



The 8 Senses: A Brief Overview

Sensory System	Function and Anatomy
Visual (Vision)	<ul style="list-style-type: none">• Visual stimuli is picked up by visual receptors in the eye• Includes visual information such as color, shape, orientation, and motion.• Helps us to determine what to pay attention to and directs actions and movements in the world.
Auditory (Hearing)	<ul style="list-style-type: none">• Receptors located in the inner ear identify loud, soft, high, near, and far noises.• Helps us process volume, tone, pitch, and rhythm of sound.
Olfactory (Smell)	<ul style="list-style-type: none">• Smell is processed through receptors in the nose and distinguishes between a range of smells.• Strong memories can be associated with smells.
Gustatory (Taste)	<ul style="list-style-type: none">• Taste is registered by receptors in the tongue and linked to olfactory senses (smell)• Linked to our ability to taste sweet, sour, bitter, salty, and spicy flavors.
Tactile (Touch)	<ul style="list-style-type: none">• Receptors exist all over our skin and send signals to the brain when something is touched and about what has been touched.• Responsible for experiences of touch, pressure, pain, vibration, temperature, and texture.
Vestibular	<ul style="list-style-type: none">• Receptors are located in the inner ear and process balance and movement related to gravity.• Helps to distinguish between speed and direction of movement and establishes our relationship with gravity.
Proprioceptive	<ul style="list-style-type: none">• Receptors are located in muscles and joints and provide information about where your body is in space.• Controls body awareness, coordination, smooth movement, and applying the correct pressure.
Interoception	<ul style="list-style-type: none">• Signals from receptors on our internal organs provide information about our body and emotional state.• Related to our urge to urinate, hunger, temperature, pain, and understanding of emotions (joy, sadness, anxiety).



Visual Processing

Under-Responsive	Over-Responsive
<ul style="list-style-type: none">• Enjoy bright, reflective, or spinning objects or lights• Can't find objects in competing backgrounds• Find it difficult to name colors, shapes, and sizes• May struggle to discriminate differences in visual elements	<ul style="list-style-type: none">• Avoid visually overwhelming environments.• Perform poorly in functional activities that depend on visual information processing• Sensitivity to bright lights and sunlight• Seem scared of moving objects• Experience headaches or nausea after continuous visual stimulation.

Is it Vision or Visual Processing?

Your OT may recommend a visit to the Optometrist to rule out any visual deficits and to evaluate if the eyes are working well together on moving and stationary objects.

Possible Signs of Visual Functioning Deficits

- Loses their place or omits words when reading or writing
- Slow, labor intensive reading speed
- Tilts or moves head while reading or writing (or covers an eye)
- Decreased endurance for reading and writing
- Complains of tired eyes, rubbing eyes, watering eyes during reading and writing tasks
- Easily distracted and poor concentration

Possible signs of Visual Processing Disorder

- Quality of written work is poor despite adequate fine motor skills
- Struggles to copy words or drawings accurately
- Avoids puzzles, mazes and other "visual perception" activities
- Letters or words are reversed or inverted when reading and/or writing (age appropriate up until approximately 6 years old)
- Does not see the difference between similar numbers or letters
- Struggles to learn letters and numbers, can't make sense of letters and numbers
- Struggles to remember sight words or to identify letters in order to blend



Auditory Processing (Hearing)

Under-Responsive	Over-Responsive
<ul style="list-style-type: none">• Failure to notice sounds• Struggle with auditory (or verbal) directions• May appear as if they are not listening (but they haven't heard the noise)• Seeking out intense auditory experiences• Uses an excessive loud voice or prefers loud volume for TV, toys, music, etc.	<ul style="list-style-type: none">• Have negative reactions to a range of auditory inputs• Be easily distracted by auditory stimuli• May become fixated on singular sounds or ambient noises (buzz of the lights, birds singing outside, someone talking in the next room)• Have a strong reaction to unexpected noises leading to behavioral overreactions (meltdowns, anxiety, avoidance)• May be loud themselves to drown out unexpected or overwhelming noises

Is auditory dysregulation/sensitivity the same as Auditory Processing Disorder?

NO! Only an Audiologist can diagnose Auditory Processing Disorder once your child is at least **SEVEN YEARS OLD**. Auditory Processing Disorder is a disruption in the way the brain interprets/understands what it is hearing, not hearing loss! Some signs and symptoms of APD are:

- Significant difficulty understanding speech, especially in the presence of background noise
- Difficulty following multi-step directions that are presented verbally, without visual cues
- Easily distracted by loud or spontaneous (sudden) sounds
- Difficulty attending to long periods of listening
- Difficulty remembering and/or effectively summarizing information presented verbally
- Difficulty reading, spelling, and/or writing when compared to their peers (performs consistently below grade level)

If you have any concerns about your child's hearing ability, you can go for a hearing test at any age to rule it out! Occupational Therapists can provide strategies, listening programs, school modifications, and environmental modifications to help support your child with Auditory Processing dysregulation.



