

When assessing a student's behavior, look for what that behavior is trying to communicate rather than whether the behavior is good/bad/right/wrong.

Most undesirable behaviors are a form of self preservation, Survival is a primary attentional priority. Recent findings by Stephen Porges and colleagues are identifying mechanisms of our stress response as a physiological priming for the reactions to threat or arousal by fighting, fleeing or shutting down, and finding that insufficient discharge of those threat or arousal responses is what leads to traumatic stress.

To some more sensitive, elements in our daily environment interfere with attention and Executive Functioning. A sensitive tactile/auditory/visual system can be easily overwhelmed by unnatural fibers in clothing, strong odors from toxic household products, ambient or unexpected sounds, and differing experiences of proprioceptive and tactile stimuli such as the hard plastic in a classroom desk, or the bright unnatural lights.

Tending to these environmental stimuli take attention to deal with, and can interfere with the ability to concentrate and communicate. As we are always attending to something prioritizing attention via regulation to body and environment is a means to improve learning.

"If a person's body cannot function with relaxed autonomic nervous system, but instead requires mental effort to keep it in balance, there will be insufficient brain power, focus, concentration and attention available for intellectual growth and tasks" - Vernon H Mark MD *Brain Power*

Arousal response changes and signs of stress.

When our foundational systems are challenged we attend to our basic needs of safety, security, and acceptance. When we are tending inward our availability to attend outward diminishes.

A stressed system has difficulty learning.

Subtle changes to look for in others that are signs of stress or arousal.

Change in muscle tone

Loss of visual focus

Change in facial color or ear color

Change in breath rate or pattern

Loss of mastery of an activity that has been integrated

Reports of nausea, dizziness, disorientation or other somatic complaints

Difficulty completing a request

Silliness or wiggly actions

Asking to stop or inability to follow through with a task.

Signs of arousal to teach client/student to recognize in themselves:

Increase heart or breath rate

Panting

Tingling muscles

A rush of heat or energy throughout the body.

Increase of thoughts

Mind racing

Worrying

The best way to manage this arousal response is to accept and acknowledge the experience via the felt sense of the body in relation to the immediate environment. Let these feelings run their course staying grounded in the breath and body sensations. Let them move through their peak, diminish and resolve. Orienting to the immediate environment and the cues of relative safety within it.

Some of the signs that resolution of this arousal has been achieved are:

Trembling
Shaking
Vibrating
Warmth
A full slow breath
Relaxation of muscle
Feelings of relief

Ways to discharge the stress response:

1. Make noise; yell, scream, laugh, sing, sigh, vibrate the vocal cords.
2. Tend and befriend; seek support, talk about feelings in the body, get hugs, get reassurance.
3. MOVE; run, jump, flap your wings, spin around, dance, get the wiggles out, shake, kick a ball, punch a pillow. (Violence against others is never the solution here.)
4. Meditate; mindfully create awareness around your experience, your feelings, the story you are telling yourself in relation to these experiences and feelings.

The following infographics from Project Brainheart explain the different brain parts, their forms, and functions.

Reptilian brain



Brain stem (midbrain + pons + medulla + the vagus nerve)
+
Cerebellum

These structures capture signals from the physical world (through our five senses) and our body, and modulate our heart rate, breathing, blood pressure, body temperature, hunger, and arousal accordingly.

Often called our 'autonomic nervous system'

Though only
10%
of brain mass,

these circuits
contain
80%
of our brains'
neurons!

Source: Paul McLean, Bruce D Perry, Robert Sapolsky, Suzana Herculano-Houzel

Limbic (mammalian) brain



Diencephalon (including the hypothalamus - who interfaces with the reptilian brain)
+
Amygdala (salience)
+
Hippocampus (memory)

These structures give emotional saliense to our experience. They decide what we learn - both explicitly and implicitly.

They also trigger fast action, before the neocortex has time to kick in



Source: Paul McLean, Bruce D Perry, Robert Sapolsky

Neo-cortical brain



Frontal cortex
(ventromedial Pre Frontal
Cortex + dorsolateral PFC +
Insula + Anterior
Cingulate)

The neocortex is
responsible for concrete
and abstract thought, for
“doing the right thing
when it is the harder
thing to do.”

This part is the last part
of the brain to mature
(in our mid-twenties!)
and the one most shaped
by experience.

Though only
18%
of brain neurons,

these circuits
constitute
80%
of our brains'
mass!

Source: Paul McLean, Bruce D Perry, Robert Sapolsky

The Neuro-sensory system and functions as identified by the HANDLE institute. Find out more at www.handle.org

Tactility- Tactile sensations refer to our sense of touch. How we input sensory stimulation from our largest sensory organ- our skin. With an over sensitive sense of tactility the feeling of wind blowing across the skin can be painful. Tags in shirts or unnatural fibers in clothes can disrupt our attentional priority. The seam on the inside of a sock can disrupt a whole day.

