What is Sensory Integration?

- Everyday we receive information from our senses. This information helps us to organize our behavior in order to interact with the world around us.
- Senses:
  - sight
  - hearing
  - touch
  - taste
  - smell
  - balance and movement (vestibular sense)
  - Muscle and joint sense (proprioception)
Sense of Gravity and Movement
Vestibular

- Unconscious information from the inner ear about balance, gravity, movement and changes of positions in space.
- Information can last in the body for 4 to 8 hours.
- Influences: muscle tone, motor planning, non-verbal communication, language development.
- Located in the inner ear.
- Tells body: if body is moving, what direction, and how fast.

Sense of muscles and joints
Proprioception

- Unconscious information from the muscles and joints about position, weight, pressure, muscle stretch, movement and changes of position in space.
- Stays in the system for 1 ½ hours.
- Powerful for calming and organizing the nervous system.
- Important for body awareness.
Sense of Touch
Tactile

• Spinal Cord and Skin
  – Develops early in life of the fetus
  – Information stays up to 1 ½ hours
  – Closest to nervous system-discrimination and protective purposes.
• Receptors for: Light touch, deep pressure, skin stretch, vibration, movement, temperature, and pain
• Infants-
  – Use touch to physically interact with objects and learn characteristics of item.
  – Mouth- large number of receptors.
• Tells body- What we touch, where we were touched, and what we were touched with.

Sense of Smell and Taste
Olfactory, Gustatory

• Provide information about smell and taste through contact with the nose and mouth
Sense of Sight and Sound
Visual and Auditory

• **Vision**
  – Enables us to identify sight, what is coming at us, prepare for a response. Detect contrast, movement, guide our direction of movement
  – Provides time and space information
  – Vision is not eyesight, which is the ability to read an eye chart
  – Vision is not a skill we are born with, but develop it gradually as we learn to make sense of what we see.
  – Proprioception, Vestibular, Tactile, and Auditory senses influence vision
  – 66% of brain activity is devoted to vision when eyes are open
  – 93% of communication in non-verbal - 55% comes from seeing the speaker’s facial expressions and body gestures
  – 25% of all school age students have undiagnosed vision problems
  – 75-90% of classroom learning depends on vision

• **Auditory**
  – Works together with Vestibular as they both process movement and sound. Both processed by hair cells in the receptors of the ear.
  – Born with basic skill to hear.
  – Auditory skills begin to develop in the womb.
  – First sense to become functional
  – Vital for hearing, balance, flexibility, bilateral coordination
  – Not born with the skill of listening, it is acquired as we process vestibular and auditory input.

Basic Three Layers of the Brain

• **Internal layer**
  – Innate responses to environments
    • Reflexes, body stasis (temperature regulation, breathing, heart rate etc.)

• **Sensory layer**
  – How the brain interprets information from the seven senses

• **Higher cognitive layer**
  – Attention
  – Learning
  – Demonstration of Knowledge
  – Language
  – Problem Solving
  – Social Interaction
  – Self Esteem
  – Self Control
How sensory sources influence child development.

- Through organization of vestibular, proprioceptive, and other sensory information the child develops reflex maturation, body scheme, postural balance, and bilateral integration.

- Reflex Maturation;
  - innate response to sensory input- (pulling your hand back when you touch something hot or putting your arms out when you trip and fall forward)

- Body Scheme;
  - awareness of what position the body and body parts are in. (crawling- arms extended, knee bent, hips bent, trunk straight horizontal to the floor, neck extended and head facing upright.)
How sensory sources influence child development.

- **Postural Balance:**
  - Subtle spontaneous adjustments to maintain body position. (Standing on one leg)

- **Bilateral integration**
  - The brain's ability to allow the right and left side to work together. (walking or riding a bike)

- **Bilateral integration**— a younger child can use sensory motor skills to develop perceptual motor skills.
  - **Body coordination**— walking, running, playing ball, skipping, jumping.
  - **Eye/hand coordination**— tying shoelaces, buttoning clothes, writing.
  - **Perception of objects in space**— position of one’s body in relation to objects (working on a puzzle, or navigating around an obstacle course).

- **Hearing and speaking skills**— Being able to remember and repeat a list of words, “Please go to your room and get your socks, shoes, sweater and coat.”

- An older child can use a more mature brain to
  - read, write, think, complete independent seat work, and behavior control
Real Life

• You are walking late at night alone down a dark street. You hear someone behind you. They reach out and touch your arm.
• How do you feel?
  – Fight, Fright, Flight response. Increased heart rate and respiration. Heightened awareness of auditory and visual surroundings.
• Then recognize the person’s voice.
• The type of touch is gentle
• Visually recognize that person
• How do you feel?
  • Able to calm and adapt your response and act appropriately to the situation.

How we perceive our environment.

