

THE COMPLEXITIES OF Sensory Processing Differences

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The diagnosis of autism presents with what seems to be an ever-changing list of characteristics. However, the condition has predictably been identified through the observation of restrictive and/or repetitive behaviors, rigidity in thinking, social deficits and, more recently, with reports of sensory processing differences.

The original Sensory Processing Theory was proposed by Dr. A. Jean Ayres. It suggests that our behaviors, emotions, and functions are based on our underlying responses to sensory information within a mind-body interface with the world. Since we live in a world that constantly provides sensory stimulation through sights, sounds, tastes, smells and more, the way we process sensory input drives our neurology and speaks through our behaviors. In the simplest of terms, if we see a car coming, we move out of the way. If we smell something burning, we might pull the fire alarm or remove a burning pan from the stove. These inputs also affect our emotions. If we hear someone give us a compliment, we might feel happy. Within this complex system of input, processing and reaction, we find that our thoughts, emotions and behaviors are all driven by the input we receive from the world around us.

While we all react in similar ways to certain stimuli, we also have some significant sensory processing differences. For example, some people are picky eaters and will tend to avoid slimy and strong-tasting foods. Other people like — or even crave — extreme tastes and textures. When these sensory differences create difficulty and interfere with daily living, they are considered to be a *Sensory Processing Disorder* (SPD). Challenges associated with SPD can lead to struggles with cognitive stamina, physical and emotional regulation, and behavioral reactions. When this system isn't working efficiently, some severe behaviors can occur, including aggression, elopement, or full shutdown.

Sensory Processing Differences and Autism

Within the evidence-based literature, researchers report that approximately 85 to 90 percent of individuals on the autism spectrum have sensory processing differences. These can take the form of hypersensitivities, or heightened sensory sensitivities, as well as hyposensitivities, or tuning out.

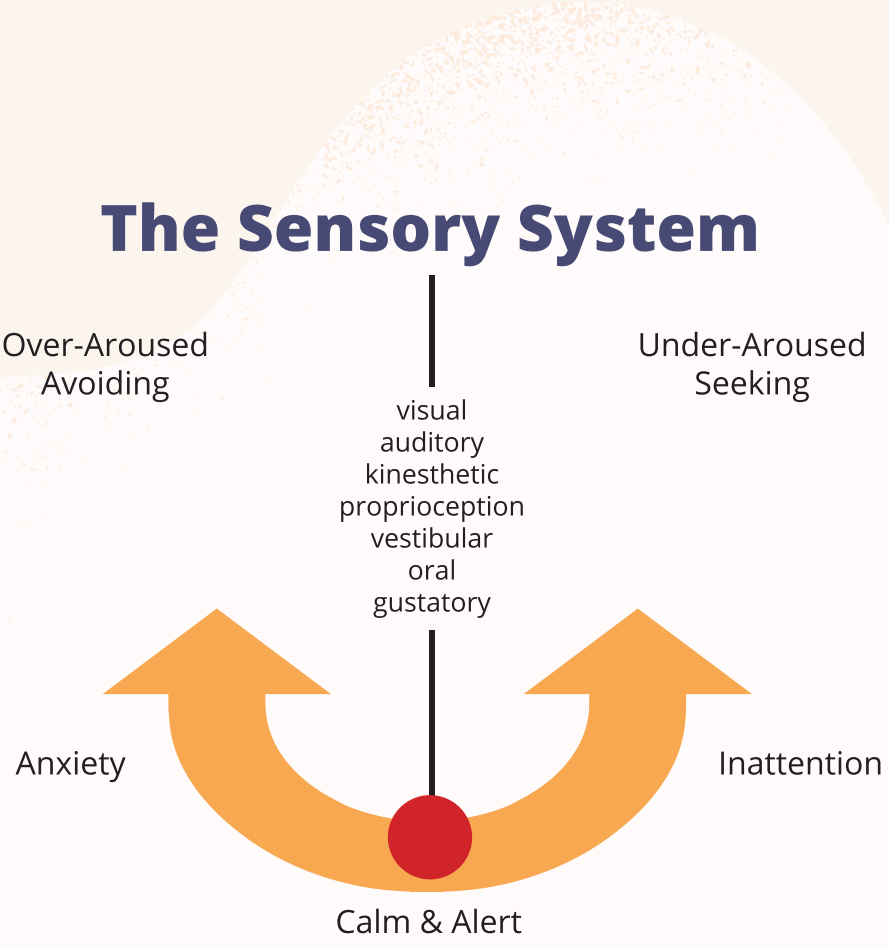
Someone who is hypersensitive finds that too much information comes in each and every day. The result is over-arousal. Individuals who are hyposensitive, on the other hand, seek and crave mental stimulation to fill the void of being tuned out to sensory input. I believe, however, that the differences we see in those with autism are even more complex than simply taking in too much input or tuning out input. After talking with hundreds of diagnosed individuals, I believe that the sensory processing and filtering system within autism is quite different than it is for those who are not on the spectrum. In autism, I've been told that autistic individuals[1] take in **all** signals simultaneously, while those who are not on the spectrum can filter, block and generalize across signals more naturally. As such, those diagnosed with autism may not filter input or prioritize those signals in the same way. For example, someone who is diagnosed with autism might find it very difficult to pay attention to the teacher if the lights are flickering. Someone without autism, on the other hand, might not even notice that the lights are flickering.