Olfaction- Olfaction is the neurological process behind the sense of smell. It develops in utero and plays a role in bonding early in life. The olfactory nerves connect directly to the limbic

system in the brain. It's information therefore is processed by the cerebral cortex without having to bypass other brain areas. Olfaction has an unconscious effect on our emotional response because the limbic system is the seat of where emotional reactivity begins. An irregular sense of olfaction can be associated with the following: Behavior changes related to certain odors, distractions or allergic reactions to specific odors, increased awareness of certain odors strong, a need to leave an area when subjected to certain odors, frequent sinus infections, overly emotional behaviors, upper respiratory infections, rhinitis, paranoid sense with regard to things not visible in the environment, lack of concern for personal grooming especially body odor or halitosis.

Gustation- Gustation is the sense of taste. Taste information is transmitted from the taste buds to the nerve pathways to the brain. Issues of taste can be related to nerve disruption at the site of taste buds, direct injury to the tongue, disruption in the transmission of information to the brain, or disruption in the processing of that information. When our sense of taste is similar to that of other members of our cultural social group then we are better able to fit into mealtimes, celebrations and other events that involve food. Together with olfaction taste provides a warning that the substance in mouth is rancid or noxious in some way.

Digestion begins in the mouth. When food is chewed properly and passes over the taste buds it sends messages to the brain about how sweet, salty, sour, or bitter food is. The composite messages of these signals allow the appropriate gastric juices to be sent to the stomach to continue to digestive process. Some of the issues below may appear to be about gestation and may be attributed to picky eating, but can also be due to auditory sensitivity, tactile sensitivity, muscle tone, food sensitivities, overgrowth of certain fungi in the intestinal tract, allergies. trigeminal nerve dysfunction, olfactory issues or visual perceptual issues.

Disruptions in gustation look like: Dislike of sweet, salty, sour, bitter, spicy, cold or hot, a fussy eater in general, eats mostly refined simple carbohydrates, refuses crunchy food, has allergies to certain foods or categories of foods, swallowing food without chewing, appears uninterested in food, will eat only soft or blended foods, eats huge amounts but stays thin, will only take liquids, needs each food item separated from one another, dislikes fresh tomatoes but likes ketchup or tomato sauce, must have sandwiches cut a certain way.

Kinesthesia- (proprioception) Kinesthesia relates to the sense of muscle, joint and tendon position in specific active situations or body in space. Kinesthetic memory involves learning these positions and the sequence of changes in these positions for repeated movements such as dancing, tying our shoes, or bike riding. Once we have repeated an activity numerous times it is committed to kinesthetic memory. When we rely on kinesthetic memory to move through an activity such as walking, we can focus our attention on other aspects of our environment or on other tasks simultaneously such as having a conversation. When we have not developed our kinesthetic memory, we must tend to the experience of learning how to feel our body in space and motion. Irregularities in muscle tone and or differentiation (discussed later) can interfere with the development of kinesthetic memory. Most activities we have learned through kinesthetic memory can be recalled even years after they have been accessed.

The following issues are among those that may occur in a person experiencing kinesthetic weakness and irregularities: Inability to carry a conversation while walking, clumsiness in using eating utensils, inability to express ideas in writing, difficulty in counting the number of times they perform a specific movement, slow articulation of words and ideas, awkwardness in dressing and grooming skills, difficulty learning to acquire rapidity in typing, difficulty writing getting dressed
The thing that help improve kinesthetic memory are

re-patterning exercises and structural Bodywork exercises aimed to improve proprioceptive awareness.

Audition- Audition or hearing involves reception and interpretation of sound waves via both air conduction and bone conduction. It requires relatively normal and healthy conditions of bony structures in the middle and inner ear as well as the auditory nerve, normal levels of endolymph fluid in the ear and, resilient cilia.

Audition can be challenged for varying ranges of sound both in terms of tone as well as amplification. Other cranial nerves and developmental functions have an influence on hearing. The vestibulocochlear nerve (auditory vestibular nerve), known as the eighth cranial nerve, transmits sound and equilibrium (balance) information from the inner ear to the brain. Auditory sensitivities can manifest as hyper or hypo sensitive reactions to sound in general or specific sounds. Many people who are sensitive to specific sounds make their own white noises to mask the bothersome sounds. This may be humming screeching or clamping their jaws tight to reduce the perceived volume of incoming sounds. There are gestational factors such as maternal nutritional health have been linked to effects on the development of hearing. Ear infection, sinus infections and other abnormalities of the mucous membranes and bony structures of the head and face can also impact hearing. As we age the fluid in our inner ear increase in viscosity changing our hearing.

