



Concept Training

An introduction to Sensory Circuits

Led by

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Objectives

- To develop a greater understanding of Sensory Processing Disorder (SPD) / Sensory Integration Dysfunction (SID) and in particular, sensory-based motor disorder.
- Identifying some difficulties.
- Implementing strategies, e.g. 'Sensory Circuits'.

Understanding Sensory Processing

Sensory processing or sensory integration is necessary in order for us to process information from our senses.

Sensory integration was defined by occupational therapist Anna Jean Ayres in 1972 as "the neurological process that organises sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment"

The human nervous system



Sensory receptors throughout the body are activated by stimuli in the external world and ones own body. The nerves & spinal cord deliver messages from these sensory receptors to the brain to be processed.

The Sensory Systems

1.Sight

2.Hearing

3.Smell (Olfactory)

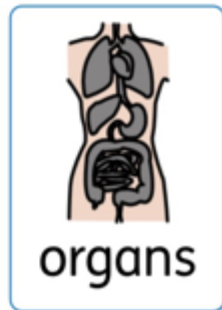
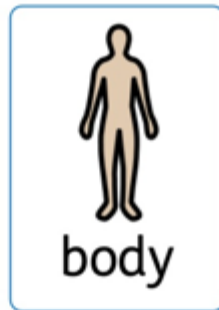
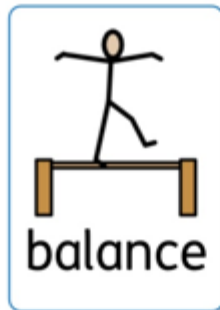
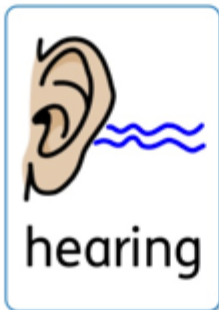
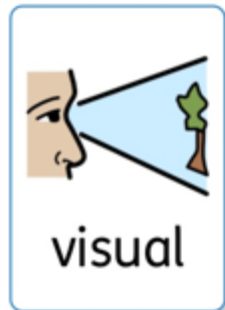
4.Taste (Gustatory)

5.Touch

6.Vestibular

7.Proprioception

8.Interoception



Proprioception

Necessary for body awareness. Also causes a chemical reaction in brain / feel-good factor & helps with self-regulation.



PUSH



PULL



HEAVY MUSCLE WORK



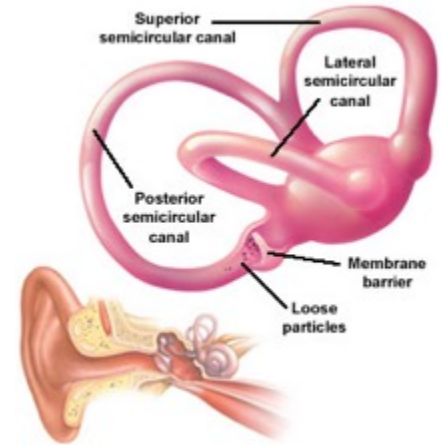
STRETCH



Vestibular

Important for balance & spatial awareness.

