

Connections

Understanding Your Child's Sensory Needs

Antonia Llull, MOT, OTR/L
And
Susan Kerton, OTR/L

Pediatric Occupational Therapists
Sensory Integration Specialists

Excerpt from Connections: Understanding Your Child's Sensory Needs

Welcome

The intent of this booklet is to enable you, the primary caregiver of a child with sensory-integration difficulties, to understand:

1. what your child is experiencing
2. how and why certain activities work
3. how to interact with your child in a way that increases successful sensory experiences

We wish to provide you with the means to support what your child does in therapy, at home. It is much like fostering your child's education by doing homework with him/her. **Many of the activities we recommend will foster the spirit of play and provide opportunities for success and laughter.**

Discussion of each sensory system, its impact on human development, and the home program is based on our clinical experience using the theories and treatment approaches of A. Jean Ayres, PhD, OTR; Patricia Wilbarger, MEd, OTR, FAOTA and Julia Wilbarger, MS, OTR; Patricia Oetter, Sheila Frick, and Eileen Richter

In this guide, we use the term **INPUT** for all information received by the body, through the sensory system.

What we can do as a team!

- Promote inclusion of a variety of activities/stimuli in your child's daily routine.
- Become aware of your child's reactions to specific activities -- what soothes, engages, and/or stresses.
- Acknowledge your child's abilities and foster self-esteem by modifying activities to achieve success.
- Nurture the vitality play brings to your child's life. "Play" is your child's work. Children learn about their bodies, the environment, and social interaction while playing.

Modulation (ability to integrate all sensory information – Sensory Processing)

Definition: (from **Sensory Integration – Theory and Practice** by Fisher, A.)

"Sensory Integration (S.I.) refers both a neurological process and a theory of the relationship between the neurological process and behavior." **Sensory Integration is now also called Sensory Processing.**

Ayres (1989) defines it as:

"Sensory integration is the neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body efficiently with the environment. The spatial and temporal aspects of inputs from different sensory modalities are interpreted, associated, and unified. Sensory integration is information processing....The brain must select, enhance, inhibit, compare, and associate the sensory information in a flexible, constantly changing pattern, in other words, the brain must integrate it".

Modulation is the ability to organize sensory input, a person receives, in a way that enables the body and mind to maintain a balanced arousal state. An optimal arousal state allows a person to be productive, attend to everyday activities, and demonstrate safe, socially acceptable behaviors. Higher-level functions, such as cognitive processing, praxis, language development, and academic skills occur in the "just right" state of arousal.

High arousal is a result of either: 1) **over-reacting** to sensory information OR 2) the body's **need** for **more information** when it **under-registers** sensory information. A high arousal state, **may look like: agitation, frustration, hyperactivity, inattention, impulsivity, and/or shutdown.** Low arousal is a result of under-registering sensory information. If the body **under-reacts** to sensory input we are in a low arousal state, **this may be interpreted as: lethargy, fatigue, boredom, inattention, and/or laziness.**

**** A child may appear in a low arousal state when they are actually in a "shutdown" state secondary to over-stimulation **** It is critical to know the difference – working with a skilled sensory integration specialist will assist you in recognizing when a child is "lethargic" from low-arousal versus over-stimulation.

Respiration is a vital part of maintaining the "just right" state of arousal required for the different activities individuals participate in throughout the day. It is a primal need to breathe with adequate inspiration and expiration. When this balance is compromised the body can go into a high or low arousal state depending on the individual's autonomic system's response.

Difficulties with modulation result when:

- Your child does not process and organize a combination of visual, auditory, olfactory, tactile, vestibular (movement system), and/or proprioceptive (signals from muscles & joints) input.
- Your child insufficiently grades his/her respiration.

Vestibular-Proprioceptive System (Movement and Position Sense)

The vestibular and proprioceptive systems work together to provide an internal sense of movement, balance and position in space. An integrated **vestibular system** is responsible for providing a child with information about his/her body's **relationship to gravity, orientation in space, and movement.** Most specifically, it informs us how our head is positioned and which direction it is moving in (simply, it tells us where we are). Furthermore, the vestibular system facilitates development of adequate muscle tone to support postural stability.

