

Sensory Integration

By: Nancy Lawton-Shirley
Special Children Center

Sensory Integration is a term that has evolved out of the neurosciences in the early 1900s. It is a term that describes the brain's ability to take in information from the senses, organize it, and respond to it during experiences of daily life. It is a process that helps mature the brain and mature the physical body. Through the senses, children are able to make sense out of their physical bodies and out of the physical world, which leads to adaptive responses to the environment.

The senses lay critical foundations for normal development, impacting on gross and fine motor development, speech and language production, social and emotional maturity, and behavior and learning. Challenges with sensory integration can occur in several different ways. One way is that the brain has a very high threshold of need for specific sensations, which then drives the person to seek out high intensity sensory activities in order to help make sense of the world. For example, a child with a high threshold need in the movement system may be constantly on the move, constantly wiggling, jumping, and crashing. Another potential area of challenge in sensory processing involves sensory defensiveness. Sensory defensiveness is a misinterpretation of sensation, which usually results in a very low threshold trigger (small amounts of sensation) activating protective responses of flight/fright/fight to different sensations.

Sensory Information

1. **Vestibular** (movement processing). This is a powerhouse of sensations. It provides information regarding position of the body and the head in relationship to gravity. It establishes balance and position in space, and coordinates information with the child's eyes for eye tracking and convergence. It lays down social emotional security. It provides the child with a stable base from which to develop fine and gross motor skills. It is a reference point for all other sensations. It integrates information at very primitive level in the brain. It is a system that integrates information from both sides of the body. Challenges in the movement system can be seen either in high threshold need (a child needing constant movement) or sensory defensiveness (a child very fearful of heights, movement activities, or changes in the position of the head).

2. **Proprioception** (information from muscles and joints). Proprioceptive input is a very powerful self-regulator. It helps calm and organize. It is a feedback system that helps regulate and recalibrate movement activities for better integration and responsivity. It is the system that allows one to learn by doing, every time one moves the physical body, information is activated through muscles and joints to give feedback in performance and success. Challenges in this area can result in poor body awareness, poor static balance, difficulties with motor sequencing, or difficulties self-regulating during movement.

3. **Tactile** (touch). This information is gathered through receptors on the skin. Through touch the child begins to have a sense of self and the physical boundaries of self. Touch lays down the foundation for a child's understanding of shape. It helps the child learn about the environment through physical experience with the environment. It sets the child up for bonding with parents, siblings, and peers. The touch system has the ability to wake up the physical body (i.e. light touch), or to self-regulate and calm (i.e. pressure touch). Challenges in this system can present with poor ability to learn through touch. Children who have difficulties in this area typically will be insatiable with touch, needing to touch everything more in order to learn and explore. These children will also classically lack social boundaries of personal space. Hypersensitivity to touch will result in flight/fright/fight reactions to unexpected or light touch.

4. **Taste**. Taste perception helps the child discriminate food flavors. Input to taste neurologically sets the child up for attending and focus. Challenges in this area can present with poor perception of taste or a need for high intensity of sour or spice. Hypersensitivity may result in poor or picky eating or gag response to foods.

5. **Olfactory** (smell). Smell neurologically taps into very primitive parts of the brain that activate strong memory and emotions. Neurologically it is the quickest to impact on the nervous system. It has the ability to calm or excite. Challenges can be seen in hyper response, i.e. non-noxious smells are interpreted as noxious or hypo responsive in which the child does not appear to notice smells within the environment.

6. **Vision**. The visual system is very reliant on other sensory foundations. Vision is paired with movement to give the understanding of position in space. Vision is paired with touch to give the understanding of form perception. Visual processing is different than eyesight. Eyesight is determined by the ability to perceive a stimulus at specific distances from the eye. Visual processing is the ability to understand visual information. Hypersensitivity can result in sensitivity to light or visual distractibility. Inaccurate processing will result in difficulties understanding visual information. Many times, challenges in other sensory systems will impact on the visual information and understanding (i.e. poor movement processing can result in reversals, etc.).