Also needed for arousal / alertness levels



Interoception

Important for noticing pain or discomfort



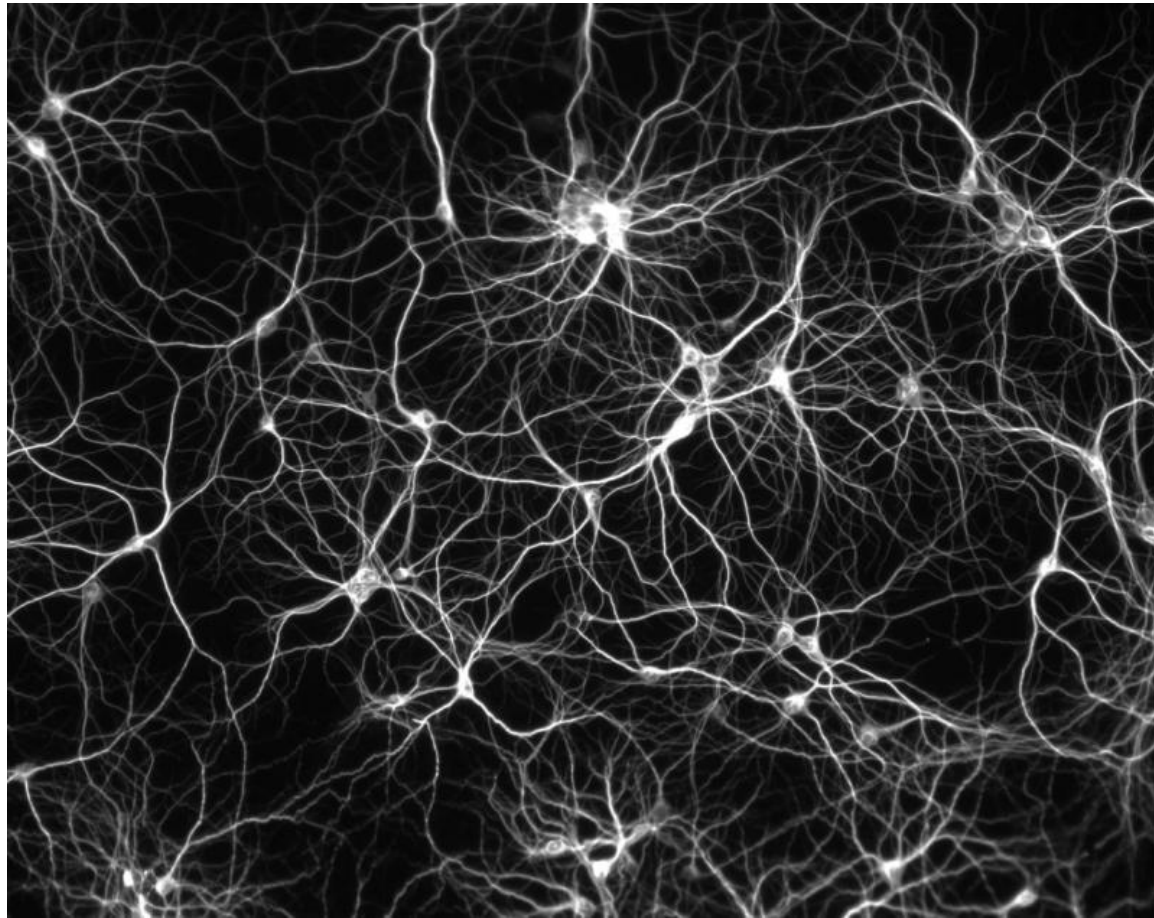
We can categorise sensations:

- Sensations that provide information from the environment
- Sensations that provide information about when the body is moving and where the body parts are in relation to space
- Sensation that provides information about the internal workings of the body

Adapted from Sensory Integration & the Child (Ayres 2005)



Reflexes



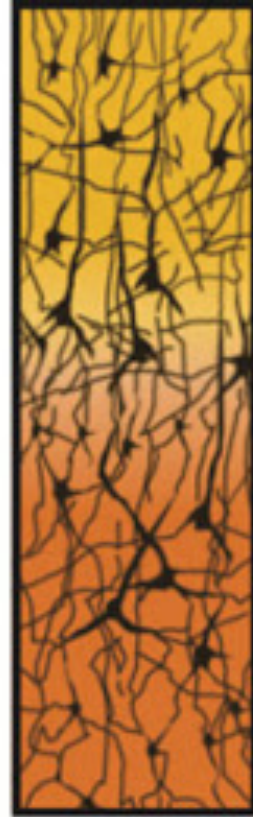
Many of the new-born baby's neurons in their brain are responsible for reflex actions, which help them to survive and develop in their first few months.



