

# Sensory Dysfunction Explained

Presented by students of Occupational Therapy:  
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# Nice to Meet You



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# Sensory Systems

**VISUAL**



**AUDITORY**



**TASTE**



**SMELL**



**TOUCH**



**PROPRIOCEPTION**

Body  
Awareness



**VESTIBULAR**

Balance &  
movement



# Proprioception



How we sense our body's movement, direction, location, and actions.

- Body Awareness
  - How a child perceives their body parts location and where each part is in relation to each other.
    - Stepping down from a curb without looking at their feet
    - Performing simple movements with eyes closed
- Graded Control
  - The amount of force used to complete an action.
    - Pencil pressure
    - Throwing a ball
    - Squeezing a glue bottle

# Vestibular System

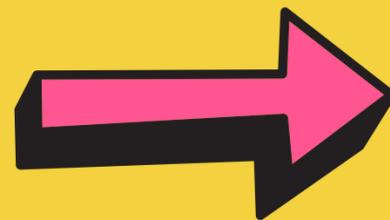
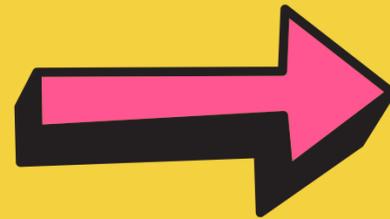


Balance and movement throughout the environment and awareness of our body's position in space.

- The body's relationship with gravity
  - Gravitational security
  - Gravitational insecurity
- Senses when the body is moving
  - Constantly moving or fearful of moving
- Assists in the development of proper coordination, posture, and balance

# Talking about Sensory Systems

## Intact Sensory Structures



## Sensory Processing Dysfunction



# Sensory Processing vs Sensory Integration

## Processing

How is the information being received?

Structures (skin, eyes, ears) receive information

Information is then sent to the brain where it is interpreted

## Integration

Brain combines different sensory input - the next step of processing

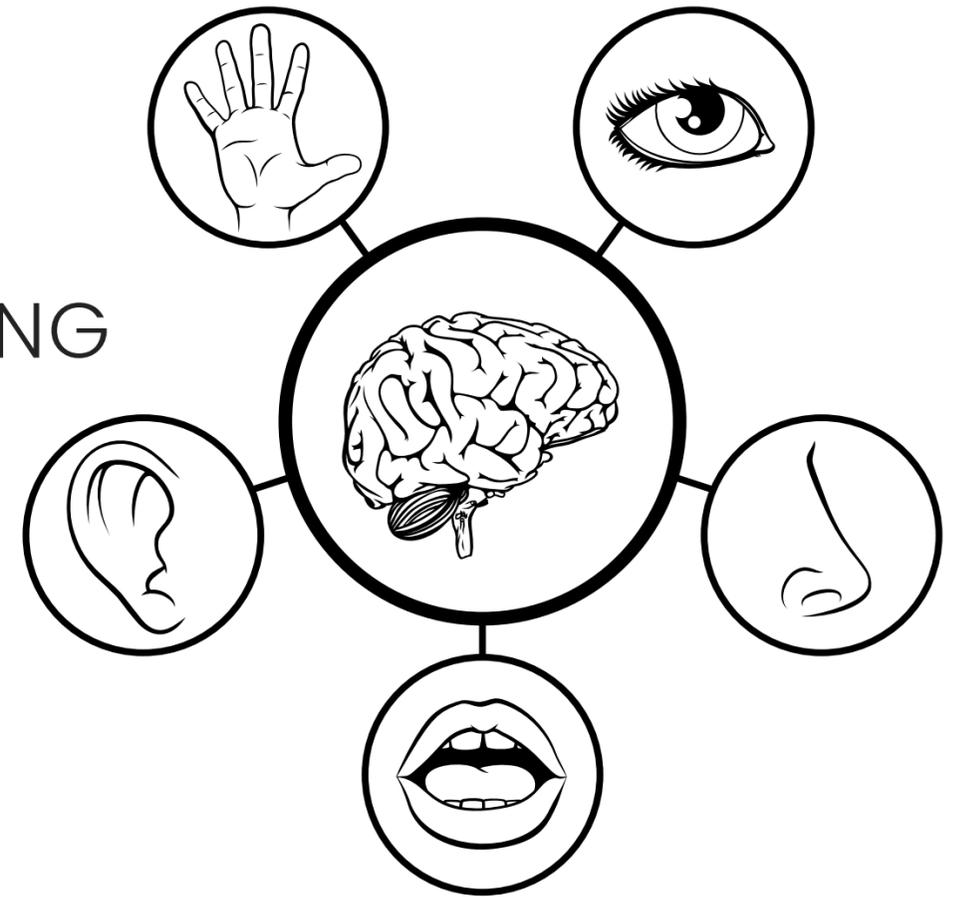
Theory of Sensory Integration: focus on three systems: vestibular, tactile, proprioceptive