Postural tone is the muscle's readiness to respond and hold for stability throughout the body. **Poor muscle tone** impacts:

- Stability in the neck, which helps the eyes focus and visually track, without moving the head, in order to read efficiently and track moving objects in the community for safety
- Trunk posture during lying, kneeling, sitting, and standing
- The quality of respiration which impacts endurance for physical activity and modulation
- The stability of the shoulder girdle which supports mobility, precision, and dexterity in the hands during self-care, self-help, and tool use

Proprioception is the body's **position sense** -- the input received and processed by the muscles and joints informs the body of it's position without the use of vision, i.e. A person receiving adequate information knows if both arms are up and bent versus up and straight without looking into a mirror.

When a child's **vestibular-proprioceptive system** does not organize and process the information coming in (over-reacts or under-reacts), **the following behaviors may be observed:** clumsiness, awkwardness, strong avoidance of certain activities (i.e. swings or any rides that move), a need for very strong input (i.e. craving spinning, crashing, hitting, and jumping with force), carelessness, impulsivity, distractibility, and/or an activity (arousal) level that is exceptionally high or low in response to movement or activities that really make the muscles and joints work.

Fear of heights and strong resistance to having both feet off the floor and/or being in an inverted position are also indicators that input is not being effectively processed by the vestibular-proprioceptive system.

The Tactile (Touch) System

The touch system begins to function before a child is born. It is a child's first language. Touch (tactile) receptors are found throughout the skin. They register touch, pressure, vibration, temperature, and pain. A child uses touch to explore and make contact with the world around him/her. Information from the touch system is used in three ways.

- 1) **Protection:** our tactile system tells us when a situation/object is potentially harmful or painful.
- 2) **Discrimination:** our tactile system helps us to determine size, shape, texture and location of objects that come into contact with it. This is vital for the development of fine motor skills
- 3) **Recognition of Novelty:** an integrated tactile system recognizes novelty and change. When something is familiar, i.e. clothes, jewelry, the information is inhibited (after a time we no longer consciously feel the ring on our finger or the necklace around our neck). This inhibition of familiar touch information allows our tactile system to work more efficiently for protection, discrimination, and recognition of change, i.e. when the ring is removed the change is noted.

If a tactile system is not integrated, touch information is novel or unfamiliar all of the time -- so its always new, always strange. For example, a child may always want to take off their shoes and socks, have difficulty changing from shorts and t-shirts to pants and long sleeves, and need the tags cut from the back of their shirts because it continuously irritates him/her.

When your child has difficulty interpreting tactile information he/she may be tactile defensive. Tactile defensiveness is characterized by aversive reactions to various types of stimuli (touch & textures) that are not generally considered dangerous, painful, or irritating. ** A child may have maladaptive behaviors secondary to tactile-defensiveness, without showing aversion to textures -- a skilled sensory integration specialist will be able to evaluate this problem area and implement a plan of care to address the issue **

What this looks like

The tactile defensive child may be aggressive, isolative, hyperactive and/or distractible. A child may experience mild, moderate or severe tactile defensiveness.

Mild- The child may seem choosy or overly cautious. He/she may be over-reactive,

mildly hyperactive, and/or uncomfortable with change. He/she may typically avoid certain clothes or food textures. He/she may show a need for a large personal space.

Moderate- The child may experience difficulty in social situations because he/she behaves aggressively or separates him/herself from the situation. He/she may frequently move away from an approaching peer or hit if unexpectedly touched. Learning to take care of ones self is difficult -- Dressing, bathing, and eating may agitate your child. Teachers may advise you of poor attention or behavior in the classroom.

Severe - Strong avoidance AND/OR seeking of multiple forms of tactile input, negatively impacts all aspects of the child's life. They may shut-down (block out their environment), become extremely hyperactive, and/or impulsively engage in intense tactile experiences, i.e. tantruming, banging, shutdown, over attachment to soft toys, and/or repetitive rubbing or hitting.

Tactile defensiveness does not necessarily limit the academic capabilities of your child, but over-reaction to tactile input may interfere with the learning process.

Precautions

- **Pay attention to which types of fabrics, textures, toys, and/or social situations seem to cause a negative response, for example:**
 - Quick touch, light touch, tickling, and/or unexpected touch especially from behind
 - Rough or wet textures (finger paint, sand.)
 - Temperature changes
- **Believe him/her when he/she says something "hurts".**
- **Try to avoid irritating textures/tastes/tactile activities prior and during academics or other new learning challenges. Your therapist will advise you how to best introduce, new tactile experiences and decrease aversion to common tactile input.**

Information from the touch system is used with input from the vestibular-proprioceptive system to tell us where we are in space, which is essential for planning and executing effective motor actions – Somatopraxis.