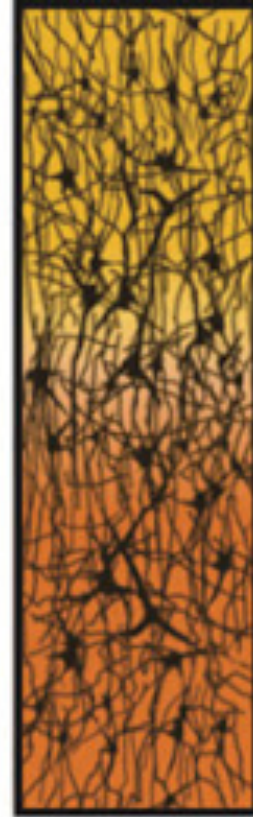
Newborn



1 Month



9 Months

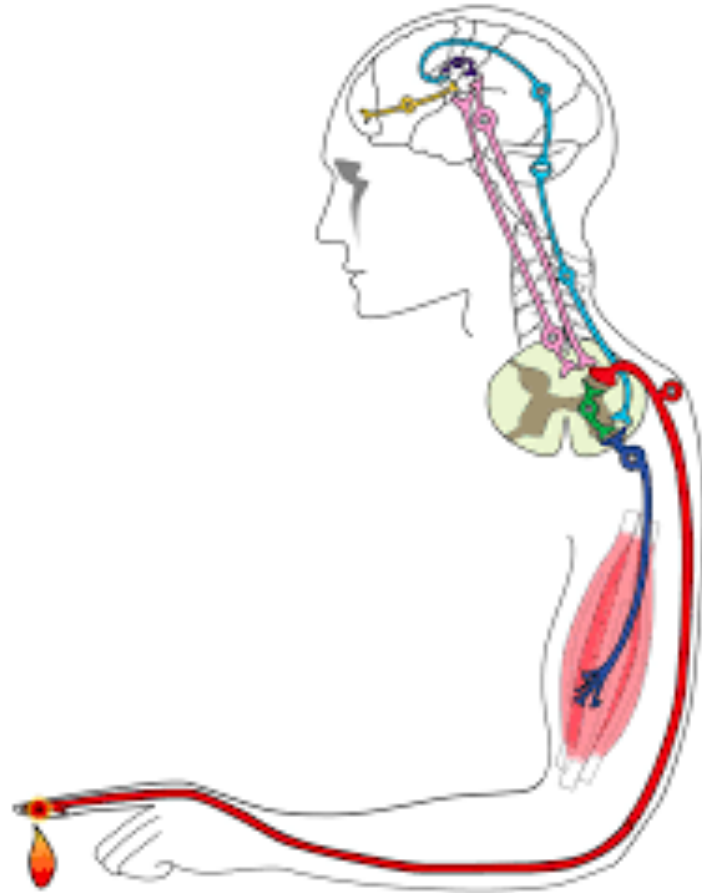


2 Years



Adult





Reflex actions are automatic and do not require the cortex (thinking part of the brain) to be involved in planning and initiating a motor action.

Pathways of the Nervous System

Stage 1

Receptors send messages (via Spinal cord) to Brainstem

Stage 2

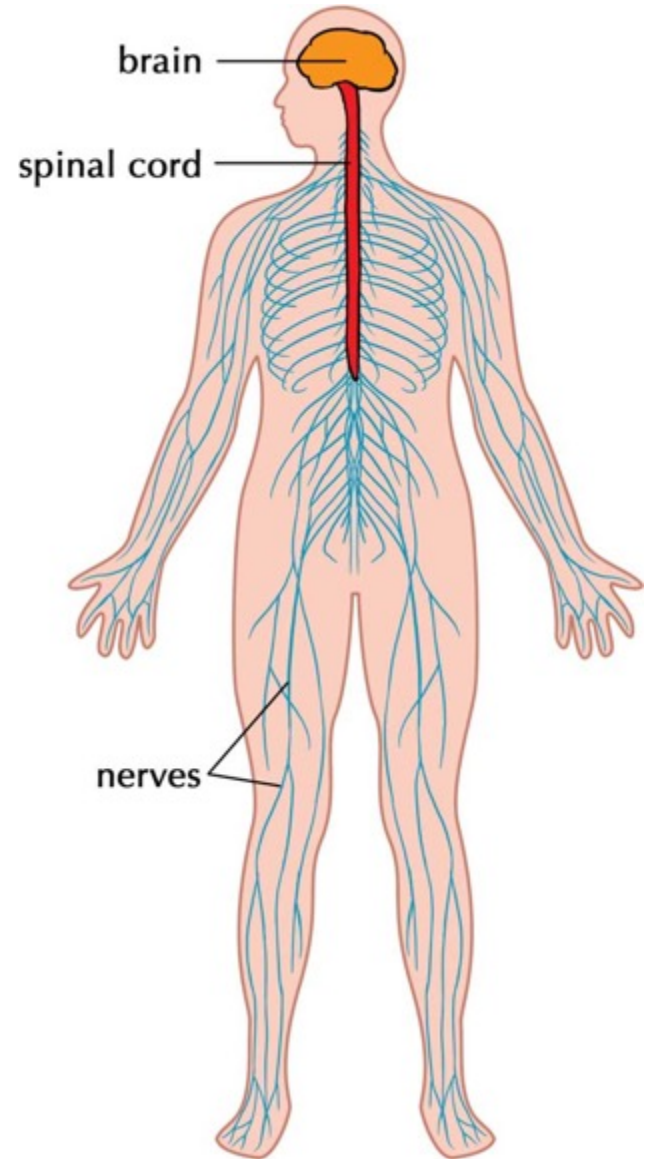
Messages sent from Brainstem to Cerebrum & Limbic System

Stage 3

Messages sent to Cortex

Stage 4

Cortex makes decisions and plans responses before sending messages to muscles (Praxis)