Modulation

– Our arousal level to a specific event

• Hypersensitivity
  – sensory seeking: (the need to seek out various input via bouncing, smelling objects, mouthing non food items etc.)
  – sensory avoiding: (avoiding participation in tasks, inflexibility with changes in routine, non touching textures or movement activities etc.)

• Hyposensitivity
  – sensory seeking
  – sensory avoiding

Discrimination

– The quality of sensation
  • light touch vs. hard touch
  • hot vs. cold
  • where on your arm did someone touch you and with what object.

• Persons can display various combinations of difficulties in the above areas. Both effect how you focus and attend to an event and then adapt your response.
Possible Indicators of Vestibular Processing Dysfunction in Development.

**Vestibular**

- Reluctant to participate in movement activities
- Impulsive and or unpredictable with movement
- Slow moving
- Aggressive
- Clumsy
- Fearful of heights
- Difficulty sitting still compared to peers
- Rocks, spins, or seeks out movement more than peers.
- Fearful of climbing or descending stairs or having feet leave the ground

- Uneasy with being upside down
- Doesn’t get dizzy or becomes dizzy quickly
- Feels limp when moving or lifting her
- Slumps in chair or over table
- Problems with digestion and elimination
- Fatigues easily
- Unable to catch himself from falling
- No established hand preference
- Using two hands together in alternative movement patterns
- Avoids crossing midline

- Consistent observations of these behaviors
Possible Indicators of Sensory Processing Dysfunction

**Proprioception**
- Child frequently bumps, pushes, hits others
- Child appears clumsy, walks into things often
- Child is not aware of personal space of self/others
- Has low tone
- Kicks heels on floor when sitting
- Rubs hands repeatedly on table
- Prefers not to move
- Avoids, crawling, jumping, hopping and other activities that bring strong input into the joints and muscles
- Child has difficulty petting animals pushes hard on crayons (too much force)
- Controlling and bossy
- Unaware of physical danger
- Frequently breaks toys or drops
- Difficulty with motor planning

**Possible Indicators of Tactile Dysfunction**

**Tactile**
- Doesn’t notice soiling, wetting, or clothing twisted or falling off
- Child not aware of messy face, runny nose
- Child is over/under-sensitive to temperature
- Child dislikes touching messy textures
- Over reacts to light touch
- Aversion to hair brushing or teeth brushing
- Bothered by wind and rain
- Rigid and inflexible
- Dislikes surprises
- Avoid walking bare foot or prefers to be barefoot
- Prefers certain clothing types or fabric
- Needs to touch certain textures frequently
- Decreased pain awareness
- Asks for frequent “tickles or back rubs”
- Rubs or bites skin
- Difficulty identifying items solely by touch
Possible Indicators of Sensory Processing Dysfunction

**Auditory**
- Frequent ear infections
- Distracted by sounds not ordinarily noticed
- Little or no vocalization or babbling
- Known delay in speech development
- Unaware of direction of sound
- Difficulty maintaining attention to a conversation
- Difficulty recognizing familiar sounds
- Difficulty following one or two directions
- Immature sentence structure
- Speak very loud or too softly
- Distressed by sounds that don’t bother others—tłat flushing, soft background music, hum of the refrigerator

**Taste and Smell**
- Chews non food items
- Eats only soft food
- Overly sensitive to food textures
- Gags on foods thicker and lumpier
- Smells objects or people
- Sensitive to smells

**Possible Indicators of Visual Sensory Processing Dysfunction**
- Overly sensitive to bright lights
- Avoids eye contact
- Easily distracted by objects in sight
- Likes to play in the dark
- Avoids large crowds
- Unaware of movement, bumping into moving objects
- Seek out bright lights, strobe lights
- Finger flicking, spinning, staring at patterns and edges
- Squirm during visual tasks such as workbook activities.
- Difficulty with judging distance between objects
- Difficulty understanding concepts such as up/down, forward/back, before/after, and first/second
- Confuse likeness and differences in pictures, words, symbols, and objects.
- Difficulty remembering what he/she saw during the day
- Poor visual memory
- Difficulty with jigsaw puzzles
- Difficulty with walking up stairs or kicking a ball
Sensory Diet/ Not only food based

• What is a sensory diet?
  – A strategy that provides children with a necessary combination of sensory activities that “feeds or nourishes” a child’s nervous system.
  – When a child’s nervous system is properly organized, the child is able to achieve optimum attention and interaction. This is the best state to learn.

• Examples
  – We rock a baby at night to get them to sleep, this calms their nervous system.
  – When we get sleepy while driving in the car, we roll down the window for cold air and turn the music louder.
  – While listening to this presentation you may be, chewing on your pen, tapping your foot on the floor, leaning on your face, or rocking in your seat.

Sensory Diet

• Modifies sensory input to help meet the needs of each child.