The ability to interpret sound is dependent on accurate sequential reception of sound waves in the inner ear. Transmission of sound to areas of the brain are sorted and processed to form tunes, words, meaningful environmental sounds or meaningless sounds.

Some issues that reflect irregularities in audition include: delayed language development (receptive and expressive), dislike of crowded noisy environments, placing hands over ears,

difficulty falling asleep or staying asleep if there's any noise, asking for repetition of words and conversations, misconstruing words, having difficulty modulating speaking voice, delayed and laborious decoding in reading, lack of appreciation of music, avoidance of chewing.

Hearing can be protected by using ear muffs or ear plugs in noisy environments such as concerts, and crowded events.

Ocular motility- Ocular motility is also referred to as visual tracking, and is the ability of the eyes to move smoothly through all the planes of the visual field without blurring or losing an image. Disability is dependent on the muscles and the cranial nerves that service the eyes as well as the vestibular system which provides information and regulation of body in space. A common test to determine if someone has a compromised vestibular system is to spin the person on a rotary board, observe the degree of random and rapid eye wandering, and measure the amount of time it takes for the eyes to resume to normal ocular motility.

The following issues may occur in a person experiencing difficulties with ocular motility: inability to hold head still while tracking, dizziness and or nausea, eye pain, watering or discomfort, reporting that objects blur or are lost in the field of vision, rubbing eyes after use, frequent headaches or stomach aches after visual work, eyes move with a jerky or bouncy motion, eyes stop tracking an object that continues to move, overflow movements to other parts of the face or body when attempting to follow an object with eyes, inability to read aloud but able to grasp meaning from silent reading. Exercises that aim to strengthen ocular motility include silly straws, blowing exercises, hand clapping games, eye exercises and cranio-sacral-facial therapies.

Binocular Functions- Binocular functions refer to the ability of the eyes to coordinate their activities so that we can merge the visual fields of both eyes into one distinct image. The most

commonly observed aspects of binocular function are convergence- the ability of the two eyes to team and focus on a central object, and accommodation- the ability of the eyes to shift their focus from near point to a farpoint or vice versa. A single eye can have normal acuity, but the eyes must team together for optimal visual functioning.

Some common problems of binocular function include weak convergence, lazy or wandering eye over-convergence, and light sensitivity. Binocular functions rely on various parts of the eye, the brain, and the central nervous system to receive the and organized stimulation properly and to activate various muscles of the eye to accommodate the continually shifting visual demands.

A number of activities that are part of the normal natural development promote the development of bile ocular functioning. The sucking reflex is one of the most influential of these kinesthetic memory and muscle tone. Crawling is also involved in differentiation and interhemispheric integration which are both instrumental in the development of binocular function.

The following are issues that may occur in a person experiencing difficulty with binocular functions: Difficulty going down stairs, poor eye-hand coordination, pain watering discomfort when required to perform visual work, inability to read without losing place, rubbing eyes after use, frequent headaches or stomach aches after visual work, difficulty copying from the board, light sensitivity, poor three-dimensional perception, difficulty sustaining eye contact, an unusual tip of the head while writing. Exercises that aim to strengthen binocular functions are also silly straws, blowing exercises, hand clapping games, eye exercises and cranio-sacral-facial therapies.

Differentiation- Differentiation refers to the response and integration of reflexes. It is the ability to direct specific parts of the body to move according to plan while all other parts remain still. Think of patting the head while rubbing the belly here. It is the precursor to the development of lateralization and helps the brain establish specialized centers. Individuals with immature differentiation may demonstrate a weakness in kinesthetic memory since the overflow movement takes the brain's focus and processing away from the intended movement. Imagine the child who is using scissors and also displaying overflow movement of their tongue. Individuals with immature differentiation of response coupled with irregular tactile perception may not realize that they are kicking, knocking over or in other ways disturbing people or objects in their environment. They deny responsibility for these actions and may be viewed as liars. It is usually evident that there was no malice in their actions. However after prolonged periods of receiving blame and punishment for these problems an individual may begin to exhibit the behaviors that his or her peers begin to expect. Irregularities in differentiation can cause poor academic learning, and also serious social problems. The following are issues that may occur in difficulties with differentiation: Overflow movement to the head or jaw when eyes are tracking, overflow movement to the opposite hand when other hand is engaged, overflow movement to the legs when other limb engaged, ticks that involve more than just the eyes including Tourette Syndrome, inability to isolate each finger for fine motor coordination, overflow movement to the tongue and or mouth when concentrating, knocking things over at the table, startled reactions, and difficulty turning off obsessive compulsive thoughts and actions. Exercises for differentiation include bead transfer and hula hoop mazes or rope turning sequences.

