Sensory Processing

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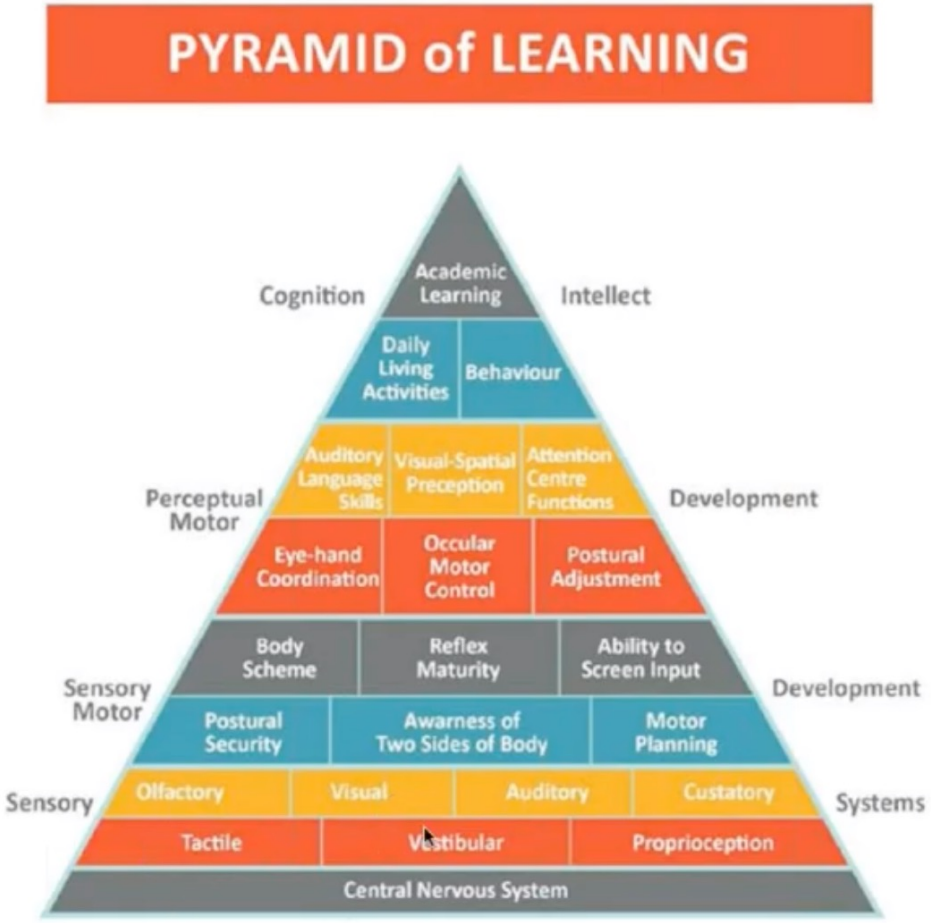
Learning Objectives

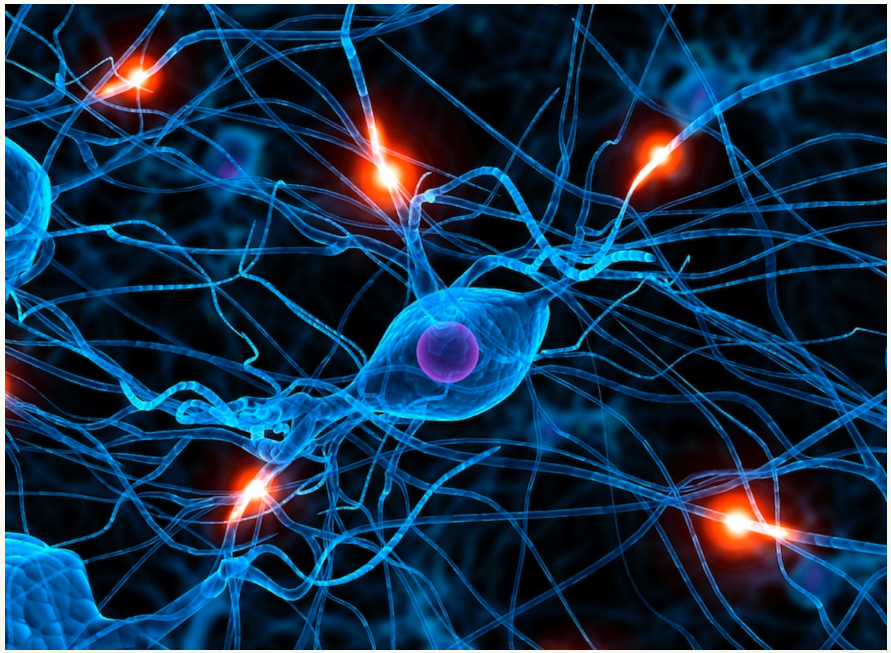
- Identify each subtype of sensory processing disorder.
- Identify the 4 characteristic patterns of sensory modulation disorder.