# Sensory Processing & Modulation Disorders

How do we manage incoming sensory information?



- Modulating: Grading response to sensation
- Filtering: Suppressing irrelevant information



Effect on development: senses need to be mastered in order to support thinking and learning

# Evidence behind the Diagnosis

## Neurological basis for sensory processing dysfunction

- Malfunction of brain structures and brain chemistry that are responsible for modulating and filtering information may not be working properly
- Studies measure different aspects of sensory processing by looking at brainwaves, brain structures, and neurochemistry
  - Example: Study of brainwaves showed that children with SPD, compared to typically developing children, showed a neurological deficit in filtering sensation
- Studies establishing link between sensory processing disorders and deficits in cognitive and executive functioning (problem solving, planning, higher level thinking)
  - Example: In children with Autism, sensory processing deficits predicted deficits in cognitive and executive function



# Sensory Modulation Disorders

(Subtype of Sensory Processing Disorders) How is our body reacting to sensation?

## OVER SENSITIVE

- Sensory Overload
- Poor Filtering abilities
- Attention difficulties due to sensory overload and poor filtering
- Difficult engaging in **daily tasks** that have a tactile sensation
- **Inappropriate behavior:** disproportionate response to sensation, acting out, withdrawing
- **Mood:** moody, irritable, poor social interactions
- **Mental Health:** anxiety

## UNDER SENSITIVE

- Not responding or noticing sensation
- High threshold for attention
- **Perceived as lazy**, impacts relationships from peers and teachers
- **Attention:** difficulty initiating and maintaining attention to sensation that are a typical intensity, such as a teacher speaking
- **Engagement:** clumsiness can make it difficult for children to engage in activity

## SENSORY SEEKING

- Seeking out intense input
- Perceived as "wild" or "hyperactive" causing disciplinary and social problems
- Socialization is impacted because they made be too close or too forceful
- Attention is impaired due to preoccupation with finding sensory input

# Sensory Integration

Definition: Sensory integration theory is the idea that our five senses work together and communicate with our brain to produce a motor, behavioral, emotional, or attention response to support our bodies' interaction with the environment (Lane et al., 2019, Roley et al., 2007). This process is seen as active and ongoing as we continually interact with our environment while completing day-to-day tasks.