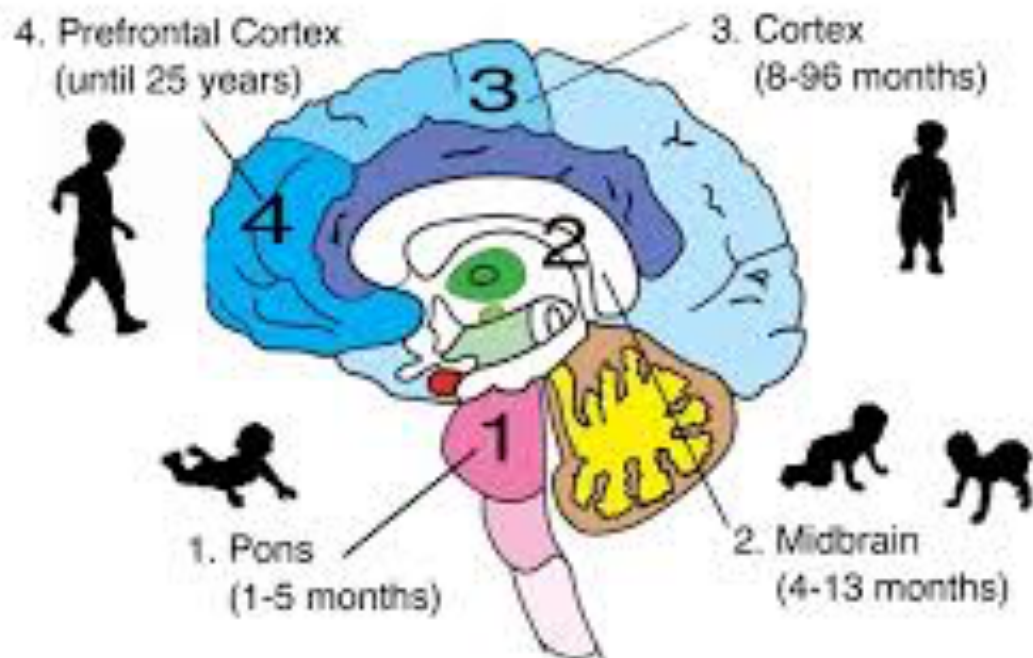


Praxis

Planning how to interact with the environment & carrying out the plan. Organisation of our bodies & behaviour



Neurodevelopment Through Movement



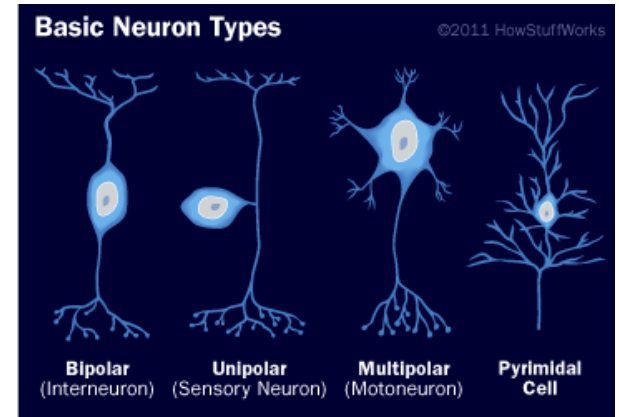
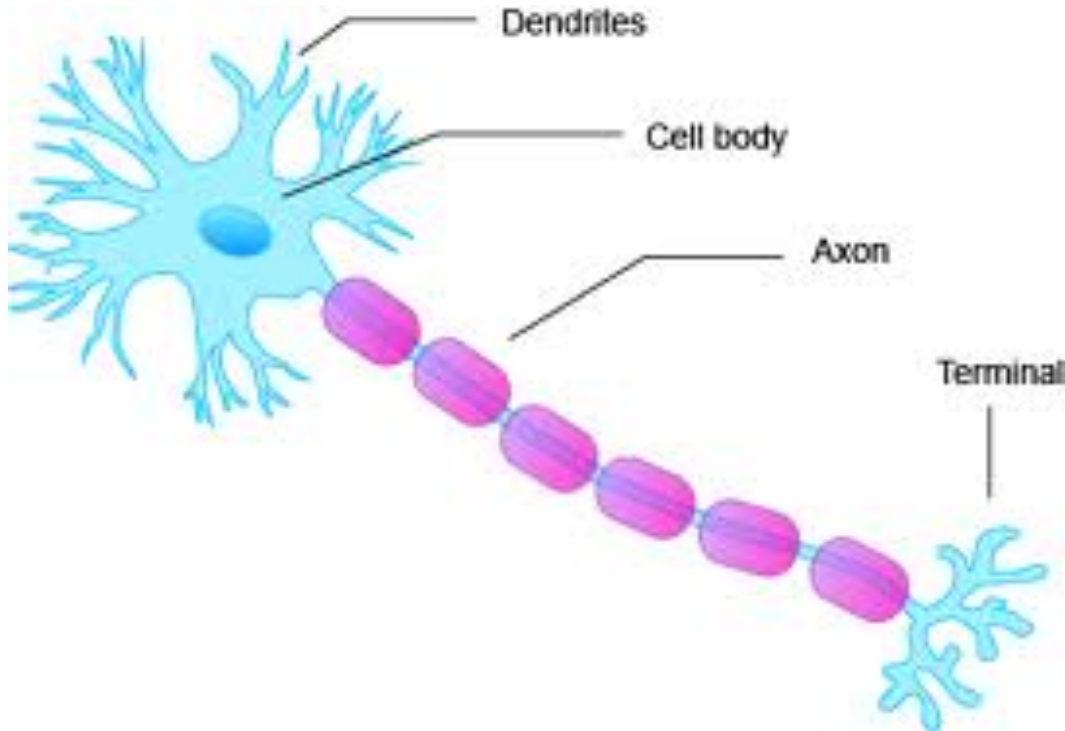