Williams, M.S., & Shellengerger, S. (1996). *How does your engine run? A leader's guide to the Alert Program for self-regulation*. Albuquerque, NM: TherapyWorks.

Neuroplasticity

One of the key theoretical concepts of the sensory integration frame of reference.



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Neurotransmitters

Chemicals that communicate information throughout the brain and body. Relay signals between nerve cells.

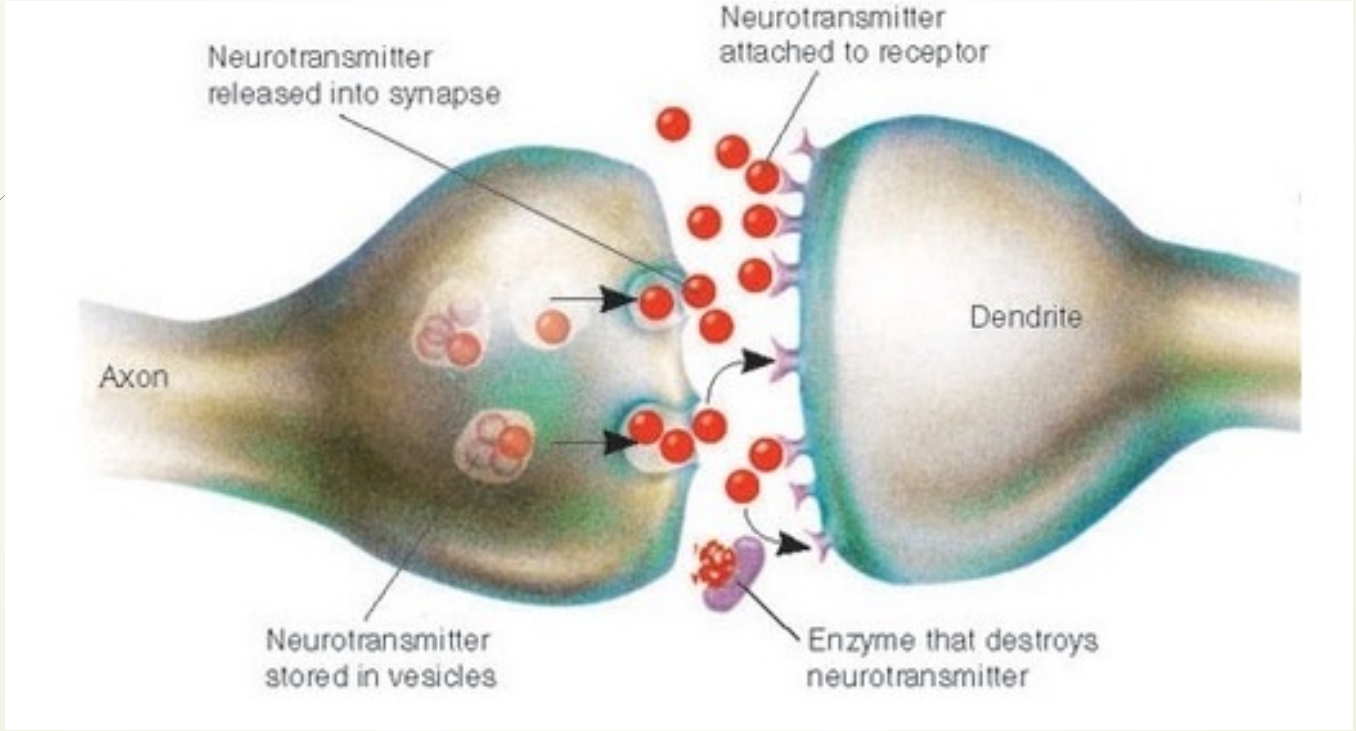


Photo Credit: https://qph.is.quoracdn.net/main-qimg-45f820c0d3df1609fda6fcfc71519df3?convert_to_webp=true