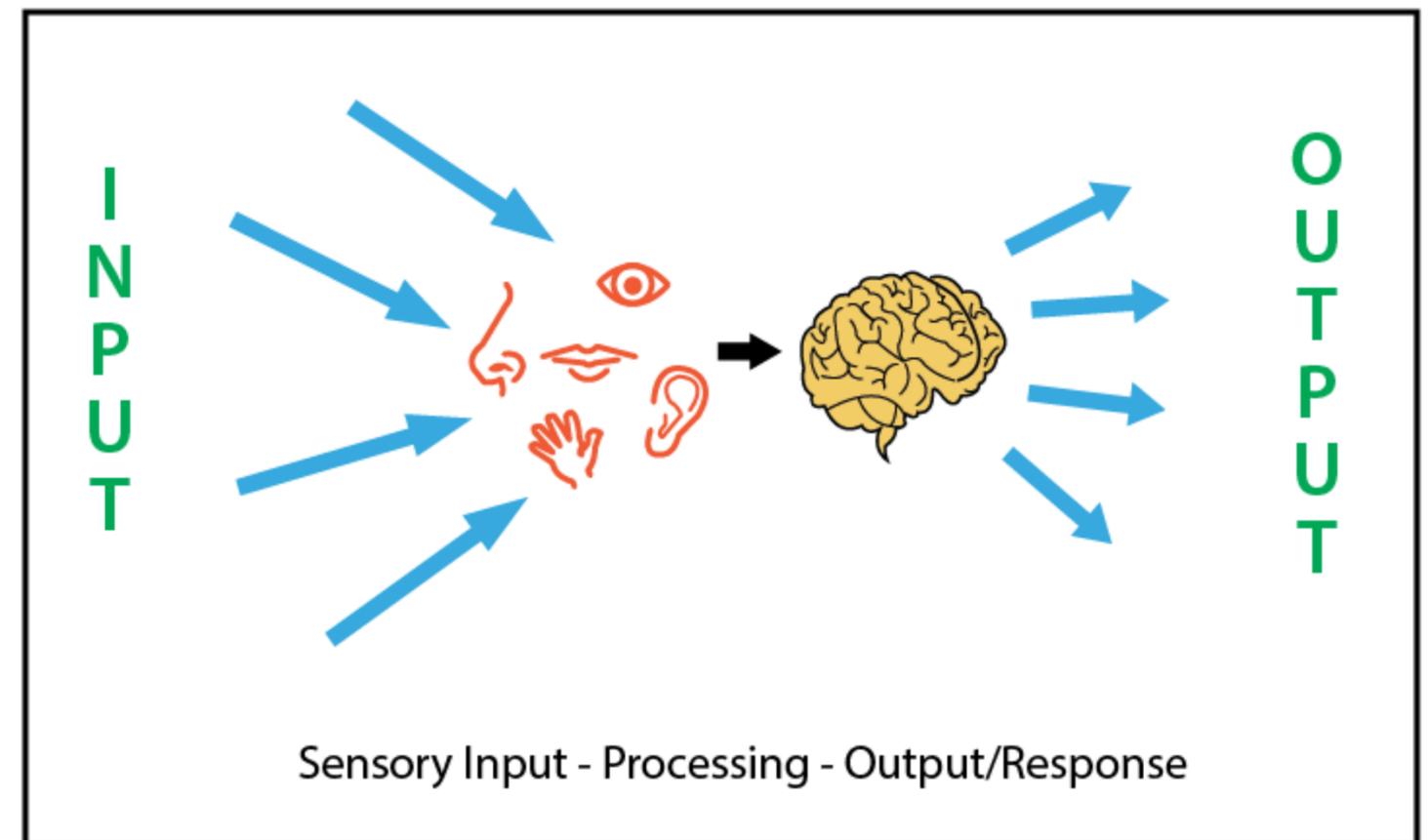


Image: Child Success Center, 2015

# Patterns of Sensory Integration Disorders



## **Proprioceptive System dysfunction:**

Symptoms:

- Craves heavy work tasks.
- Seeks joint compression/traction.
- Low awareness of body positioning in environment.

## **Vestibular System dysfunction:**

Symptoms:

- Craves movement/lacks signs of dizziness.
- Struggles with using both sides of the body together.

## **Tactile System dysfunction:**

Symptoms:

- Seeks extra touch input, no touch input, or both.
- Uses vision more than usual to guide day-to-day tasks.

# Impact of Sensory Integration Disorders

Limitations in adaptive behavior: difficulty with adapting behavior to changing environment or context.



Limitations in executive functioning: (I.E. planning, self-monitoring, organization, working memory).



Decrease in occupational performance: school, play, activities of daily living (ADLs).



# Therapies

## Brain Training



*Photo courtesy of The Center for Connection, n.d.*

# Occupational Therapy's Role



- Evaluate need for sensory intervention.
- Collaborate with family, teachers, and other health professionals.
- Identify sensory stimuli affecting daily performance.
- Provide sensory strategies and interventions to support sensory needs to accomplish daily activities.

# Sensory Based Therapy

Activities that provide multiple forms of sensory input to organize sensory systems.