One of the best analogies I've heard for these differences is to imagine the difference between driving on a two-lane highway and driving on a seven-lane super freeway. Even though there are other lanes that exit and enter, you can comfortably drive between lanes when there are just two lanes. Individuals on the autism spectrum have a filtering mechanism that works differently, so life is like continuously driving on a seven-lane freeway. Since more information is taken in and processed, it becomes difficult to distinguish between important and less important inputs. In addition, those on the autism spectrum only have two choices: staying on the seven-lane highway and paying attention to all of the sensory input, which leads to over-arousal and exhaustion; or getting off the highway entirely and tuning it all out. Unfortunately, they find that the seven-lane highway rarely narrows. It requires a lot of energy to drive in our seven-lane world, and many tasks become unsustainable.

The Sensory Pendulum

We all have senses that move between the states of under- and over-arousal. However, we are able to think, learn, and conserve energy best in the place between, or what I call the calm-alert state. Staying in this state requires that we have exactly the right amount of information coming in to hold our interest, but not too much to make us feel anxious or overwhelmed. I believe that this "middle state" is elusive and difficult to maintain for those on the autism spectrum.

As school children, we are taught about our five senses. These include sight, hearing, taste, smell and touch. As we all know, however, there are several other senses that also play an integral part in our sensory system and in how our bodies process input from the world. These other senses include: proprioception, or the weight and pressure of our bodies against gravity; vestibular, or the movement from our inner ear and how this affects balance and coordination; the entire upper and lower digestive system, which includes swallowing, digesting, and eliminating; the full kinesthetic system, which expands well beyond touch with our hands and includes all responses and signals from our skin; our sense of temperature and pain; and even our sexual responses.



How can we tell if an individual is over- or under-stimulated? Fortunately, the sensory system speaks through behavior. As a result, when the auditory system is **over-aroused**, individuals will **avoid** stimulation by covering their ears, listening to something predictable, or making their own noise to drown out the noise of the world around them. When the auditory system is **under-aroused**, individuals will **seek** new auditory input and crave a variety of noises. When it comes to visual stimuli, individuals might crawl under a desk or wear a hoodie to partly cover their eyes, or they might scan the room for visual stimulation. This might cause them to watch the ceiling fan, a computer screen, or a fish tank, even though doing so distracts them from listening. It is also important to note that one can be over-aroused in one sensory state, but under-aroused in another. Each sensory system operates within its own differences and preferences.

To further complicate matters, each sensory state changes with fatigue. An individual that exhibits seeking behaviors when rested can quickly shut down and swing into the avoidance stage when tired or overwhelmed. Thus, we must think about each sensory state as being on a pendulum that constantly shifts from a state of under-arousal, to calm-alert, to over-arousal. This should then cause us to consider how these states relate to the behaviors of anxiety and inattention.



