

# Sensory Integration

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Our bodies are intended to function as "well-oiled machines," which receive input from the senses, and organize and process that information to be able to use it appropriately, or to act on it. Our senses include hearing, seeing, touching, tasting, and feeling, as well as the processes of movement and gravity. When these systems are all working properly, and the brain is able to correctly interpret the information they send, we refer to this process as sensory integration; the senses are working together! However, when there are imperfections in this system, we call that "sensory integration dysfunction." Although there are many variations in the ways that sensory integration dysfunction (or sensory processing difficulties) can present itself, there are two main underlying problems. The first is when a person receives too much sensory input; in effect, their brain is overloaded. The second is when a person does not receive enough sensory input, resulting in a "craving" of sensory information. The following section will discuss how each of the senses affects behaviors, as well as potential problems which arise when sensory integration dysfunction is present.

**Hearing.** We use our ears to hear voices, music, alarms and sirens, as well as "noise" around us generated by electronic equipment, nature, etc. When our brains are able to properly receive and organize the data they receive through our ears, we are able to sense danger, process information and instructions, and feel pleasure through music or sounds of nature. A person whose senses are well-integrated can sit in the middle of a noisy party with music, talking, glasses and silverware clinking, and dogs barking, and still be able to carry on a conversation with the person sitting across the table. This person's brain simply filters out the unnecessary information, and focuses on the words the individual speaker is saying.

In contrast, a person with sensory integration dysfunction may hear all of the above sounds at the same level, in effect being bombarded by each of the sounds. This person will be unlikely to follow the conversation directed at them by the person across the table. Imagine a similar child in a classroom, surrounded by pencils being sharpened, children talking, music playing, feet shuffling, and chairs being scraped across the tile floor. This child may not be able to complete the math or reading assignments correctly with all of the other stimuli overloading his brain. In fact, this child may even exhibit behavioral problems resulting from his frustration and inability to screen out unnecessary sensory input. The teacher may notice the child "clowning around," staring into space, or flapping his hands. This child may become terrified of the fire alarm, perceiving that sound as painful. Another child may struggle when the room is quiet, because that child is not receiving enough input through his hearing. This child may begin tapping his pencil, humming, kicking his desk, or otherwise producing his own noise. All children are different in their needs, but the teacher

should be sensitive to the child with sensory integration dysfunction, taking time to determine whether that child needs a quiet area to study, a set of headphones to block out extra sounds, or perhaps a stereo headset to provide quiet music.

**Seeing.** Our eyes provide us with input regarding such things as color, light, movement, locations, body language, and facial expressions. This information, when properly received and analyzed by our brains, allows us to find our way around, read, interpret body language and facial expressions, anticipate movement, and sense danger. A child who is under-reactive to sight stimuli might flick her fingers in front of her face, or hold a book close to her eyes. On the other hand, a child who is overly-sensitive or overly-reactive to visual input might be frightened in a crowded mall, or become either withdrawn or hyperactive in a room with bright lights and an abundance of color or movement. People with sensory integration dysfunction may not respond appropriately to others' facial expressions, due to their inability to properly organize visual input. A large classroom which is visually stimulating, with colored posters, stacks of books, bright lights and windows, rows of desks, and many children, can be very distracting to the person with sensory integration disorder, and may require that special accommodations be made for that person.

**Smelling.** We are often surrounded by fragrant scents from perfume and flowers, and delicious smells of popcorn and freshly-baked bread or cookies. Other smells we encounter in our environment include cleaning agents, newly mowed grass, car exhaust, and smoke. Our sense of smell can bring us pleasure, enhance our ability to taste our food, and warn us of danger. However, as with the other senses, the sense of smell can cause frustration for a person whose brain is not able to properly analyze, screen out, or respond to the information it receives. Some people are overly sensitive to smells, and a whiff of perfume or cleansers can be very distressing to them. Other people are under-reactive to smells, and may hold things close to their nose to be able to smell them better. Whether they are overly- or under-reactive to smells, students who are keenly aware of the smells around them in the classroom may be unable to concentrate on the work they should be doing.

**Taste.** Taste often brings us pleasure. We tend to eat the things that taste good! But taste can also warn us of danger. We know that milk may be sour or food may be spoiled based on the way they taste. But a person with sensory integration dysfunction may be either a very picky eater, avoiding certain (or many) tastes and textures, or may be an indiscriminate eater, eating almost anything! Taste is an area which will likely cause more distress and grief for the parents of children with sensory problems, than for teachers and peers.