7. **Auditory**. Auditory information gives us the ability to perceive sounds and localize sounds within the environment. It lays down the foundations for language development. It connects up with parts of the brain responsible for attending and focus. Hypersensitivity in this system can result in flight/fright/fight reactions to loud or unexpected noises. Sometimes children will be hyper acute and hear small sounds at great distances that most people do not hear. If there is an auditory processing issue, the child may have difficulties in discriminating sounds, filtering sounds within the environment, or understanding the meaning of sound.

Sensory Integration Treatment

Through evaluation, a child's strengths and vulnerabilities in the different sensory systems can be identified. An understanding can also be gained about how different challenges in the child's development of sensory processing may be impacting on function in areas such as bilateral motor coordination or ability to organize and sequence movements through time and space (praxis), social and emotional responses, and for independence in activities of daily living. Every child's clinical picture will vary. A child may have either sensory defensiveness or high threshold or both. An individualized treatment plan is set up for each child.

Play is a child's work. It is through play that children can be engaged to interact with their environments, be motivated to challenge themselves, and participate in activities that will help them to perceive and respond to their environment. When children are motivated and engaged, the brain chemistry is set up for learning.

At Special Children Center, many different techniques will be integrated together as we approach your child's strengths and vulnerabilities. You will see the environment set up to be inviting. There will be a wide variety of potentially challenging activities that a child will be engaged in to help target facilitation of higher skill development. Since treatment is play-based, it may look like your child is simply playing. However, the process is very complex and interactive, with the therapist identifying specific sensory needs and strengths. The therapist is constantly adapting activities, presenting new challenges for the child, and integrating these activities with the child's interests and self drives in mind. Through this process the child is then set up for potential self-regulation, postural control, praxis and sequencing, eye/hand control, fine motor skill development, social and emotional development, and learning. The use of any one modality is very specific, and is paired with your child's need, and what a given activity can provide for your child. Some examples of how specific play equipment can be used to facilitate a child's functioning are as follows:

- **Trampoline.** The trampoline is a powerful tool that is an excellent resource in clinic and home programs. Jumping on the trampoline activated information to the joints and the movement system. It also provides heavy work input to the physical body, activating cardiovascular conditioning, and facilitating self-regulation (calmer state). The trampoline can also be used for increasing self-awareness and motor sequencing, weight-shifting and balance, abdominal activation, and bilaterality, depending on the activity that the child is engaged in while on the trampoline. For home programs, mini-tramps are not recommended because they interfere with core stability.

- **Swings.** There are many different types of swings that are available at Special Children Center. Each swing has unique properties. Some swings will specifically work on core muscle groups for strengthening and core stability. Other swings are ideal for changing the plane of the child's head for increased intensity of movement stimulation. Other swings will have a higher intensity of input to joints along with the movement activity, which can have potential for strengthening, increasing modulation or self-

regulation, or increasing bilateral input to lower and upper extremities. Various eye/hand coordination activities can be used in combination with any of a variety of swings to help facilitate that area of development.

- **Climbing Wall.** Climbing walls are an excellent way to provide heavy work to upper and lower extremity muscles. Because it involves many muscles of the body, it helps facilitate self-regulation. Climbing wall activity helps facilitate body organization and sequencing if the child has to plan how to motor in a specific direction for a specific goal. In addition, activities can be integrated into the climbing wall for visual orientation in space, organization, and sequencing. Elongation and strengthening of trunk, upper extremity and lower extremity musculature occurs naturally with this activity.

- **Hydrotherapy.** Water is well known as a therapeutic modality, and provides resistance to all movements a child makes in the water. It also provides pressure touch. The lower the child dives underwater, the more pressure touch is presented to the physical body. Jets in the hydro spa increase the intensity of pressure touch and the resistance to the child's movements. Water properties are calming and organizing, providing pressure touch and proprioceptive input to the body for self regulation and body awareness. Activities in the water will help strengthen the body. It is easy to facilitate bilateral motor coordination, eye/hand coordination, respiration, and praxis. Since the pool is a highly motivating area for most children, it becomes an optimal place to work on many different aspects of a child's development. It is sometimes easier to get the child's head out of vertical and to stimulate the movement system in the water. Working on balance displacement in the water is ideal, as the buoyancy of the water supports the body, allowing for success even with slower balance responses. The warm temperature, when combined with specific techniques, can improve range of motion and relax tight muscles.

If you have any questions about activities here at Special Children Center, please ask!