Pay Attention to Behavior

How can we assist and support individuals with significant sensory processing differences such as those we see on the autism spectrum? First, we must recognize that there is no normal. Each individual, irrespective of any diagnosis, has sensory differences that are as unique as a fingerprint. Next, we need to remember that not all behavior is driven by choice or control. Much of the behavior we see in autism stems from sensory differences. Also, since we can't see inside the bodies of those with sensory differences, we must listen to what they are telling us and observe their behaviors. More specifically, if someone is seeking or avoiding based on sensory differences, we will see the behaviors if we watch closely enough.

We address sensory differences best when we pay careful attention to each sense and to the behaviors that are being elicited. We can then provide the necessary stimulation to fulfil the need so that the individual can return to the center, or calm-alert state, of the pendulum. This is often referred to as a sensory diet. It is important to reach the center as it is the only state where new learning can occur with efficiency. The following chart outlines possible behaviors to observe when creating a sensory diet.

	Under-arousal (Seeking)	Over-arousal (Avoiding)
Auditory	Makes noise, hums, chatters Moves into noise or turns up the volume	Covers ears, or shuts down in noise Avoids loud places
Visual	Scans the room Notices details	Pulls hoodie or hair over eyes Likes to work in enclosed spaces
Taste	Likes strong tastes, such as sour tastes, vinegars, spicy foods, mixed foods	Won't mix foods Picky eater Shallow gag reflex
Smell	Sniffs or smells things Likes strong smells	Complains of headache with smells
Kinesthetic and Touch	Always touching things Loves to get dirty and play with gooey things Likes to be barefoot	Can't stand to be messy Always has clean hands and face Bothered by textures and fabrics of clothes
Vestibular	Loves to spin	Easily carsick Shuts down with motion
Proprioceptive	Aggressive, such as pinching, pushing, biting Loves to jump	Falls out of chair Seems to flop when tired Poor physical stamina

Sensory Processing – Energy

Many tasks become more difficult for autistic individuals because they spend so much energy managing their differences in sensory input. We each have a limited amount of energy to process the information we receive. One of the biggest consumers of our cognitive energy is processing sensory information; the second biggest is processing within the social arena. The reason that many people with autism seem so burned out is because they require extra cognitive energy to manage the "seven lanes" of sensory input that arrive continuously during every waking hour. Ideally, we would all remain in the calm and alert phase of the pendulum, which is the most efficient use of our cognitive energy. This state is also ideal because extra energy is not required either to seek extra sensory input or to control the environment because things are too overwhelming. For some individuals, staying in the middle isn't easy, and fatigue moves them away from the middle.

When individuals have low cognitive energy, they become increasingly sensory sensitive or start shutting down completely. In a state of mental exhaustion, a child can be pushed past the limit and into a full neuro-crash shutdown by a single loud noise or one uncomfortable piece of clothing. When the sensory basis for these behaviors is understood, they should not be interpreted within the lens of behavior and consequence but as representing a state of seeking or of being overwhelmed. They are a sign to others that the individual needs more stimulation or has reached the limit and can no longer process any more information. In shutdown moments, it can be helpful to talk slowly or patiently. No matter how you speak with your child, however, the well is still dry. There is no cognitive energy left.

When children reach this state, their bodies are biologically sent into a fight-or-flight response by the sympathetic nervous system, or into a freeze response by the parasympathetic system. In these states, some will want to fight and may become aggressive, or some will want to flee, and could elope or hide. For those in which the parasympathetic system is dominant, freezing or shutting down is the result.

How to Help

There are some aspects of the sensory processing system that can be confusing and complex. In my experience, the best way to address sensory differences is to follow the steps outlined below in sequential order.

Determine if your child has auditory processing differences, particularly in the area of speech/sound discrimination. I have found this to be one of the biggest consumers of cognitive energy for those on the autism spectrum. You can then see if noise-blocking headphones or a calming music playlist are effective. Close your eyes and try to locate the sounds in the environment that could be causing the sensitivity. You can also have the individual formally assessed for an auditory processing disorder by someone who specializes in this field of work. This specialist may recommend custom ear filters or listening therapy. Some kids need loud music or must have the TV turned up to drown out unpredictable sounds in the environment.