Opportunities to move in response to sensory stimuli are very important for brain development.

The developmental sequence of using our senses or how we sense (sensory integration)?

1. Sensory registration (take note of all the sensations)
2. Orientation (where are they all coming from?)
3. Interpretation (what are they? Do I remember them?)
4. Organisation of a response (what shall I do about it?)
5. Execution of a response (moving part of my body)

Children need time for this complex process



Brain activity is “activity-dependent”

Stimulation encourages something or someone to grow and to develop

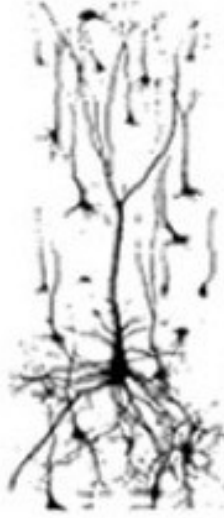
36 weeks
gestation



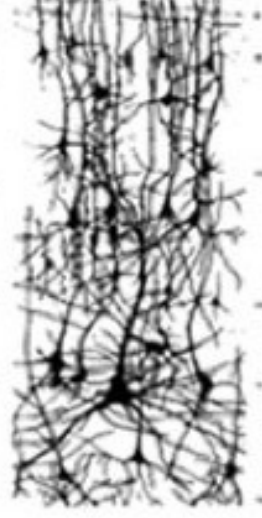
Newborn



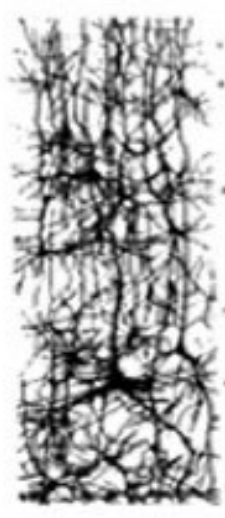
3 months



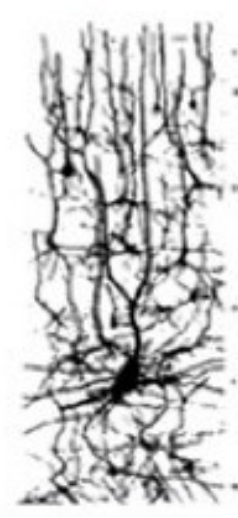
6 months



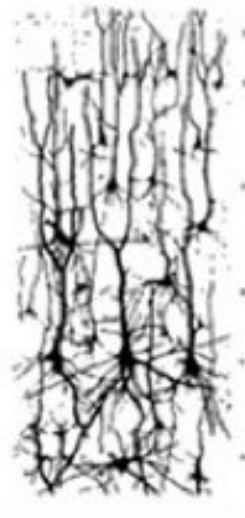
2 years



4 years



6 years



Synapse Formation

Synaptic Pruning

As a young child processes sensory stimuli and their brain practices planning and executing movement until it becomes automatic, so new pathways are developed and become more efficient. Some of the old unnecessary pathways can then be pruned.