**Touch.** We only have two eyes, two ears, and one nose, but our bodies are covered with very sensitive touch receptors. Through them we get information about hot and cold, hard and soft, smooth and rough, and pain and pleasure. When a person's brain is receiving and analyzing this information from the **tactile**

**system** correctly, he will quickly remove his hand from a hot stove, put mittens on when going out into the snow, and smile when receiving a caress from a loved one. However, a person who has sensory integration dysfunction may react violently to a warm surface or a gentle pat on the back. He may not remember to wear mittens even on an extremely cold day, or he may always wear long sleeves, even when it's warm, because he dislikes having his skin exposed. If he is under-reactive to touch, he may receive a serious wound, acting as though it is merely a scratch. He may hate to get his hands dirty and to touch unfamiliar objects, or may have an intense need to touch anything and everything.

A child with sensory integration dysfunction is going to present unique challenges to the science teacher leading a lab dissecting frogs. This child is either going to resent having to be involved in such a messy endeavor, or is going to be attacking the frog to find and to handle every slimy bit of the innards. Similar problems may arise in art class and in the cafeteria. This child may have difficulty standing in line, because either he will be touching everyone, or he will be complaining that everyone is touching him. Often he may perceive a light touch from a classmate as a hit, and he may strike out at the other child. Parents may have difficulty choosing a wardrobe for this child, because there are certain fabrics or articles of clothing that he refuses to wear, or the tags in the back are bothersome to him.

A child with tactile defensiveness or a need to touch things, may benefit from carrying a stimulating object in his pocket. This may be a small textured ball, a key ring, or something that vibrates. When the child needs help concentrating, or needs to be able to touch something, he can reach into his pocket for that item. Many children with sensory integration dysfunction twirl their hair, rub their fingers together, or even chew their fingernails.

**Vestibular System.** Although most people are familiar with the above senses, there are actually two other systems that play a very large role in our brains' ability to receive information and to respond to it. The first is the vestibular system, which has to do with **movement and balance**. A person with sensory integration dysfunction may be hyper-responsive (over-reactive) to movement, or hypo-responsive (under-reactive) to movement. Hyper-responsiveness to movement may cause a person to experience motion sickness in the car or on an amusement park ride. This person may be afraid of heights or dislike being upside down, which is referred to as *gravitational insecurity*. This person may seem stiff, and even hold his head upright, to avoid excessive movement. (Problems with their vestibular system may have caused the strange crawl that both of my sons developed; they did not like to put their heads down, so crawled in a way that allowed them to keep their heads upright.) A child with these difficulties may struggle on the playground or in physical education classes, where they may be expected to swing, go on a merry-go-round, hang upside down, or run.

Hypo-responsiveness to movement may result in a child who is always moving: spinning, swinging, rocking, flapping her hands, and fidgeting. Many children with sensory integration dysfunction appear as though they have Attention Deficit with Hyperactivity Disorder (ADHD) simply because they rarely stop moving. These children often exhibit poor balance, and may have difficulty navigating around objects, bumping into walls and tripping over chairs. They might enjoy hanging upside down, and appear able to spin without becoming dizzy. While a child with sensitivity to movement is going to be presented with many frustrations outdoors, hyperactive children are likely to be more challenged indoors, especially during times when they are expected to be quiet, focused and attentive.

**Proprioceptive System.** The last system deals with **body position**, and is known as the proprioceptive system. This system is often referred to as "awareness of body in space." When this system functions properly, it allows us to sit down onto a chair without falling, walk up and down stairs without watching our feet, close a door with just the right amount of effort, squeeze a glue bottle just hard enough to squirt out a small dot of glue, and walk down a crowded sidewalk without bumping into anyone. Disturbances in this system can obviously lead to problems. A person who does not know how far her arm extends may end up hitting someone as she reaches for an object. This person may step on someone's foot as she walks, not realizing that a foot was in her way. She may slam doors, or close them so lightly that they do not latch. She may be clumsy, and may be unable to climb a piece of playground equipment or walk up stairs without difficulty, perhaps needing to watch her feet to see where to place them. Problems with the proprioceptive system can be the main contributor to difficulties with **motor planning**, which is the ability to figure out how to use one's body. For example, when walking under a low doorway, most people know just how far to bend down to avoid hitting their head. A person with motor planning difficulties may bend over too far, or not far enough. This person may not know how to climb up the monkey bars on the playground, or may not be able to get down once she is up there! Routine tasks such as dressing, tying shoes, eating with utensils, and writing can be challenges for people with motor planning difficulties.