Olfactory Processing (Smell)

Under-Responsive

- Not notice strong smells or unpleasant odors in the environment
- Not notice drastic changes in smells within their environment
- Smell objects frequently (i.e., lotions, soaps, markers, clothing, gasoline, and other strong odors).

Over-Responsive

- Have strong reactions to smells in the environment that may be unnoticed by others
- Have physical responses to smells (gagging, nausea, headaches)
- Refuse certain foods based on smells
- Be bothered by perfume, cologne, and chemicals
- Have difficulty with new places due to tolerating the smells

Olfactory processing has a strong emotional link to memories!

As each child's tolerance for olfactory input is different, it is important to discuss specific strategies to try out at home with your therapist! However, here are some general suggestions for activities to desensitize the olfactory system:

- Guess the scent: soak cotton balls with various essential oils, use scented candles, scratch and sniff stickers, foods/drinks, or flowers to conduct a "blind scent test"
- Discuss scents throughout the day; put labels to them and discuss emotions or memories tied to them
- Acknowledge hypersensitivities and emotions linked to them. For example, if your child becomes upset or angry about someone eating a type of food near them, acknowledge that as a valid emotional reaction and help identify appropriate responses, whether that is calmly leaving the room temporarily, moving away from the stimulus, or taking a moment to remind themselves that the smell will not harm them
- Work on desensitization to smells in increments. Start with small doses in brief amounts of time and always read your child's cues and respect their boundaries



Keep in mind that different smells can be calming, such as lavender, and others can also be alerting, such as peppermint, citrus, etc. Be sure to trial different scents with your child and be aware of their responses and reactions.

Gustatory Processing (Taste)

Under-Responsive	Over-Responsive
<ul style="list-style-type: none">• Enjoy spicy foods and strong flavors• Become more alert & engaged after eating a strong flavor• Seek out strong and unusual flavors• Need constant stimulation (chewing gum, snacking on crunchy foods)• Crave specific textures of food (crunchy)• Chew, suck or eat inedible objects (may enjoy the taste or texture of these items)	<ul style="list-style-type: none">• Eats a limited range of food and has difficulty trying new foods (anxiety, gagging, etc.)• Be specific about temperatures of food (may eat food only near room temperature)• Avoid social situations (family mealtimes, community gatherings, public settings) where there is a wide range of novel tastes and smells• Dislike brushing teeth (the taste of toothpaste may be strong).• Have difficulty with mixed textures

Is my child just a picky eater or is there more going on?

This is a frequent question that we hear and can help assess and address!

Occupational therapy can target feeding challenges as it pertains to gustatory dysfunction, oral motor tone, sensory sensitivities, etc. and can provide strategies to help at home. Something to discuss with therapist and SLP** Here are some ideas below:

Strategies for an over-responsive gustatory system:

- Incorporate a mellow toothpaste flavor such as strawberry or blueberry rather than mint
- Reduce stress and anxiety by keeping mealtimes calm and offering preferred safe foods along with non-preferred foods.
- Keep your eating environment calm and reduce sensory input such as bright lights, loud background noise, etc.

Strategies for an under-responsive gustatory system:

The above strategies are provided by trained therapists and should be tailored for each child's individual needs. For any clarification or specific questions and strategies for your child, please reach out to us!



- Incorporate a variety of foods with new and interesting flavors into a daily diet
- Incorporate gum chewing into a daily routine
- Have crunchy or chewy snacks available at home and during the school day

Tactile Processing (Touch)

Under-Responsive	Over-Responsive
<ul style="list-style-type: none">• May not register when they are touched• May apply increased force or touch too strongly without realizing it, resulting in hurting others or themselves• Enjoys roughhousing and play that involves deep pressure (wrestling, etc.)• Seek pressure/compression to their bodies• Not notice when skin is dirty (may be prone to messy eating, be unaware food is on face, unaware of runny nose, etc.)• Enjoys fidgeting and touching things around them including toys and peers• Likes intense temperatures – a hot bath, hot food, chewing on ice	<ul style="list-style-type: none">• Have strong aversions to touch, clothing tags, certain fabrics, button closures, clothing seams, certain textures, etc.• Not tolerate stickiness, mess, or dirt on hands• Appear to “over-react” when slightly touched or bumped into unexpectedly• Be sensitive to temperature changes (and sensitive to heat and cold)• Have difficulty with grooming (hair care, nail cutting, washing)• Experience discomfort with food, face paint, or makeup on the face

Your child’s therapist may trial a variety of strategies and therapeutic programs to regulate their tactile system during OT sessions. The goal for children who are under-responsive (seekers) is to provide tactile input in a safe way, whereas those who are over-responsive (avoiders) would benefit from desensitization to tolerate this input. Below are some simple home strategies:

Strategies for regulating an under-responsive tactile system:

- Consider having them carry a small hand fidget to provide input when needed
- Wearing compression clothing, weighted vests, or weighted lap pads/blankets
- Exploring a variety of textures and sensations (sand, rice), especially messy play!