Oral Defensiveness

A child may display the signs and symptoms of oral defensiveness secondary to:

- tactile defensiveness in the mouth and face
- inadequate sensory processing (awareness and discrimination of different textures) in the mouth
- inadequate coordination of the suck-swallow-breathe synchrony
- inadequate respiration

A child with oral defensiveness may avoid certain food textures or be over/under sensitive to spicy, pungent or sour foods. He/she may resist having teeth brushed or find going to the dentist an intensely unpleasant or frightening experience. Due to it's nature, oral defensiveness may be the last issue to resolve. Respiration plays an important part in oral defensiveness. When a child feels that their air way is being compromised when they already have poor respiration they will automatically protect their airway by avoiding certain types of foods that have elicited a gag or choking in the past.

Olfactory/Gustatory Defensiveness

Smell and taste are closely related. Smell is a basic, protective function because we learn to discriminate noxious odors and tastes. Information from the nose travels directly to the brainstem and can elicit an autonomic/unconscious response, i.e. if we smell smoke before we see the fire we prepare to run or sound an alarm (heart rate increases, adrenalin prepares us for fast action). Smells are very powerful because they are linked to our memories that can elicit intense feelings which directly impact our arousal levels.

A child may have difficulty processing things he/she smells or tastes. He/she may either over or under react when exposed to certain odors, **this may look like fearfulness, irritability, obliviousness to certain smells and tastes, and/or ignoring noxious odors.** When the system is not integrated, the child with difficulty discriminating what they are smelling or tasting may do things like, eat soap, sniff windex, taste hand sanitizer etc.

Visual System

The visual system provides us a significant amount of information about our environment and greatly assists our ability to move through space efficiently and safely. Much learning occurs with the visual system at the brain's cortex level. However, *our brains stem also processes an important aspect of vision* -- it constantly monitors our environment for change while we are visually paying attention to something important. For example, when we are consciously, visually attending to a person talking to us our brainstem is processing information (unconsciously) about our surrounding so we can react to a change (a wasp flies towards us, a door opens unexpectedly, a ball flies through the room). If this part of our visual system does not process and organize this type of information appropriately (what is novel, familiar, and/or relevant in the current environment) we cannot effectively pay attention to one visual cue for learning and appropriate social behavior.

When a child has difficulty modulating visual stimuli, he/she can't process and organize the visual information in a way that is meaningful to him/her. **Visual processing difficulties** occur when a child has difficulties blocking out (inhibiting) irrelevant visual information, this may look like:

- difficulty filtering out extraneous information and paying **selective** attention to one specific visual cue
- easily distracted by other visual stimuli (things moving in the environment)
- difficulty maintaining eye contact
- avoiding of visual information (covering eyes or face, isolating self in dark place)
- **visual defensiveness** (a hyper-responsiveness to any changes in a visual field -- i.e. child startles to: a door opening, a ball thrown a safe distance away and/or changes in light intensity elicits inappropriate aversion or startle)

If a child cannot visually attend to the target object, his/her ocular-motor and visual-motor development may be limited which typically results in decreased visual information processing. He/she may have difficulty successfully visually tracking and scanning. Visual tracking (ocular pursuits) is the ability to focus on a moving object and follow it with the **eyes only**. Visual scanning (ocular saccades) is critical for reading (the eyes must move from left to right across a page, one word at a time) and for safety in the community (moving vehicles etc.). Visual-motor integration is critical for writing and Visual perception is critical for interpreting visual information – same, different, orientation, and more.

The Auditory System (hearing & listening)

Humans are social beings. Communication is a vital part of our social structure. Communication has two components: 1) Speaking and 2) Listening

There is a difference between hearing and listening - listening is a skill we develop. In order to communicate effectively, we need to pay selective attention to relevant auditory information and filter out the extraneous sounds, i.e. the noises in the background while someone is talking to us.

Auditory processing difficulties occur when a child is unable to inhibit (block-out) irrelevant sounds. This may look like:

- over reaction to sounds, such as background noises and/or unexpected sounds
- easily distracted by noises
- over-stimulation in a noisy environment
- have difficulty listening /following directions sequentially
- tuning out auditory cues, i.e. "not listening"

Auditory processing difficulties impact **safety** as well as social interaction and learning. For example, hearing and listening helps us locate things, i.e. auditory information can tell you in which direction and/or approximate speed of a moving car.