Neurochemistry

Serotonin

- Feel-good- + mood, sleep, appetite, satisfaction
- Low levels: ADHD, Depression
- High levels: Bipolar (Manic)
- Sensory input (proprioceptive) believed to increase this

Dopamine

- Sleep/wake cycle, pleasure & reward system, motor control
- Released with sex, praise, food, & learning
- Low levels: Depression, ADHD
- Exercise and rewarding sensory experiences increase it- Need high intensity input

Epinephrine

- Adrenaline- fight-or-flight response, represses parasympathetic N.S. (responsible for sleep, digestion, immune response)
- Increases cortisol levels (stress hormone)

Endorphins

- Natural painkillers- runners high
- Released through prop and vest. Input (exercise) and pain
- Sometimes self-injurious behaviors release this

Incoming Sensory Information

- Vision
- Smell- Olfactory…information goes directly to the cortex
- Hearing (Auditory)
- Taste (Gustatory)
- The Proprioceptive Sense
- The Vestibular Sense
- Interoception
- Touch (Tactile)

TACTILE SYSTEM

- Touch, pain, temperature & pressure
- Gives concrete feeling of body and the environment
- Primary **protective** system
- The most available and can be used for modulation

With the proprioceptive system makes up the SOMATOSENSORY SYSTEM

The Proprioceptive System

- Receptors present in all skeletal muscles

- Gives information about movement

(Unconscious movement, not to be confused with kinesthesia- conscious movement)

The Vestibular System

Sends information back to:

- Muscles- for extension/fixing patterns
- Vestibular information also goes to the cerebellum

Vestibular & Proprioceptive Systems

Help to develop:

- Posture
- Balance
- Muscle tone
- Gravitational security
- Movement of the eyes in coordination with head and body

The Interoceptive Sense

The Sense of Internal Organ Function.

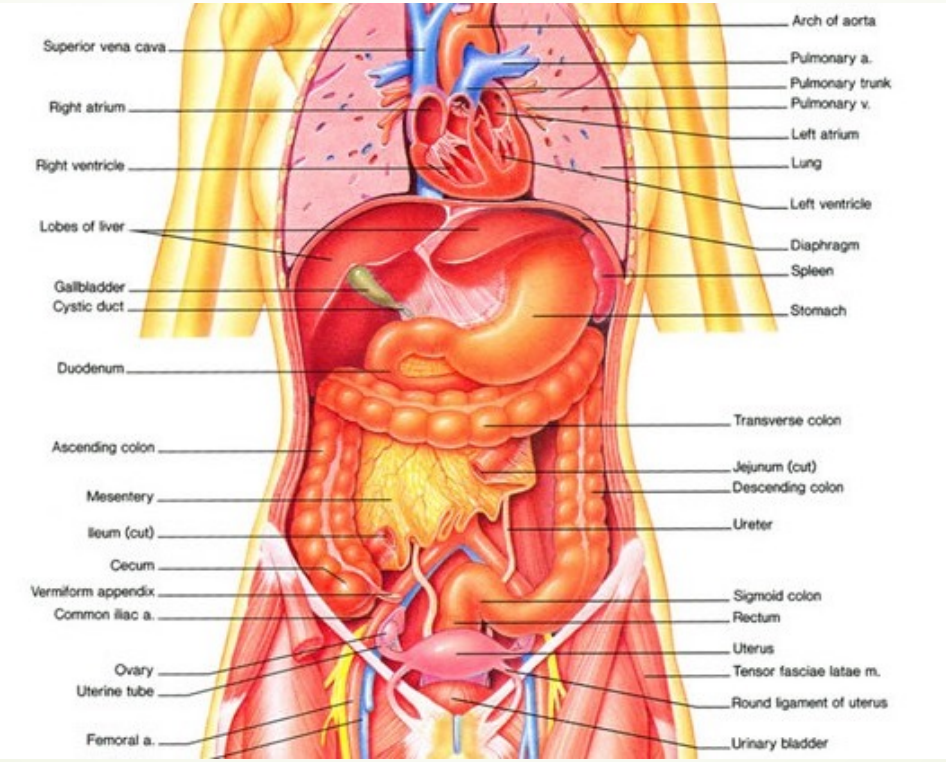


Photo Credit: http://humananatomybody.info/wp-content/uploads/2015/10/Internal-Organs-Anatomy-Human-photo-DLbX.jpg