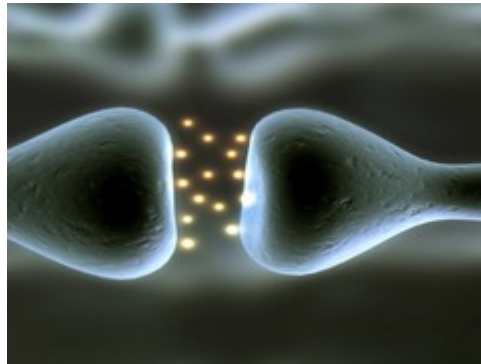
We need to practice & learn until a motor skill becomes automatic

Children are programmed to be active. As they explore the world, repeating activities, so they are developing their neural pathways and sensory integration develops.



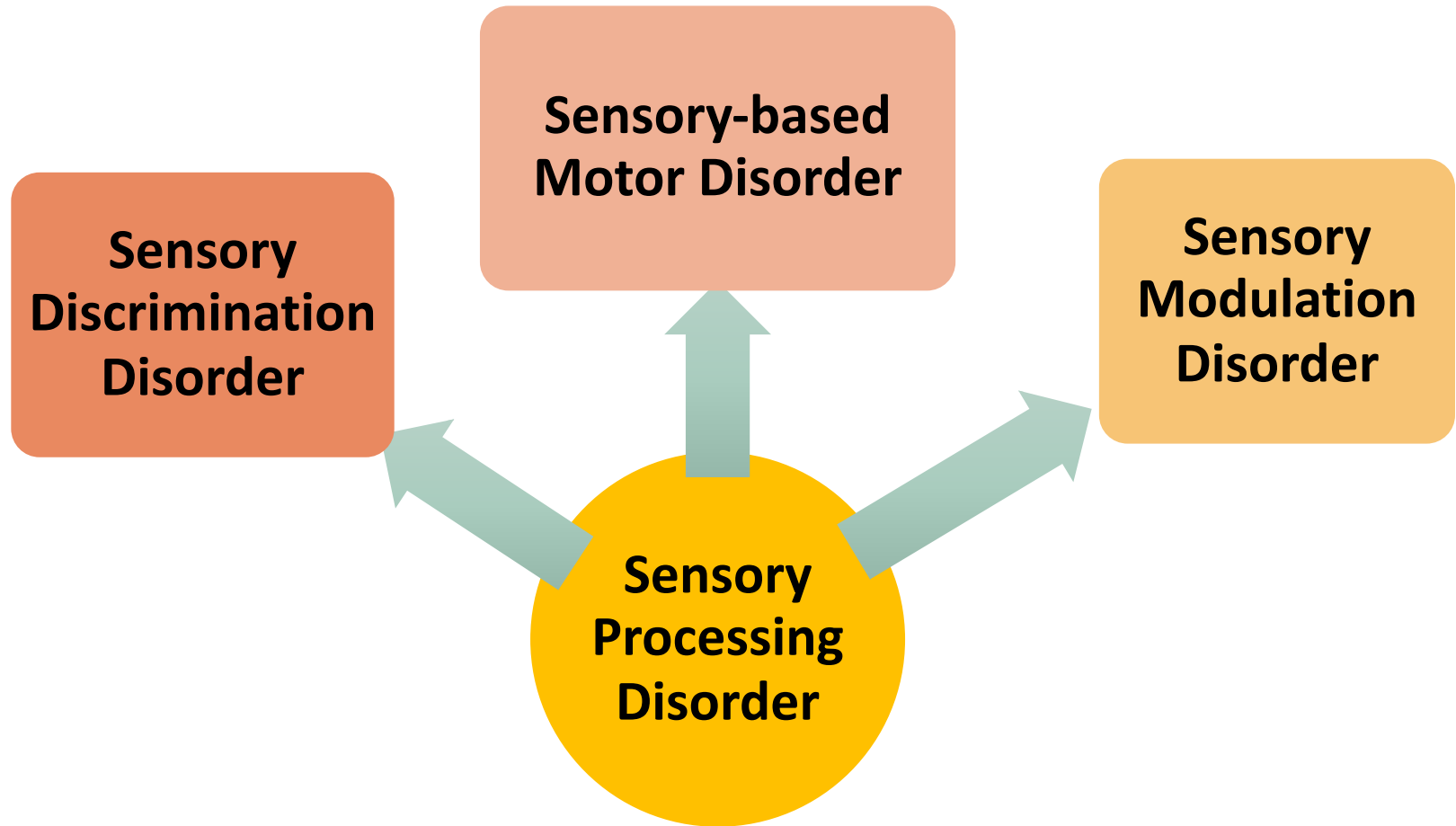
Synapses

These are the junctions between these neural pathways. In order to jump across a synapse and link the pathways a sensory message needs to be strong.