# Ayres Sensory Integration Therapy

Who is Anna Jean Ayres?

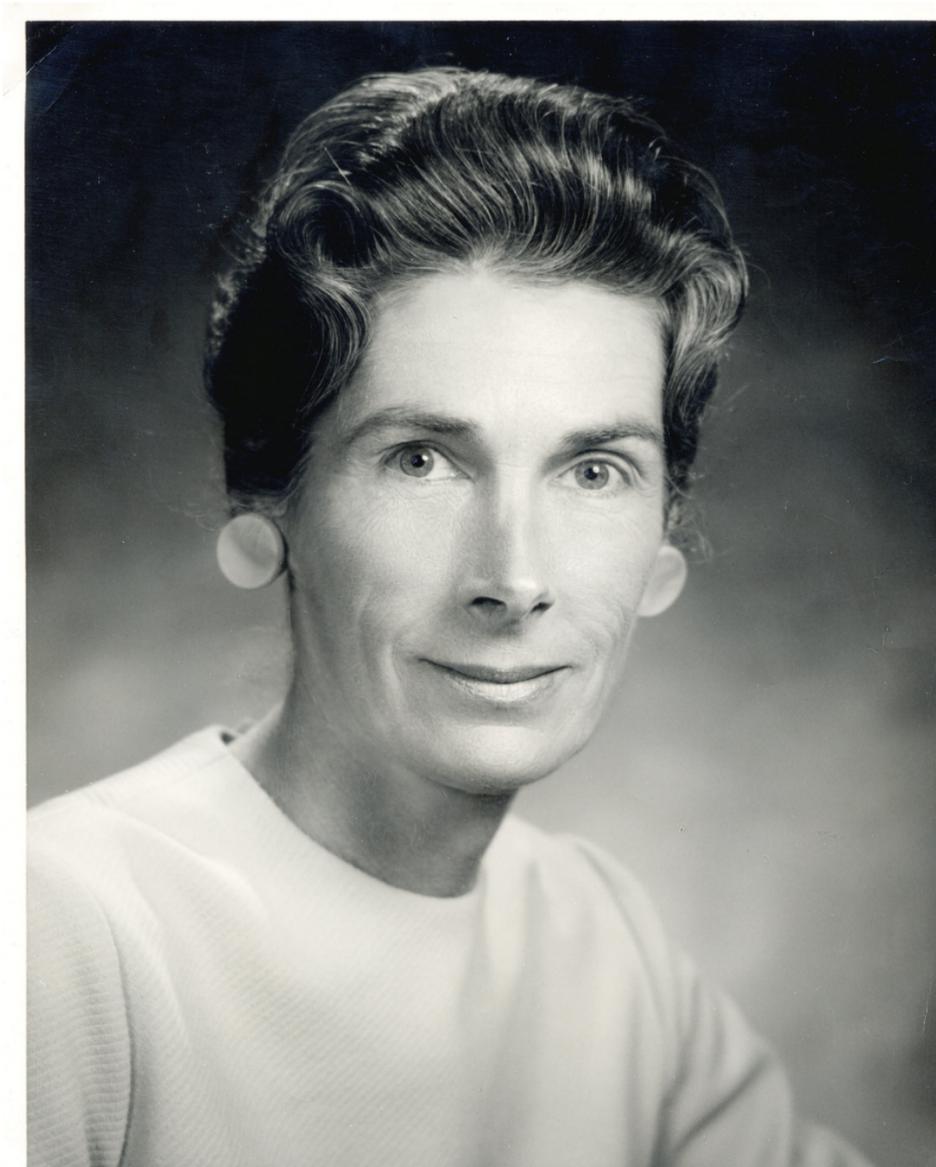


Image: Wikimedia, 2022

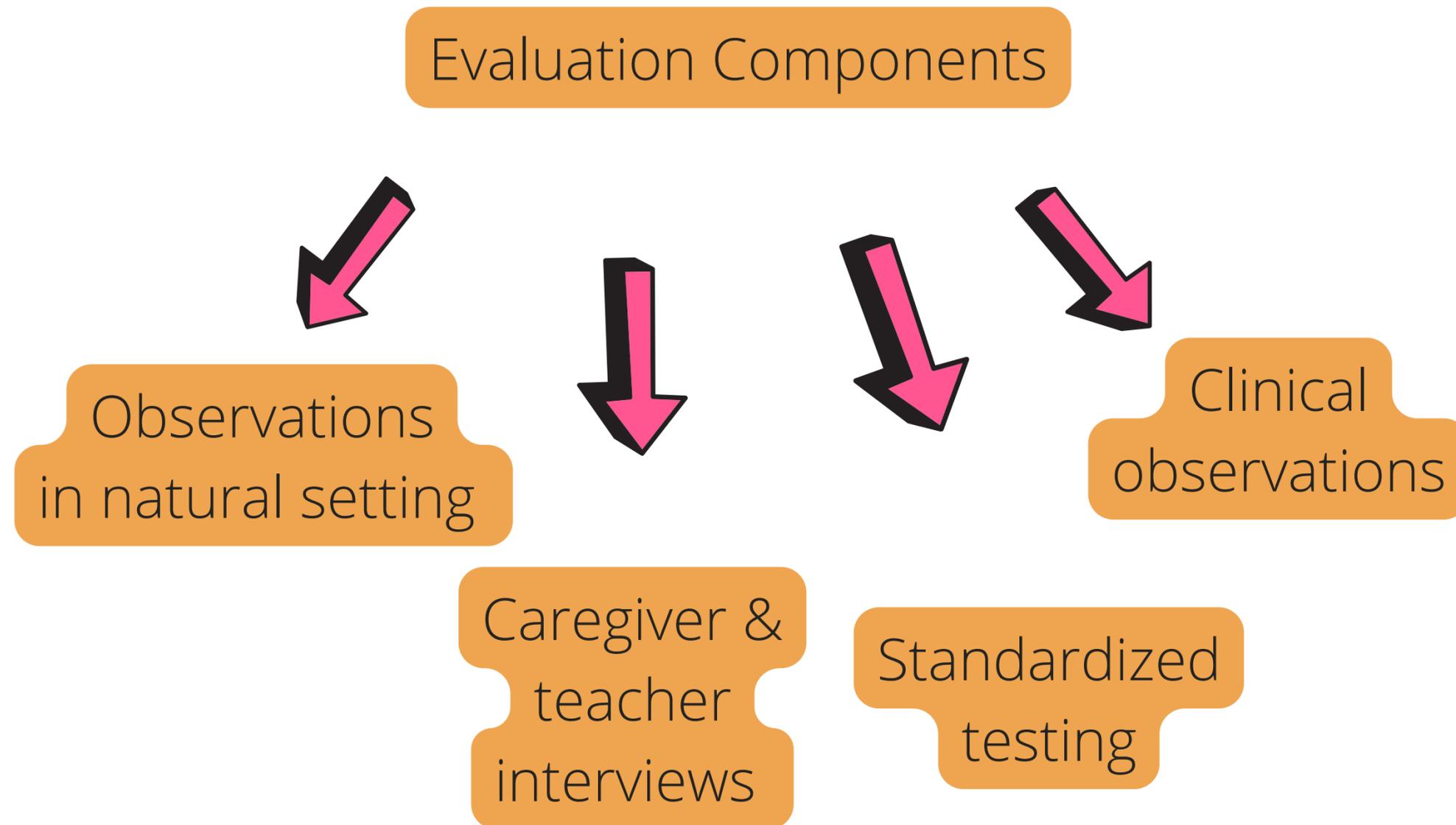
# Ayres Sensory Integration Therapy

## Main Principles

- There are some main principles that make Ayres Sensory Integration Therapy unique.
- These principles are guidelines for the therapist and must be incorporated to be considered a true Ayres Sensory Integration intervention.