Remember that not all individual preferences or behavioral problems are caused by sensory integration dysfunction. Some people prefer to work with the radio on. Some people like "dirty work" more than others. Generally, a person who has sensory processing difficulties will manifest this in several different areas. However, if you recognize your child in the preceding descriptions, do not despair! Many things can be done to enable a person's brain to properly receive and respond to sensory stimuli.

First, provide your child with an environment that is full of a variety of sensory input: colors, light and dark, sounds, music, things to climb on, different textures, and opportunities for movement and exploration, exposing all of the senses to various types of input. This varied exposure to sensory input (targeting specific

needs) is often referred to as a *sensory diet*. It is important to learn what excites your child, what calms him, and what frightens him. Allow your child to choose activities that fit his needs and interests. Providing different experiences, along with support and encouragement, will be a good foundation for helping your child with sensory problems.

Second, knowing that your child may encounter things that are disturbing or overwhelming, help her to adapt the activity, or even avoid it when necessary. If your child does not like light touch (many people with sensory integration dysfunction do not), make a point of using a firm, calming, *deep pressure* touch. If your child cannot study in an environment with a high level of noise and other stimuli, help him to find a quiet place to complete assignments and prepare for tests.

Remember that your child may not be able to process a lot of sensory input simultaneously. For example, she may not be able to talk while she is walking on a balance beam. She may not be able to look at you when you are giving her verbal instructions. Although you might encourage a child to make eye contact with people when greeting them, asking a question, or beginning or ending an interaction, he or she might not be able to look at you when you are giving instructions or discipline. Instead, when we finished, we ask the child to rephrase what was said in order to monitor his or her comprehension.

Many children benefit from Sensory Integration (SI) Therapy, either through their schools (if their sensory integration dysfunction is interfering with their ability to learn or to participate in the school environment), or through private therapy. Usually, SI therapy focuses on the tactile, vestibular, and proprioceptive systems. This therapy does not teach specific skills; rather, it provides exposure to sensory input in a controlled environment. Once children are able to tolerate and subsequently process the sensory input, they are able to catch up on skills that they may have been missing. Sensory Integration Therapy can be a wonderful way for parents to learn activities to do with their children at home! Once you learn about SI from occupational therapists, you can begin incorporating many different activities into your daily routine, including trips to the playground, "messy" play with paint, modeling clay, and sand, and a variety of exercises. Trained therapists can also provide an evaluation of a child to better determine what that child's needs are.

Some children need deep pressure in order to calm themselves and to help their brains organize and process sensory input. Children who crave deep pressure may benefit from using a weighted vest, blanket, or wrist or ankle weights. I recommend talking with an occupational therapist for specific suggestions regarding your child's needs.

There are many deep pressure activities you can do with children. Swinging in a blanket, being rolled in a blanket like a "hot dog," pulling each other across the

room in a laundry basket, and carrying heavy milk cartons are all excellent activities. The *Wilbarger Brushing Method*, developed by Patricia and Julia Wilbarger, uses a surgical scrub brush to stimulate the touch receptors, followed by deep pressure (proprioception) on the joints. A trained therapist could determine whether a child might benefit from brushing, and could instruct parents on how to use this method with their child.

Although adults are generally able to control their environment by making decisions about the sights, smells, and sounds that surround them, as well as the activities that they engage in, children rarely have the "luxury" of avoiding uncomfortable sensory stimuli in this way. In a crowded, activity-filled classroom, there is often no opportunity to escape the noise and confusion. Activities such as finger painting, sculpting with clay, or dissecting a frog are planned for the entire class to participate in, and frequently, the student's performance is rated based on the successful completion of these tasks. It is important to talk with your child and his teacher to determine what activities and situations may be presenting challenges in the classroom and in other environments, and to help to provide a solution. There is much that can be done to help a child with sensory integration dysfunction!

For more information on sensory integration disorders, I highly recommend reading the book by Carol Stock Kranowitz, called *The Out of Sync Child*.

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