Muscles tone also affects listening. In order to listen the muscles of the ear need to contract appropriately and maintain listening readiness. Over time, hypotonia (low muscle tone) may make this "enduring" activity difficult.

Auditory defensiveness may occur as a result of one or more of the following:

1. Faulty structure or response **inside** the ear
 - hypersensitivity to certain frequencies/sounds
 - inadequate response or a hyper-responsiveness to certain sounds/frequencies
2. Difficulty processing and organizing auditory information for what is relevant versus irrelevant OR what is new versus familiar, this results in
 - information perceived as new and potentially harmful
 - inability to filter out extraneous noises and pay selective attention to a specific auditory cue (sounds in the environment distract from listening to directions, conversation, and generally limits attentive behaviors.

Disruption of the auditory system **may look like irritability or fearfulness when exposed to certain noises such as unexpected sounds (banging/slamming), vacuum cleaners, alarms, lawn mowers etc.** In severe cases, the auditory system may become so overwhelmed by sound that a child with normal hearing may appear deaf. The child may also have **difficulty attending to verbal commands and following directions.** Consequently, the child may appear to ignore rules given verbally.

Praxis (Initiation, Sequencing, & Motor Planning)

Praxis is our ability to **conceive, plan, [imitate], initiate, motor plan, follow through, and end a way of "doing" a task** (specific dance steps, an obstacle course, deviating from a normal route, arts & crafts...etc.). In order to develop praxis skills it is critical to have our vestibular, proprioceptive, tactile, auditory, and visual systems working together efficiently to give us all the information about how our body functions in relation to its current environment (our environments always change and therefore our brain needs a

reliable body and motor map to adapt appropriately, otherwise we would always be in a state of "not knowing"). Praxis is an **end-product** of adequately functioning **proprioceptive, vestibular, tactile, and language systems**. Children with deficits in vestibular-proprioceptive and /or tactile processing, typically have difficulty planning, starting, and following through on unfamiliar movements in anticipation of events about to happen, i.e. when a ball is coming toward him, he must anticipate when he will make contact with it and then must move his arms & body toward that interception point prior to the ball's arrival there.

With each new experience a child gains more awareness of how his/her body moves in space and the timing of those movements. When children can't process this type of information adequately, they don't build a reliable, motor map to use when faced with **new** challenges. An explicit example of this would be to ask someone to get themselves from one store in the mall to another in as few steps as possible without telling him/her which store he/she is starting at -- however, as soon as he/she is given his/her bearings (where he/she is in space) the task becomes simple. *A child is consciously attempting a new or unfamiliar task but relies on past experience and unconscious processing of spatial awareness, body awareness, and timing of how his body actually moves in relation to the object he interacting with, i.e. climbing a new monkey bar set, negotiating his way through an unfamiliar room with obstacles and uneven surfaces. A child can not plan a new task if he has no idea how to start it as a consequence of an unreliable body and motor map in his brain.*

Patterns of Dysfunction related to Sensory Integrative (Sensory Processing) Disorder

Difficulties with Praxis (Dyspraxia):

- Somatodyspraxia: dyspraxia associated with poor tactile discrimination
- Poor praxis on verbal command
- Poor bilateral integration and sequencing

Difficulties with visual perception and visual motor integration

Poor form and space perception (visual and tactile)

Auditory-language dysfunction

Poor eye-hand coordination

Tactile defensiveness (in body and/or oral area)

Hypotonia with associated poor postural stability

Decreased coping mechanisms and frustration tolerance

Decreased social-emotional skills

Decreased speech and language skills impacting adaptive communication

Deficits in Learning

Home Program – Sensory Diet

A home program includes activities that provide your child with the sensory input he/she needs throughout the day. When provided on a routine basis, the activities facilitate improvement in organization and processing of the all sensory input. It is recommended to combine something that stimulates with something that calms in order to minimize an unwelcome increase or decrease in arousal. The balance created by combining the activities (stimulating) and organizers (calmers) supports increased skill development with your child. Your occupational therapist will provide you the recommended combination of sensory experiences, which are intended for incorporation into normal play times with your child. The activities should not be limited to the in-doors.

Please do not introduce new activities if your child is tired, upset, over-stimulated, and/or sick.

For more information, consultation, and evaluation please contact MPowerMe, LLC at mpowerme.therapies@gmail.com