems usually thought to come from use of the computer mouse.

These nerves working together allow to enjoy and to experience what it means to be a well-functioning, social human being. We chew and swallow which allows us to eat together. We talk with each other, sing together, turn our heads to see each other. We can listen to each other.

In fact it requires the function of several of these nerves for us to be able to hear the human voice when there is background noise. These nerves tighten some muscles, which act as a filter to lower sounds and serve to highlight the range of hearing of the human voice.

Some people who are dysfunctional in the Social Engagement System need to look at your lips to get what you are saying, or cannot hear you because of the background noise. The sign that someone can listen is that they make eye contact when they speak with other people.

These nerves are also necessary for mammals to survive. Reptiles have the stress/relaxation parts of the nervous system. They do not nurture their offspring, either by breast feeding, protecting or teaching them the skills of survival. Mammals do these activities and thereby insure the survival of their young. These activities are not random, but in fact are hardwired into the nervous system (social engagement system) and helped by a highly efficient, well-structured hormonal system.

The social activities often take place in a safe environment. We are not usually mobilized when we are engaged in these social activities.

The social engagement system also allows for a speedup or slowdown of heart rate without the need to get pumped up with adrenaline. Top athletes can move quickly and yet remain calm mentally at the peak of performance.

We do hear cases of parents killing their children, beating them, abandoning them. These stories and others showing disruptions in the social unit make the front pages of many newspapers every day. These themes of social dysfunction are often at the heart of the movies we see, or the books that we read. Somehow, from a social perspective, we expect people with biological or loyalty relationships to value each other and to care for each other – not to abandon, harm or ignore each other.

Socially engaged people generally have self-confidence and treat others with respect. But if that strategy does not work and they feel threatened, they move down the hierarchical ladder into a stress response.

When people are stressed in their autonomic nervous system, they are in a fight or flight behavioural modality. The slightest stimulus will set them off. They have a short fuse.

Being in the fight emotion, one has to find an enemy to fight – verbally, economically, politically emotionally or physically.

Being in the flight mode, one has to find someone or something to run from, to avoid, or to worry about.

When we are in the emotional states of fight or flight, we look for a justifiable cause. We generally do not consider that we might be stuck in our autonomic nervous system or have a hormonal imbalance. We seek to justify our emotions by a psychological or thought pattern.

Other mammals have the ability to literally shake off a bad experience. They might shake, run or jump and then they return to normal. But most people get caught in the negative emotion. It is tempting to think that our highly developed cortex with our ability to think about things somehow blocks us from coming free of bad experiences and getting on with our lives. Most mammals are hunters or hunted. They have lots of close scrapes, but seem to be able to leave them behind.

Past experiences with a negative quality that have not been released, worked through or completed leave us with an automatic reactive pattern. Push the button and you get the response. When we experience something that reminds us of something bad that happened, we mobilize to attack it or to avoid it.

Working from a psychological perspective (verbally), people can clear the stimuli that throw us into an emotional state.

Many times they will use a positive emotional experience to bring them out of the stress. Thinking of a positive experience, a beautiful place or someone who loved us or who we love will bring people (if they are autonomically capable) back up to social engagement.

A skilled psychologist using language can move clients back and forth from the stressor to the positive experience. The energy goes out of the negative experience like air from a balloon. Then, when the person again meets the same stimulus, they can remain centered and are not blown away into a reactive emotional pattern.

A body therapist has the same possibilities. The therapist can touch a part of the body that has been injured, or is tightened to protect an

injured part. This will stimulate a reactive pattern. The therapist can stay with the touching of their client until the client releases. Some therapists might move back and forth between areas of the body that are stress and areas of the body that feel good. Each time they touch a healthy part of the body, it is as if they draw the tension off from the tensed area.

If fight or flight does not work and the threat continues, we move further down the hierarchical ladder into an immobilized state. Happens in trauma, shock or depression. People do not move. They do not have the energy to move. They have given up.

So, we have the 3-part hierarchical system:

Social engagement

Stress

Parasympathetic immobilization

Ideally, we would spend most of our time with a calm mind in a high level of productive activity, or relaxing and enjoying ourselves socially. We would move down the ladder naturally to defend ourselves by fighting or running. If fighting or running was not enough, we would turn as much of our vital functions off as possible going into excessive parasympathetic states of immobility, apathy and depression.

Whereas it does not sound very appealing, a state of shock can help us survive. The depression lowers the blood pressure and heart rate. If a person was in an accident and losing blood, this could save their life. If they were in a stress state of excitement and tried to fight or run, they would have a high blood pressure and an elevated heart rate and they would quickly bleed to death.

Also, interestingly enough, in this state of trauma, there is also a general shutdown of blood flow to the brain, including the speech center in the frontal lobe. Thus, a person in a traumatizing situation is not verbalizing what happens and has a hard time, or even finds it impossible to find words after the event to answer the question, "What happened?"

For this reason, purely verbal approaches to depression or post-traumatic shock are usually not effective. In cases of post-traumatic shock, nurturing forms of body therapy can work to bring the disassociated person back to their body.

Treatment of "stress" can either move a person into the immobilization of a depression, or it can move the person up into social engagement.