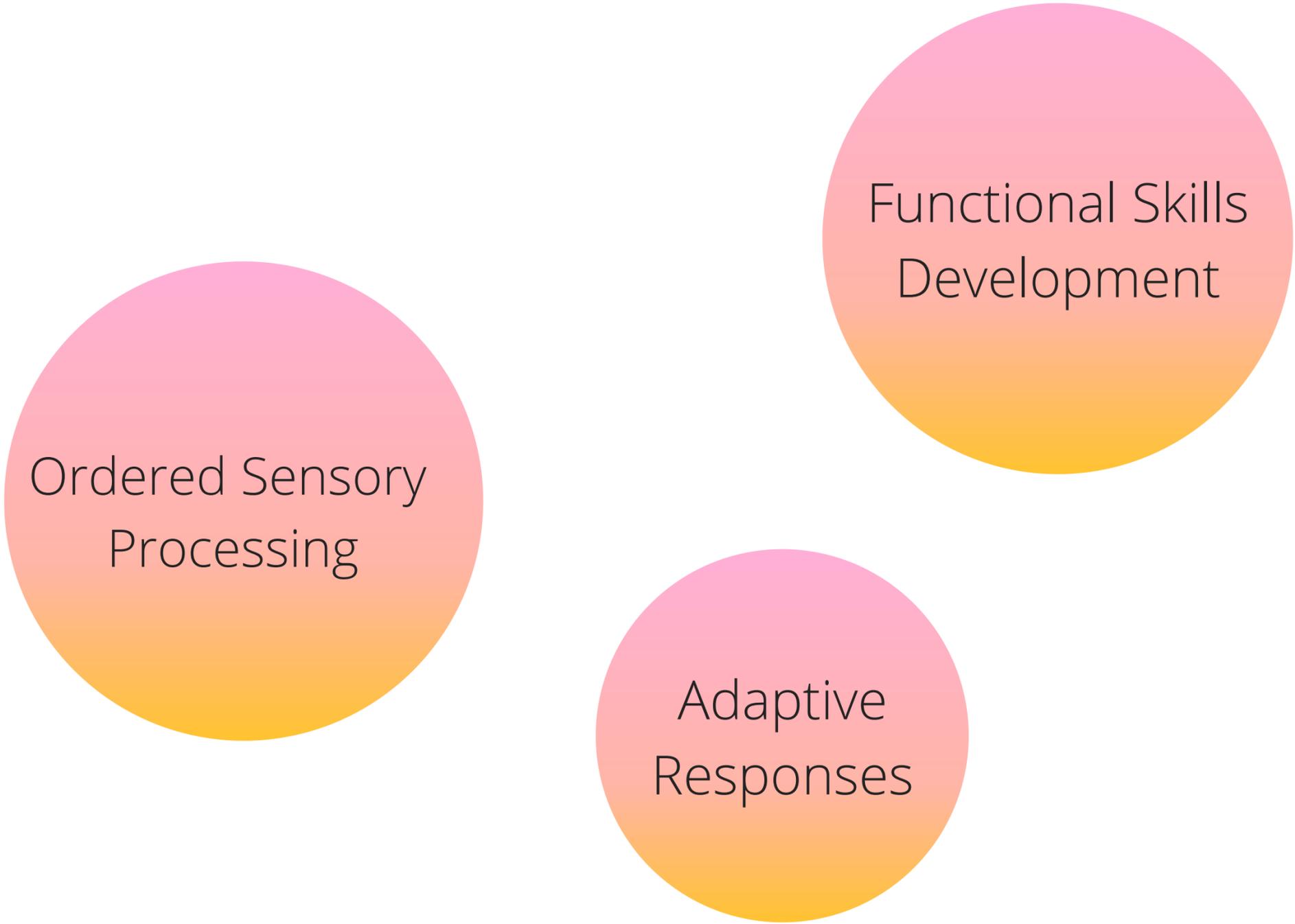
# Ayres Sensory Integration Therapy

When is Ayres Sensory Integration  
Used?