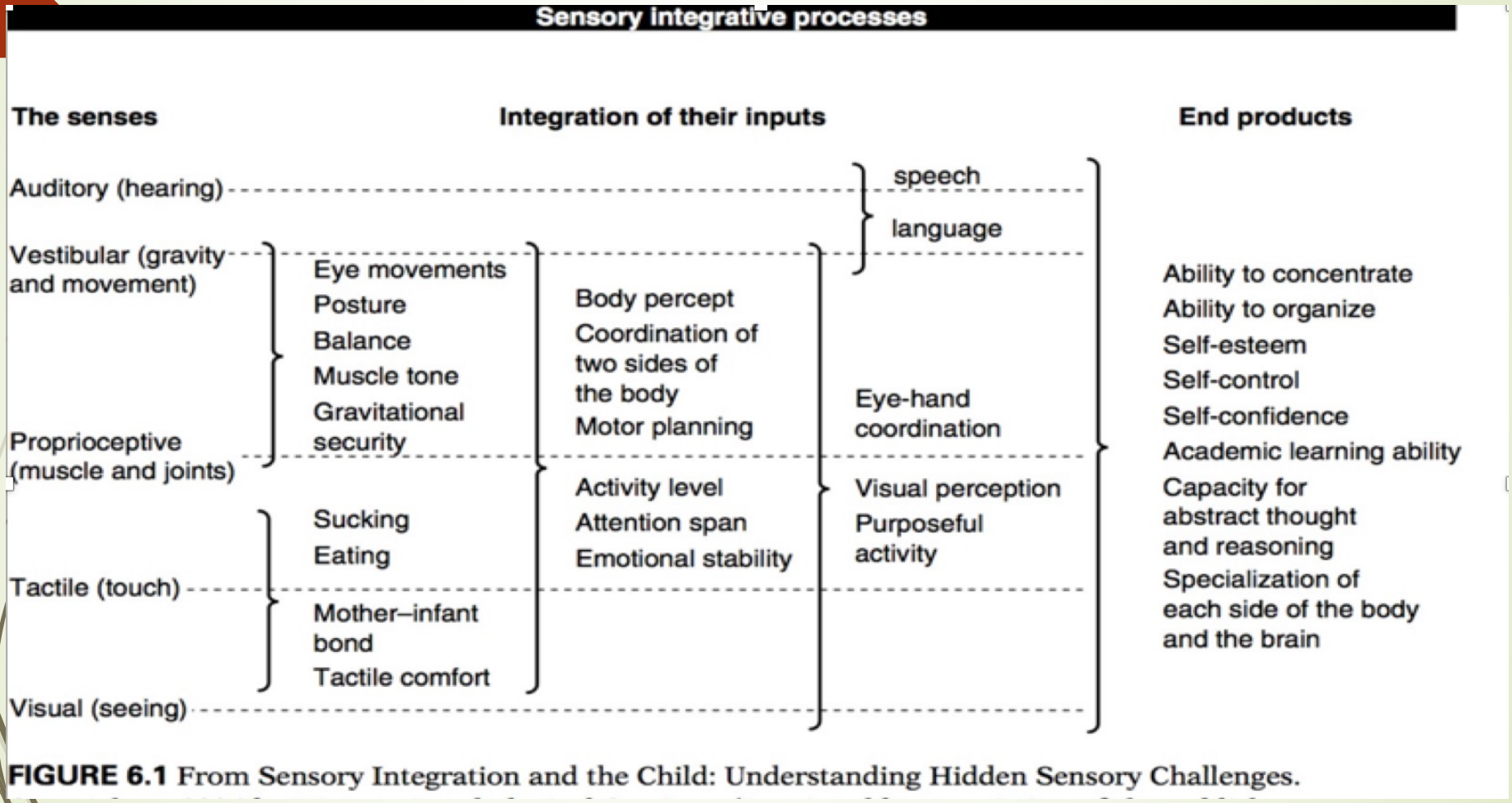
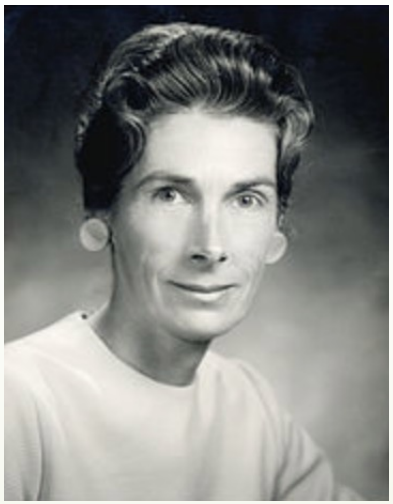