- **If the sensory message is too strong the nervous system will try to dampen it.**
- If it is too weak, then it will not jump across the synapses and carry on its journey.

The terms we use to describe Sensory Processing Disorder (SPD)



Sensory-based Motor Disorder

has two sub-types:

Postural Disorder & Dyspraxia

Both are motor difficulties with an underlying sensory basis

Sensory hyposensitivity (under responsive) usually co-occurs with Postural Disorder

Postural Disorder

- Poor core strength
- Decreased endurance
- Slow & cautious in their movements
- Preference for sedentary activities
- Difficulties with balance
- Wide base when walking
- 'W' sitting
- Poor bilateral coordination
- Low self-esteem & confidence

Dyspraxia

Dyspraxia is a difficulty with the three aspects of completing a motor action. 1) Ideation, 2) Sequencing, 3) Motor execution

When we can execute an activity automatically, a plan is no longer needed.

- Clumsy, awkward movements
- Poor body awareness
- Difficulty negotiating new environment
- Poor sequencing of tasks
- Difficulty with fine motor skills
- Difficulty timing movements
- Poor control of oral-motor for eating etc.
- Difficulty dressing
- Slow motor reactions

Strategies and interventions for children with Sensory-based Motor Disorders

- Time to idealise, plan & execute movements
- Opportunities to practice without time constraints
- Tasks broken down into smaller components
- Backward chaining
- Prompts, e.g. what do you need to do next?
- Build self-esteem
- Obstacle courses
- Twister
- Practice, practice, practice until it becomes automatic

Balance & Posture

Necessary for concentration & everyday activities.
We need both static & dynamic balance



Some children need more practice than others



Sensory Circuits

- As an element of a sensory diet
- To stimulate & arouse
- For calming
- For sensory-based motor disorders.
 - Ideation, Planning and execution of motor activities
 - Developing balance, core strength , body awareness

Sensory Circuits

Alerting Section

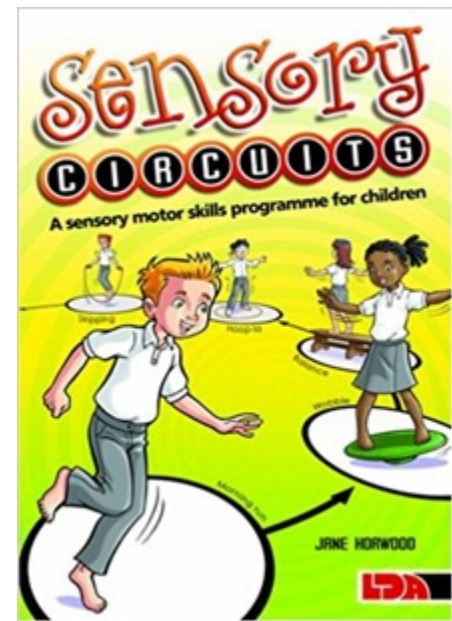
Provide vestibular stimulation in a controlled way, preparing the brain for learning

Organising Section

Activities that require planning (praxis) & balance. The participants need to assimilate information, organise their body, plan their approach, do more than one thing at a time in a set order.

Calming Section

Activities (mainly proprioceptive) that enable each participant to move on to the next part of their day in a calm and receptive mood.



The sub-types of SPD

Sensory Modulation Disorder

How we make sense of the physical world and how we place ourselves within that world.

The brain's capability to respond in the correct fashion to the surrounding environmental stimuli and the ability to remain at the correct level of responsiveness.

If a child has sensory modulation disorder the process of responding appropriately isn't automatic and it requires effort. The perception of stimuli gets muddled and the child's responses seem illogical.

High Threshold



Low Threshold

High Threshold



Passive



Active



Low Threshold

High Threshold



Passive



Active



Low Threshold

High Threshold

Hyposensitive

- Underwhelmed
- Passively unresponsive

Hyposensitive

- Underwhelmed
- Actively Seeking stimulation

Passive



Active

Hypersensitive

- Overwhelmed
- Passively suffering

Hypersensitive

- Overwhelmed
- Actively avoiding
- Actively defensive

Low Threshold

- **Sensory Diets**
- **Sensory Circuits**



Hyposensitive

- Underwhelmed
- Passively unresponsive

- **Sensory Diets**
- **Sensory Circuits**
- **Increased understanding & tolerance**