# Ayres Sensory Integration Therapy

## Goals of Ayres Sensory Integration



Ordered Sensory  
Processing

Adaptive  
Responses

Functional Skills  
Development

# **Ayres Sensory Integration Therapy**

Ayres Sensory Integration



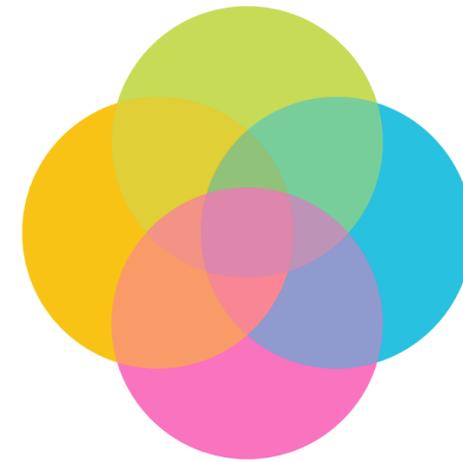
Sensory Based Interventions

# Home Strategies

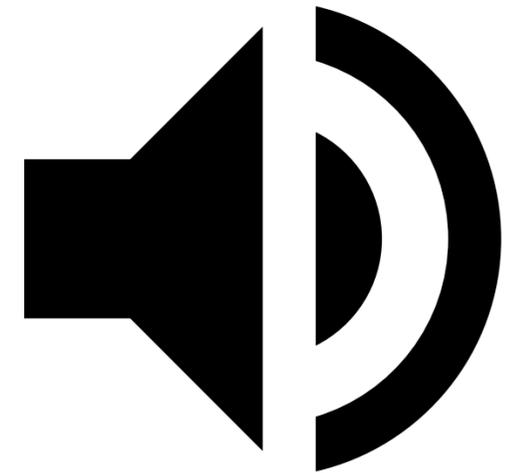
## Home Modifications



Lighting



Color



Sound

# Fun Table Top Activities



# Daily Routines: Teeth & Hair Brushing

What is the underlying issue that makes these activities a challenge?  
Child may experience tactile over-sensitivity (also called tactile defensiveness)

## What solutions address oversensitivity to touch?

### Provide sensory input before brushing

- Deep Pressure to joints: calming effect
- Desensitize the skin: massage face and scalp
- Systematic exposure to sensation: start with damp cloth

### Adapt the Activity or Environment

- Use props/modeling
- Visual Aids/Charts
- Timers, songs, games
- Vibrating brush



**Questions?**

# References

- American Occupational Therapy Association. (2015). *Addressing sensory integration and sensory processing disorders across the lifespan: The role of occupational therapy* [Fact sheet]. [https://www.aota.org/-/media/corporate/files/aboutot/professionals/whatisot/cy/fact-sheets/factsheet\\_sensoryintegration.pdf](https://www.aota.org/-/media/corporate/files/aboutot/professionals/whatisot/cy/fact-sheets/factsheet_sensoryintegration.pdf)
- American Occupational Therapy Association. (2008). *Frequently asked questions about Ayres sensory integration* [Fact sheet]. <https://www.aota.org/-/media/Corporate/Files/Practice/Children/Resources/FAQs/SI%20Fact%20Sheet%202.pdf>
- Baranek G. T. (2002). Efficacy of sensory and motor interventions for children with autism. *Journal of autism and developmental disorders*, 32(5), 397–422. <https://doi.org/10.1023/a:1020541906063>
- Bloom, M. (2022). Sensory-friendly home modifications. Tilton's Therapy for Tots. Retrieved March 21, 2022, from <https://tiltonstherapyfortots.com/resources/sensory-friendly-home-modifications>
- Case-Smith, J. & O'Brien, J.C. (2014). *Occupational therapy for children and adolescents*. Elsevier - Health Sciences Division.
- Christy, J.B. (2018). Considerations for testing and treating children with central vestibular impairments. *Seminars in Hearing*, 39(3), 321-333. <https://doi.org/10.1055/s-0038-1666821>
- Critz, C., Blake, K., & Nogueira, E. (2015). Sensory Processing Challenges in Children. *Journal for nurse practitioners*, 11(7), 710-716. <https://doi.org/10.1016/j.nurpra.2015.04.016>
- Koziol, L. F., Budding, D. E., & Chidekel, D. (2011). Sensory integration, sensory processing, and sensory modulation disorders: putative functional neuroanatomic underpinnings. *Cerebellum (London, England)*, 10(4), 770–792. <https://doi.org/10.1007/s12311-011-0288-8>
- Lane S.J., Mallioux, Z., Schoen, S., Bundy, A., May-Benson, T.A., Parham, L.D., Roley, S.S., & Schaaf, R.C. (2019). Neural foundations of ayres sensory Integration. *Brain Science*, 9(7), 1-14. <https://doi.org/10.3390/brainsci9070153>
- Miller, L. J., Anzalone, M. E., Lane, S. J., Cermak, S. A., & Osten, E. T. (2007). Concept evolution in sensory integration: a proposed nosology for diagnosis. *The American journal of occupational therapy : official publication of the American Occupational Therapy Association*, 61(2), 135–140. <https://doi.org/10.5014/ajot.61.2.135>
- Miller-Kuhaneck, H. & Watling, R. (2018). Parental or teach education and coaching to support function and participation of children and youth with sensory processing and sensory Integration challenges: a systematic review. *American Journal of Occupational Therapy*, 72(1). <https://doi.org/10.5014/ajot.2018.029017>