FIGURE 6.1 From Sensory Integration and the Child: Understanding Hidden Sensory Challenges.

Sensory Integration Frame of Reference

- Developed by A. Jean Ayres in the 60s & 70s

Sensory Integration Theory- adequate processing and integration of sensory information is an important foundation for adaptive behavior.



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7 Theoretical Postulates form the the SI Frame of Reference Foundation

1. Sensory information provides an important **foundation** for **learning and behavior**.

2. Sensory integration is a **developmental process**.

3. Successful integration of sensory information improves with **adaptive responses**.

4. The ‘‘**just right challenge**’’ provides the opportunity for sensory integration to occur.

5. Children have an **internal drive** to seek meaningful experiences from the environment.

6. Due to neuroplasticity, **enriched experiences** cause change in the nervous system.

7. Sensory integration is a foundation for physical and social **engagement and participation** in daily life activities and routines.

SI Term: Adaptive Response

- The ability to make adaptive responses to constantly changing sensory environments is key in the SI frame of reference.
- **Adaptive Response-**‘‘appropriate action where the individual responds successfully to an environmental demand’’.
- The SI process facilitates successful responses to environmental demands resulting in adaptive responses.

Indilamart.com

SI Term: Praxis

- The ability to conceive of, plan, and organize a sequence of goal-directed motor actions.

- Enables us to adapt and react quickly to novel environmental demands in a meaningful and efficient manner.

SI Term: "The Just Right Challenge"

Learning occurs when a child accomplishes a challenge.

- The ''just right challenge'' is facilitated by the therapist & provides the space where learning occurs.

Goal: craft intervention that provides the just right challenge.

SI Treatment & Occupations

OT using a SI FOR improves sensory processing and integration as a basis for enhancing successful participation in daily occupations.

Sheknows.ocm

friendshipcircle.org

SENSORY INTEGRATION: CURRENT UPDATES

The theory is constantly evolving and is informed and modified as new research is generated.

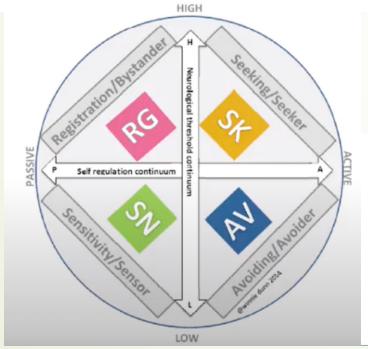
Sensory Modulation

Spokanecpt.com

Miller's Model

SENSORY PROCESSING DISORDER (SPD)

- **Sensory Modulation Disorder** (SMD)
  - SOR
  - SUR
  - SS
- **Sensory Discrimination Disorder** (SDD)
- **Sensory-Based Motor Disorder** (SBMD)
  - Postural Disorders
  - Dyspraxia



SOR = Sensory Over -Responsivity
SUR= Sensory Under -Responsivity
SS= Sensory Seeking / Craving

Winnie Dunn's Research

Children with **sensory modulation deficits** demonstrate over-responsivity and/or under-responsivity to sensation and display sensory behaviors in **4 characteristic patterns**:

- **Sensory Sensitivity**
- **Sensory Avoiding**
- **Sensory Registration**
- **Sensory seeking**

Level 1: Sensory Modulation Disorder

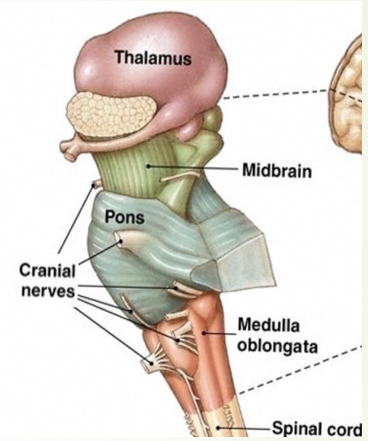
Low Brainstem: First point of entry!