Lateralization- Lateralization refers to development of lateral dominance (right or left eye ear hand leg etc.) Lateralization represents the development of specialized pathway centers and associated functions in the left and right cerebral

hemispheres. The right side of the body sends messages to and is controlled by the left side of the brain and the left side of the body by the right side of the brain. The ability to cross one's midline is also a necessary component for mature lateralization. Most people develop unilateral cerebral dominance. Their dominant eye, ear, hand, and leg are all on the same side of the body.

About 20% of the population has mixed dominance or other irregular dominance. Alternating reliance on one side or the other without awareness of doing so causes instability in perception and performance. Immaturities and irregularities in lateralization can cause perceptual, organizational and performance problems in all areas of life.

The following are issues that may occur in a person experiencing irregularities of lateralization: Delayed decision of lateral dominance, tendency to scatter or misplace objects, rotation of writing or reading service, difficulty perceiving left and right sides of objects and letters, uncertainty about personal left and right sides, tendency to move towards the non-dominant hand in motor activities, need to rotate surfaces to complete motor activities that cross the midline, difficulty making decisions, difficulty accepting a change in a rule or decision when it once it is made, excellent batting in baseball but difficulty with many other sports. Exercises that increase lateralization include functional exercises that cross the midline, and balance left and right sides of the body.

Interhemispheric Integration- Interhemispheric integration is the communication between the left and right sides of the brain across the corpus callosum. To function efficiently we need to organize information from various centers of the brain and plan responses. Efficient binocular functions require interhemispheric integration of the two sides of the brain. Individuals with a lack of synchrony between the two sides or a weakened side of body or brain have great difficulty understanding and following through on events and their daily life. Most obvious in individuals who have had a stroke or

closed head injury. Persons who lack unilateral dominance require efficient hemispheric integration to integrate information from two competing or differing perceptual and operational modes. Sucking and crawling are two activities of infancy that assist in the development of interhemispheric integration.

The following are issues that may occur in a person experiencing difficulties with interhemispheric integration: Delayed language acquisition, difficulty comprehending directions, significant difficulty with reading, problems of word-finding, aphasic like quality to speech, preservative uncontrollable repetitive behaviors, difficulty finding the balance between right and left brain modalities, lack of crawling in infancy, weekend or limited sucking in infancy, delayed accomplishment of tying shoelaces, immature dressing skills, great difficulty learning to swim or to pedal a bicycle, difficulty with organizational skills, and diminished concept of consequences. The exercises that enhance interhemispheric education include the mimicry of crawling the pole cross step and arm ball roll.

Vestibular functioning: The guy on the bike.

The vestibular system includes the parts of the inner ear and brain that help control balance and eye movements. If the system is damaged by disease, aging, or injury, vestibular disorders can result, and are often associated with one or more of these symptoms, among others:

The type and severity of vestibular disorder symptoms can vary considerably, and be frightening and difficult to describe. People affected by vestibular disorders may be perceived as inattentive, lazy, overly anxious, or seeking attention. Functioning at work or school, performing routine daily tasks, or just getting out of bed in the morning may be difficult.

Disorders of the vestibular system can manifest as symptoms in all of the other neurosensory systems. Including difficulties with

vertigo and dizziness, balance and spatial organization, vision, hearing, and cognitive functions. Not all symptoms will be experienced by every person, and other symptoms are possible.

An inner ear disorder may be present even when there are no obvious or severe symptoms. It is important to note that most of these individual symptoms can also be caused by other unrelated conditions and should be discussed with a health professional.

How the neuro sensory system and functions interact.

1.Attentional Priorities:

Olfaction, gustation, vestibular functioning, muscle tone, tactile sensations, proprioception/kinesthesia

2.Differentiation:

Vision, ocular motility, oral motor control, audition

3.Lateralization:

Binocularity, auditory/linguistic integration (verbal processing) auditory sequencing

4. Interhemispheric Integrations:

Math, reading, visual perceptual constancy, visual motor integration, written and expressive language, visual/spatial integration, receptive language, auditory/visual integration, oral expressive language, non-verbal processing.

What can parents or students do?

Involve students in basic movement or exercise opportunities. Re-patterning programs with bodyworkers involving combinations of functional exercises and therapeutic touch modalities.

HANDLE Assessment. <http://www.handle.org>

Understanding signs of stress and looking at behavior through the lens of sensory development.

EXECUTIVE FUNCTIONING SUMMIT PARENT RESOURCE

Understanding Polyvagal concepts and applications towards students. A good source is Justin Sineri's Polyvagal Podcast.