Hyposensitive

- Underwhelmed
- Actively Seeking stimulation

Passive



Active

- Hypersensitive**
- Overwhelmed
 - Passively suffering



- **Remove the stimulation**
- **Gradually de-sensitise**

- Hypersensitive**
- Overwhelmed
 - Actively avoiding
 - Actively defensive



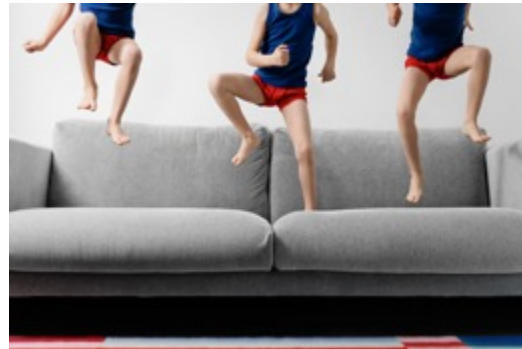
- **Remove the stimulation**
- **Gradually de-sensitise**
- **Increased understanding & tolerance**



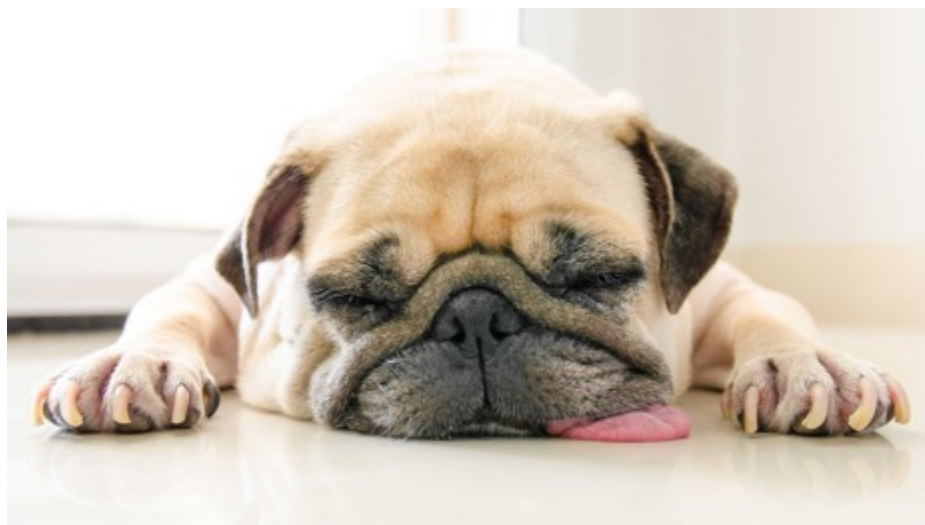
Hyposensitivity / under responsiveness / sensory dormant / Underwhelmed



Sensory seeking



We all need to self-regulate



Sensory Modulation Disorder

- **Over-responsiveness / Hypersensitivity**

An exaggerated response of the nervous system to sensory input. During an over responsiveness behaviour the body goes into 'fight, flight or freeze'. **These children do not need sensory circuits**

- **Under-responsiveness / Hyposensitivity**

The lack of response to environmental stimuli. May show lack of awareness of the stimuli. **These children do benefit from sensory circuits.**

- **Sensory Seeking**

The nervous system needs intense and frequent input in order for the sensation to be processed. There is a need or craving for this stimuli. **These children do benefit from sensory circuits.**

Alerting activities (Arrhythmical & Unpredictable)

Note: Care needs to be taken, not to over stimulate participants

- Bouncing on gym ball /space hopper
- Running
- Jumping
- Hula hooping
- Step-ups
- Scooter boards
- Being spun on a parachute, blanket or chair
- Rocking
- Walking on different surfaces
- Loud, fast-paced music
- Crunchy foods
- Swinging
- Messy play
- Sliding
- Strong smells
- Strong flavoured foods
- Loud noises
- Vibrating toys or pillows
- Light touch or stroking
- Cold temperatures
- Touch from behind
- Bright colours or lights
- Cold foods
- Peripheral vision
- Chewy foods
- High verbal input
- Feely bags

Calming activities

Rhythmical & repetitive

- Deep pressure massage
- Medicine ball games
- Weighted back pack
- Pizza game
- Vacuuming
- Cleaning windows
- Carrying shopping bags
- Hang from wall bars
- Squat against wall
- Slow rocking or swaying
- Crawling
- Low noise
- Soft music
- Low verbal input
- Wrap in blanket
- Low lighting
- Sucking thickened liquids
- Blowing
- Biting
- Lavender
- Bland tastes
- Gentle direct joint compression
- Pushing & pulling heavy objects

Planning a Sensory Circuit

Who is the Sensory Circuit for?

Do they all have similar Sensory needs?

Where will you do it?

When?

How long for?

What equipment is available? Or do you need to obtain more?

Keep it simple