Strategies for regulating an over-responsive system:

- Consider more sensory friendly clothing (tag-less, seamless, turning inside out)
- Consider bathing over showering to slowly desensitize the sensation of water in their hair/face
- Use a firmer touch on their bodies



- First use a utensil (tongs, spoon, paintbrush) in a sensory bin and gradually working up to touching with their fingers
- Exploring textures with less input, such as lentils or beans, before messy textures

Vestibular Processing

Under-Responsive	Over-Responsive
<ul style="list-style-type: none">• May appear clumsy or have difficulty with bilateral integration tasks (using both sides of their body)• Fidgeting, rocking, or getting up from their chair frequently when seated• Decreased safety awareness and may be more impulsive than their peers• Decreased attention when sitting and attending to a task for a longer period of time• Often seeking movement through bouncing, jumping, spinning, swinging, rocking, etc.	<ul style="list-style-type: none">• May experience motion sickness, dizziness, nausea, or vomiting during movement activities, such as car rides, playground activities, carnival rides, etc.• Postural instability and decreased body awareness• Experience anxiety during activities that involve movement through space (such as walking downstairs, swinging.)• Struggle with body control and coordination• Difficulty trusting movement to others rather than themselves, such as having a parent push them on a swing

What is vestibular input?

- Considered one of the “hidden” senses in our bodies.
- Input comes through the inner ear and is closely linked to balance and vision.
- Any activity providing a child with a sense of movement or weightless sensations, such as swinging
- Providing this movement input can help your child realize where their body is in space and can help calm them down

Below are examples of vestibular activities we have suggested for home. As each child’s system is different, please discuss these strategies with your therapist to determine duration and repetitions:

- Rock the child in your arms or on a hammock
- Swing them at the swing in the park, in your arms, or in a blanket with two people holding each end



- Spin them in your arms, in an office chair, or have them do spins while standing in the living room or swimming in the pool.
- Bounce the child on a ball or on your knees
- Have them jump, dance, and tumble on a mat or couch cushion
- Take them on a slide or build a slide with couch cushions.

Proprioceptive Processing

Under-Responsive	Over-Responsive
<ul style="list-style-type: none">• Struggle to know how much pressure to apply (may break pencils or use too much force when hugging/playing with others)• Enjoy jumping, bumping, and crashing into people and objects• Sometimes lack awareness of safety and can be prone to accidents• Prefer rough play and will frequently initiate activities like wrestling with siblings or other children• Tend to stand too close to others and touch them without permission.• Crave pressure and bear hugs	<ul style="list-style-type: none">• Avoid physical contact (hugs and other types of contact or pressure)• Avoid physical play and appears timid around others- may stand on the side during larger group activities• Refuse to play around slides, swings, and other playground equipment• Become anxious in crowded spaces or when standing close to others

What is proprioception?

- Considered one of the “hidden” senses in our bodies.
- Receptors are located in muscles and joints of the body and provide information about where your body is in space.
- This sensory system unconsciously tells us about our body parts’ position and movement at all times.
- Connected to our sense of body awareness and overall coordination (helps with fluid movement)
- Helps us to distinguish the right amount of force or pressure to apply during an activity

Here are some simple ways to provide your child with proprioceptive input at home to calm their bodies:

Positive Steps



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- Provide ample hugs, deep pressure massage, joint compressions, and physical play when desired. Talk with your therapist about weighted blankets and lap pads!
- Giving them push/pull/lift chores to do at home, such as moving objects, yard work, bringing in groceries, pushing shopping carts, assist with cooking and baking tasks, helping with laundry, etc.
- Physical activities such as animal walks, monkey bars, climbing ladders, wheelbarrow walks, obstacle courses, and playing with playdoh

Interoceptive Processing

Under-Responsive	Over-Responsive
<ul style="list-style-type: none">• Be unaware of pain and temperature signals• Fail to experience hunger and thirst signals• Be unaware of the urge to eliminate until it is urgent• Have difficulty identifying their arousal state	<ul style="list-style-type: none">• Have heightened awareness of hunger, pain, and thirst signals• Feel emotions with more intensity and for a longer duration• Continue feeling pain signals long after an injury, even if it is a minor injury

What is interoception?

- Considered the lesser known, third “hidden” senses in our bodies.
- Receptors on our internal organs are responsible for providing information on our internal body and emotional state
- Is connected to our urge to urinate, hunger and thirst cues, registering temperature changes, etc.
- Helps us process our emotions such as pain, joy, sadness, anxiety, excitement, etc.

Below are some strategies for regulating your child's interoceptive system:

- Use visual schedules, timers, etc. to create a daily routine incorporating regular breaks for eating, drinking, bathroom trips, and movement breaks.
- Increase awareness to the body through mindfulness practice, yoga, and deep breathing techniques.

The above strategies are provided by trained therapists and should be tailored for each child's individual needs. For any clarification or specific questions and strategies for your child, please reach out to us!

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- Incorporate alerting activities and heavy work proprioceptive activities into their daily routine to encourage body awareness
- Incorporate social stories and games/activities to identify emotions

As interoception is the newest sense that we are learning about, it is important to work closely with your therapist about your child's specific needs as this sense contributes strongly to self-regulation.