# References

- Pastor-Cerezuela, G., Fernández-Andrés, M. I., Sanz-Cervera, P., & Marín-Suelves, D. (2020). The impact of sensory processing on executive and cognitive functions in children with autism spectrum disorder in the school context. *Research in developmental disabilities*, 96, 103540. <https://doi.org/10.1016/j.ridd.2019.103540>
- Pelly, J. (2020). Sensory play: 20 great activities for your toddler or preschooler. Healthline. Retrieved March 21, 2022, from <https://www.healthline.com/health/childrens-health/sensory-play#activities>
- Roley, S., Mailloux, Z., Miller-Kuhaneck, H., & Glennon, T. (2007). Understanding Ayres Sensory Integration. *OT Practice*. 12(17).
- Rymanowicz, K. (2014). The seven senses: Supporting your child's sensory development. Retrieved from [https://www.canr.msu.edu/news/the\\_7\\_senses\\_supporting\\_your\\_childs\\_sensory\\_development](https://www.canr.msu.edu/news/the_7_senses_supporting_your_childs_sensory_development)
- Schaff R.C., & Mallioux Z. (2015). Clinician's guide for implementing Ayres Sensory Integration: promoting participation for children with autism. AOTA press.
- Section On Complementary And Integrative Medicine, Council on Children with Disabilities, American Academy of Pediatrics, Zimmer, M., & Desch, L. (2012). Sensory integration therapies for children with developmental and behavioral disorders. *Pediatrics*, 129(6), 1186–1189. <https://doi.org/10.1542/peds.2012-0876>
- Sensory processing explained [Online image]. (2015). Child Success Center. <https://childdisabilitycenter.com/home/resources/sensory-processing/>
- Sensory-Friendly Home Modifications for Autism and Sensory Processing Disorder (2019). BigRentz Inc. Retrieved March 21, 2022, from <https://www.bigrentz.com/blog/sensory-friendly-home-modifications-autism-sensory-processing-disorder>
- Students of PSY 3031. (n.d.). Kinesthesia and proprioception. In C. Olman (Ed.), *Introduction to sensation and perception*. University of Minnesota. Retrieved from <https://pressbooks.umn.edu/sensationandperception/chapter/kinesthesia-and-proprioeption/>
- Taylor, J.L. (2009). Proprioception. In L.R. Squire (Ed.), *Encyclopedia of neuroscience* (pp. 1143-1149). Academic Press. doi:10.1016/B978-008045046-9.01907-0
- Watling, & Hauer, S. (2015). Effectiveness of Ayres Sensory Integration® and Sensory-Based Interventions for People With Autism Spectrum Disorder: A Systematic Review. *The American Journal of Occupational Therapy*, 69(5), 6905180030p1–6905180030p12. <https://doi.org/10.5014/ajot.2015.018051>
- Wikimedia Foundation. (2022). Anna Jean Ayres. Wikipedia. Retrieved March 28, 2022, from [https://en.wikipedia.org/wiki/Anna\\_Jean\\_Ayres](https://en.wikipedia.org/wiki/Anna_Jean_Ayres)