Sensory Input- Is it safe? Do I recognize it?

Unable to compensate without help/therapy.

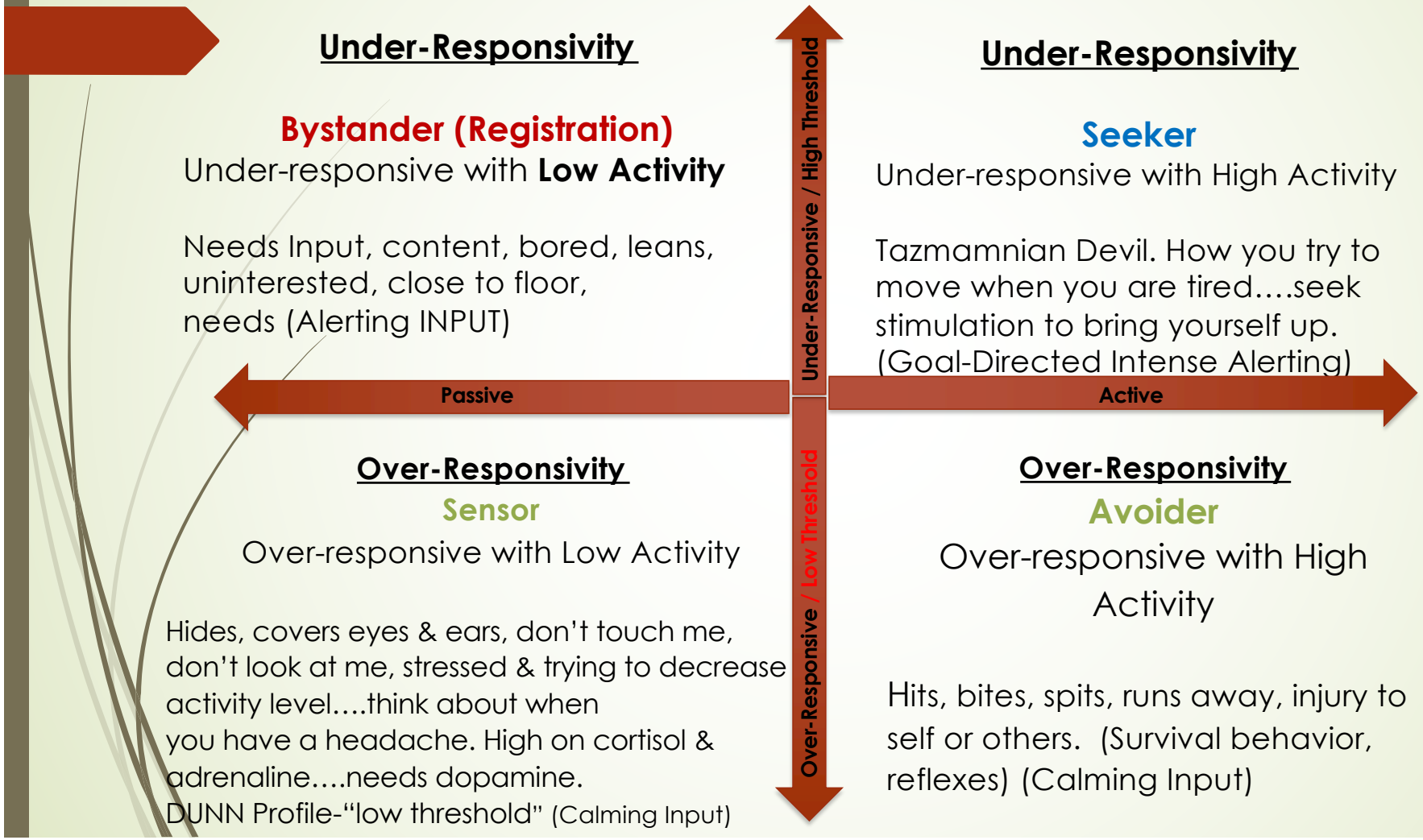
Unable to ATTEND, ENGAGE, INTERACT, Be PURPOSEFUL

Uses peripheral vision….safety



TREATMENT: Goal is to impact neurochemistry to get the sensory information to move through the lower brain stem.