Ascertain if the individual is a visual seeker or a visual avoider. Those who are visual seekers may benefit from calming visual stimulation, such as a lava lamp, a glow light, a slow-moving fan, or an interesting mobile. In the case of visual avoiders, allow them to wear a hat to block out some visual stimulation, or let them work behind a visual screen or in a small, enclosed workspace. For those sensitive to colors or bright lights, blue-blocking sunglasses can help.

Find out if the individual tends towards kinesthetic seeking or avoiding. Provide seekers with constant access to fidgets, textures or toys. Warm play-dough, a bag with fidgeting toys, or even a box of paper clips can give a seeker some useful tools to keep their hands busy. For kinesthetic avoiders, attention to touch, texture, and skin response is needed. Consideration should also be given to placing avoiders at the front or back of a school line so that other children don't bump into them. At home, I recommend that we always honor and respect the child's clothing choices, assuming the dress is appropriate and modest.

Determine if your child is a proprioceptive seeker or avoider. Seekers are often more aggressive children who need to jump and move, and who crave deep pressure or contact with objects. For these individuals, you can have an occupational therapist perform joint compressions, let the child jump and run, or give the child something safe to chew on. Letting the child jump on a fully enclosed trampoline can also help. Individuals who are proprioceptively sensitive might be unable to sit upright in a chair without sliding out. These individuals also often have low muscle tone and seem to flop or avoid any form of deep pressure or exercise. They may benefit from weighted lap bags, heavy stuffed animals, or being enclosed in a stretchy body sock. I've put weights into a lot of stuffed animals by sewing a bag of beans inside.

Discovering if your child avoids or seeks tastes and smells should be an easy task. When children are picky eaters and shy away from strong tastes or smells, they are likely too sensitive to strong tastes. Children who like eating crunchy or exotic foods and who sniff smelly soaps, lotions, or even bad-smelling things like the trash, are sensory seeking. Both seekers and avoiders can explore a variety of different smells through aromatherapy, with the alerting smells usually in the citrus family and the calming smells in the lavender and soft-fragrance flowers. Please note that only therapy-grade essential oils should be used as I've seen bad reactions to "scent of lavender," and with a variety of "touch-of-scent" type room deodorizers. There are some useful autism-specific cookbooks that can ensure proper nutrition for overly picky eaters.



We all have sensory preferences and differences, and the world around us isn't getting any easier for those who are over-stimulated. In addition, as we take in more and do more in an even faster paced world, we are all a little exhausted and overwhelmed with too much of the wrong kind of information and too little of the right. This is compounded by poor sleep, more difficulties than ever before with maintaining proper nutrition, and a world that is becoming more toxic in many ways. We need to understand that challenges in this area for many of our friends and family on the autism spectrum are much more than just differences or frustrations. Since such sensory needs can become literal deal-breakers when they are not addressed, it is time for them to be more fully understood. All of us should seek to respect and address these needs in school, in the workplace, and in the world.

Note

1. I use this non-person-first language intentionally.



Marlo Payne Thurman, Ph.D., completed doctoral level training in both School Psychology and Special Education. Dr. Thurman sits on numerous boards and is the President of the US Autism Association. She regularly speaks at conferences and trains teachers and mental health practitioners where several of her talks have resulted in keynote presentations. In addition to her public speaking and private practice work, Dr. Thurman is an adjunct faculty member at the University of Northern Colorado where she teaches preservice and continuing educators in the graduate school's Autism Certification Program.

Dr. Thurman has been recognized for her work by People Magazine, the Special Educator, ADDitude Magazine, the New York Times, and National Public Radio as well as numerous local venues. Most recently, Dr. Thurman completed a landmark study proposing an alternative Sensory-Cognitive Difference Theory in the field of high functioning autism, based on her extensive discussions and interactions with diagnosed adults. This research is the foundation for her newest book, *Autism is the Future*. Dr. Thurman lives in Johnstown Colorado, and in addition to having several "quirky" close friends and family members, Dr. Thurman credits her two adult children for teaching her about the value and beauty of being "different-minded."

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