

## WHAT IS SENSORY INTEGRATION?

Sensory integration is the ability to take in information from our senses and effectively utilize it to respond to the demands of our environment. All day, every day, we are continuously receiving information from our senses--touch, hearing, sight, taste, smell, body position, and movement and balance. Our brains must organize this information so that we can successfully function in all aspects of daily life - at home, at school, at play, at work, and during social interactions. If the brain does a poor job of integrating sensations, it can interfere with many things in life.

### THE SENSES:

**The Tactile System** (touch) provides information about the shape, size, and texture of objects. This information helps us to understand our surroundings, manipulate objects, and use tools proficiently. When you put your hand in your pocket and select a quarter from an assortment of change, you are using tactile discrimination. Dysfunctions in the discriminative system *may* result in:

- Difficulty with fine motor skills for feeding, dressing, and writing
- Problems articulating sounds due to inadequate information from touch receptors in and around the face and mouth
- Difficulty in accuracy with visual perception and basic concepts
- Impaired awareness of body scheme

**The Auditory System** (hearing) helps us to identify the quality and directionality of sound. Our auditory sense tells us to turn our heads and look when we hear cars approaching. It also helps us to understand and produce speech.

**The Visual System** (sight) interprets what we see. It is critical to recognizing shapes, colors, letters, words, and numbers. It is also important in reading body language and other non-verbal cues during social interactions. Vision guides our movements, and we continually monitor our actions with our eyes in order to move safely and effectively.

**The Gustatory (taste) and Olfactory (smell) Systems** are closely linked. They allow us to enjoy tastes and smells of foods and cause us to react negatively to unpleasant or dangerous sensations.

**The Proprioception (Body Awareness) System** is our unconscious awareness to our muscles and joints that constantly sends information to our brain to tell us our body position and posture. It also tells us how much force is needed for a particular task, such as picking up a heavy object, throwing a ball, or using a tool correctly. Dysfunction in proprioception *can* result in:

- Slower body movements
- More clumsy movements
- Movements involve more effort

- Difficulty grading muscle force – exertion is either too much or not enough when manipulating objects.
- Difficulty feeling the weight of objects
- Difficulty planning body movements when performing gross or fine motor activities (getting on or off a riding toy, buttoning clothes, etc.)

**The Vestibular System (Movement and Balance)** is located in the inner ear and is the foundation for the development of balance reactions. It provides information about the position and movement of the head in relation to gravity and, therefore, about the speed and direction of movement. The vestibular system is also closely related to postural control. For example, when the brain receives a signal that the body is falling to the side, it, in turn, sends signals that activate muscle groups to maintain balance. The vestibular system influences the eye and neck muscles in many ways including:

- The ability to follow objects
- The ability to move eyes from one spot to another or maintain a stable visual field
- The ability to interpret – is it an object, our whole head, or our whole body that is moving? Is our head moving or tilted?

The vestibular system also influences the muscles of the body:

- Helps to generate muscle tone
- Helps to move smoothly, accurately, and with proper timing

The vestibular system affects our postural and equilibrium responses:

- Helps with balance
- Facilitates spontaneous body adjustments
- Facilitates co-contraction of muscles
- Helps to elicit protective extension

The vestibular system also influences other areas:

- Reticular Interactions – responsible for the arousal of the nervous system (calming vs. arousal effects) and keeping levels of arousal balanced.
- Relation to Space - Perception of space, position and orientation within that space, personal space, etc.
- Auditory Processes - helps the brain process what is being heard: vestibular disorders slow down speech development.
- Emotional Development/Behavior – for emotions to be balanced the limbic system (generates emotional based behavior) must receive well modulated input from the vestibular system.

## **COMPONENTS OF SENSORY PROCESSING**

**Sensory modulation** is the ability to take in sensory information, decide what is relevant, and make an appropriate behavioral response. Difficulties in this area can result in

avoidance or fear of normal sensations or unusual sensory-seeking behaviors. Sensory modulation problems can impact behavior and emotional development.

**Sensory discrimination** allows us to learn about the specific qualities of sensory information such as size, shape and texture, direction of a noise, and body position and movement in space. Sensory discrimination difficulties most always result in motor related difficulties such as lack of coordination or delayed motor skill development.

**Praxis or motor planning** is the ability to plan and sequence the steps of a new or non-habitual task and is dependent on effective sensory discrimination. Children with dyspraxia have difficulty executing motor tasks, developing organizational skills, and interacting with objects in a playful and imaginative way.