Level 1: Sensory Modulation Disorder



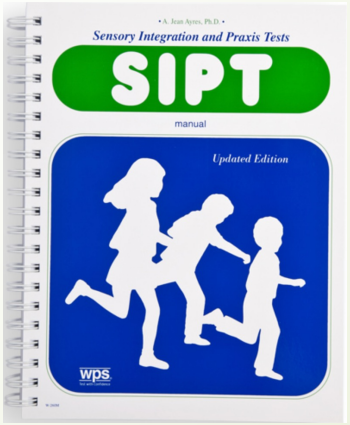
Assessment

Sensory Integration & Praxis Test

- Comprehensive assessment of sensory integration- considered the ‘‘gold standard’’ for evaluating sensory integration and praxis

- 17 standardized, computer-scored tests designed to measure visual and tactile perception and discrimination, visual motor skills, bilateral integration and sequencing, praxis and vestibular-proprioceptive functions.

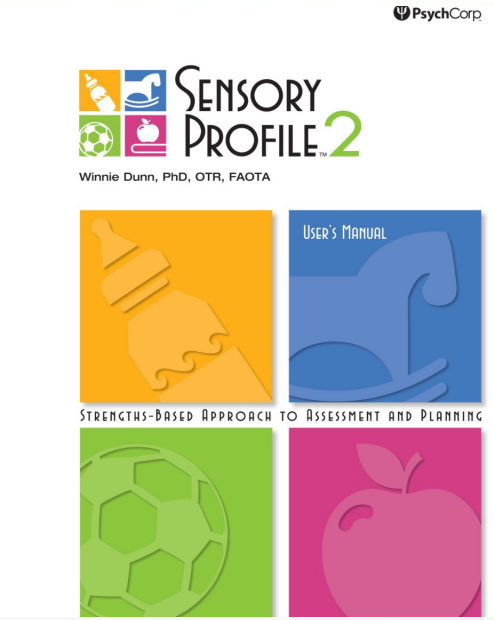
- **AGES:** 4 years to 8 years, 11 months



PsychCorp

Assessment

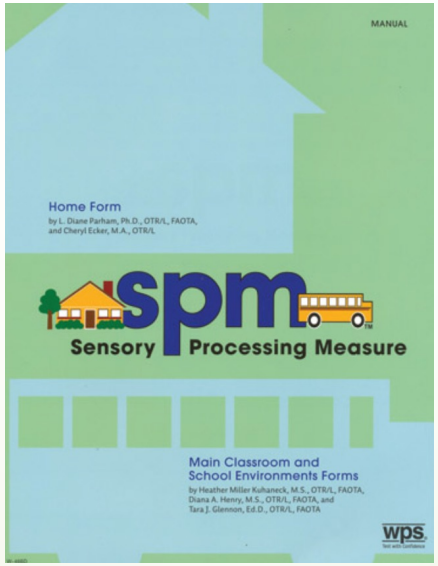
- **The Sensory Profile**- allows parents, caregivers, and teachers to rate a child's responses to sensory activities. (Dunn)
- **Age Range:** Birth–14:11



pearsonclinical.co

Sensory Processing Measure

- Assesses how sensory processing problems manifest in various settings.
- **Ages:** Ages 5 to 12 (Also a preschool version)



Therapro

- Diagnosis- Not in the ICD-10 or DSM-5

- Reimbursement is an issue

- Star Institute- https://www.spdstar.org/basic/online-education

https://www.youtube.com/watch?v=D1G5ssZlVUw

https://www.youtube.com/watch?v=IkdmOVejUII

https://www.playfactile.com/uthscmotspd

References

O'Brien, J. C. & Kuhaneck, H. (Eds.). (2020). *Case-Smith's occupational therapy for children and adolescents* (8th ed.). Elsevier.

Kramer, P., Hinojosa, J., & Howe, T. H. (Eds.) (2019). *Frames of reference for pediatric occupational therapy* (4th ed.). Wolters Kluwer.