  • It can include:
    – Scheduled activities throughout the day(jumping on the trampoline before seated tasks)
    – Sensory input through daily routine (wearing heavy weighted backpack to school)
    – Sensory input created by the environment (rocking chair, dim lights)
    – Through recreational or leisure activities (swimming, playing on the playground, amusement park)
    – Input from interactions with others (rough play)
What a Sensory Diet Can Do.

- Calm an over-aroused or overly active child
- Increase the activity level of an under-aroused or passive child.
- Prevent uncomfortable reactions to sensory input
- Reduce sensory seeking self-stimulating behavior
- Increase a child’s productivity and comfort in an environment
- Teach self-regulation strategies.

Types of Sensations in Activities

- **Movement**
  - Swinging, rocking, jumping, tumbling
    - Back and forth movement on the stomach is most calming
    - Rhythmic movement is calming vs. fast/changeable movement is alerting

- **Proprioception:**
  - Any activity that provides compression or traction to the joints and or strong muscle action against resistance.
    - Heavy work using the whole body, hands, and or/mouth.
      - Pushing, pulling, lifting activities

- **Deep Pressure Touch**
  - Firm touch or activities that put pressure on the skin
    - Massage, being squeezed under a pillow or a ball.
Types of Sensations in Activities

• **Oral Motor Input**
  – Sucking, blowing, biting, chewing or breathing activities which help to focus and organize the child.

• **Neutral Warmth**
  – Warmth- from wrapping in blanket/swaddling-maintains the body temperature without being too hot or too cold. Very calming.

Adapted from Willbarger and Willbarger, 1997

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Playing with Sensory Processing

• **Tactile**
  – Rub a variety of textures on skin (soaps, shaving cream, lotions, loofah, plastic brushes, sponges.
  – Water play-pouring and squeezing
  – Finger painting
  – Drawing in various textures-sand, salt, clay
  – Playing in sand, beans, rice, pasta, cornmeal
  – Feelie Box
  – “Describe it” - provide different objects of textures, temperatures, and weight
  – Oral-Motor activities- licking stamps, whistles, kazoo, blowing bubbles, drinking through straws, chewing gum
  – Playing with pets
  – Squishing between couch cushions, bean bags, or mats to make a sandwich
Developing the Vestibular System

- Rolling down a hill, wrap in a blanket then unroll
- Swinging or Rocking
  - Front/back and side/side is calming
- Spinning on a tire swing or merry-go-round
  - Monitor spinning since child may become over stimulated. Spin with permission
- Sliding
- Riding on scooters, bikes
- Walking on uneven and unstable surfaces
  - Beach, clutter bridge, waterbed
- Balancing on therapy ball, t-stool, or balance board
- “Tummy down, head up”

Develop the Proprioceptive System

- Proprioceptive Sense
  - Lifting and carrying heavy loads—laundry basket, groceries
  - Pushing and pulling—vacuum, rack, pull a sibling on a blanket
  - Hanging from monkey bars
  - Animal walks
  - Joint compressions
  - Bear hugs
  - Arm wrestling
  - Back to back standing up
  - Pouring sand or water from container to container
Auditory and Visual System

- **Auditory**
  - Shorten comments and directions
  - Reinforce communication with visual input—pictures, hand gestures, body language
  - Talk children through tasks—dressing, baths teaching nouns, prepositions—around, through, time—yesterday or later, categories, and emotions
  - Allow extra time for kids to respond
  - Use rhythm and beat to improve auditory memory—sing songs about brushing teeth.

- **Visual**
  - Mazes and Dot to Dot activities
  - Peg board designs
  - Cutting activities
  - Following birds and airplanes just by moving the eyes
  - Puzzles
  - Blocks

Other Fun Activities

- Make household instruments
- Jumping and crashing activities
- Simon Says, Hokey-Pokey, Mother May I
- Ball Catch
- Balloon batting
- Play dough with rolling pins and cookie cutters
- Body Rhythm—clap and tap different body parts
- Marble painting—tray with finger paint on paper rolling marbles from side to side
- Ribbon dancing
- Jumping rope
- Swimming
- Playing with scents—guess the smell
- Trying various tastes—sour, sweet, spicy and textures—crunchy, chewy, mixed
Sensory Input Guidelines

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<td>Heavy Work</td>
<td>JOINT ACTION</td>
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Sensory Analysis of Challenging Behaviors

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<td>Teeth Grinding</td>
<td>Resistive Chewy Toys, Nuk Kit/ Electric Toothbrush, Mini Massager, Chewy &amp; Crunchy Foods, Blow Toys, Limit Extraneous Auditory</td>
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<td>Strong Total Body Input</td>
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<td>Spinning Self</td>
<td>Provide Strong and Varied Movement Input</td>
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