

Sensory Integration in Mental Health

Introduction

- The field of sensory integration (SI) is still to be evolving due to rigorous and ongoing research within the field. The work of Dr. A.J. Ayres that she has done between the late 1960s and the 1990s has not only confirmed the theoretical basis of SI and the developing child but has also been expanded.
- Parham states that although components of play are relevant throughout the lifespan, **‘play is a significant and primary occupation of children’**. Play is the occupational performance area that allows for the continuation, enhancement and growth of neural processing, physical endurance, perceptual motor abilities and behaviour.

- The relationship between SI and play can no longer be ignored. **Play provides opportunities for the intake of sensory input, but SI forms an important foundation for the development of occupational performance components, motor skills and thus the abilities involved in play.**
- In children with child psychiatric conditions, it is not yet clear whether SI deficits coexist with the pathology or whether it is an integral part thereof. With conditions such as intellectual disability, attention disorders and developmental coordination disorders (DCD), sensory processing difficulties are described as part of the challenges these children experience, but it does not form part of the diagnostic criteria.

- Autism is however an exception where sensory processing difficulties are described as part of the diagnostic criteria. In the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5), Autistic Spectrum Disorders (ASD) have a Criteria for diagnosis related to restricted, repetitive patterns of behaviour where two of the four behaviours specified are related to sensory processing issues; insistence on sameness, with difficulties in changes and transitions and hyper or hypo-reactivity to sensory stimulation or unusual interest in sensory aspects of the environment.

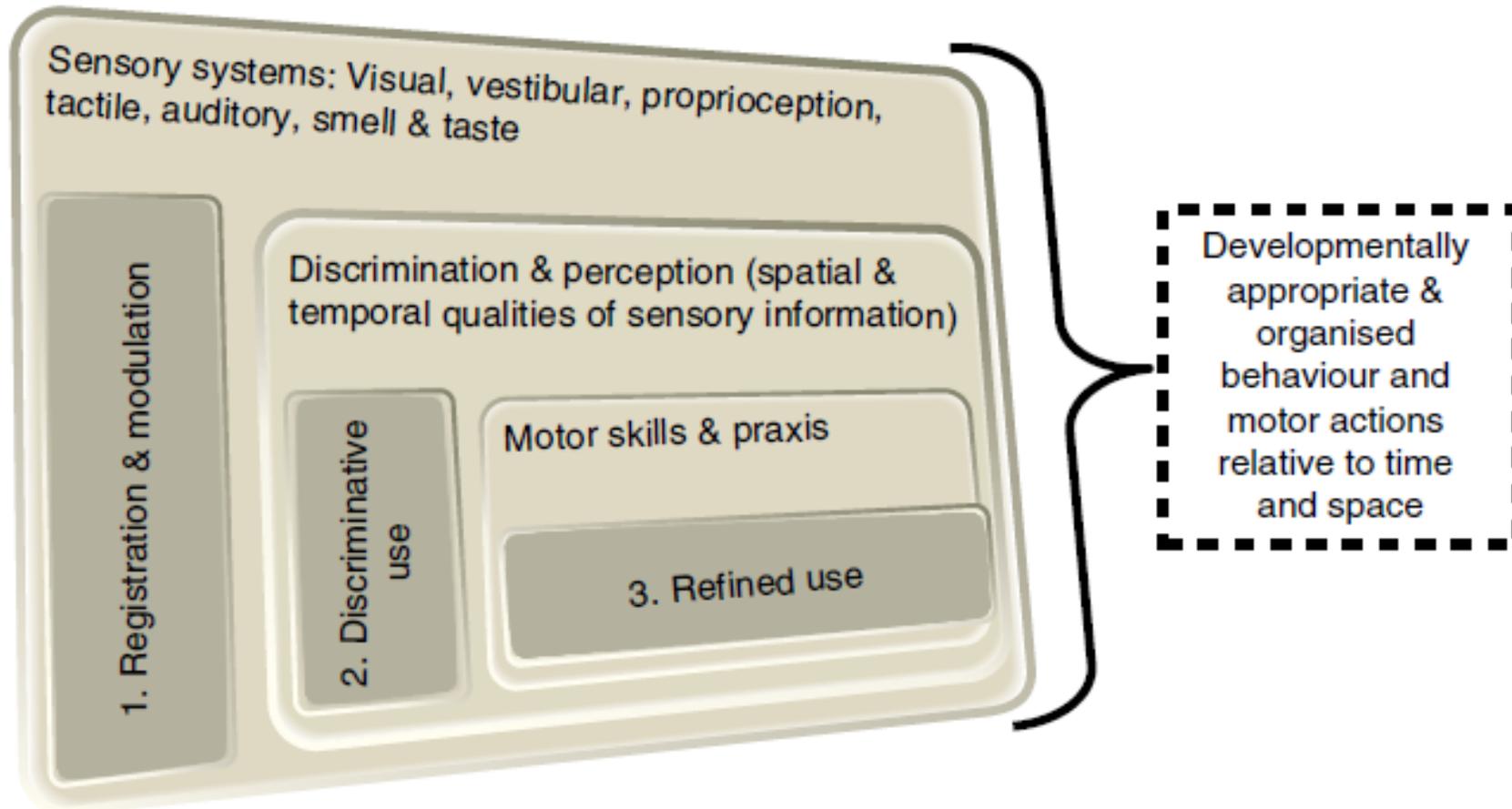
- Ayres (1989, p. 22) defined SI as ‘the neurological process that organises sensations from one’s body and from the environment and makes it possible to use the body effectively in the environment’.
- She displays the importance of the interactions between the different sensory systems and the role that the processing of sensory information and the integration of it plays in learning and behaviour (end products) (Ayres 1972). End products represent abilities and skills such as concentration, organising skills, academic learning abilities, self-esteem, self-control and self-confidence. The model demonstrates not only how sensory systems work together but also how sensory systems contribute to increasingly complex behaviours

- **Sensory systems**
- The fact that sensory information provides an important foundation for learning and behaviour is well described in SI literature based on the work of Ayres. Although all the sensory systems are crucial in typical development and function, the three sensory systems that are central in SI theory and practice are **the tactile, vestibular and proprioceptive** systems, also referred to as ‘body-related’ or body-centered senses (Schaaf et al. in Kramer & Hinojosa 2010).

Ayres had originally proposed the following on brain function, learning and behaviour, and this still holds true:

- Perceptual awareness: refers to the brain's ability to process and interpret sensory information from the environment, allowing individuals to recognize and respond to stimuli. supports and facilitates occupational engagement.
- Motor learning (Motor learning is the acquisition and modification of learned movement patterns over time.) is influenced by, if not dependent on, incoming sensation.
- Body awareness: (It's also known as kinesthesia, or the awareness of the position and movement of body parts in relation to muscles and joints. In short, it's how you recognize where your body is in space.) creates a postural model to understand visual-motor development.
- Postural control (the ability to maintain balance and stability of the body's position) is essential for skilled academic and motor performance.

- ❑ Tactile, vestibular, proprioceptive, and visual systems provide key data in the development of reading and writing.
- ❑ The ability to focus and maintain attention and to keep a steady level of activity, and the way in which the nervous system responds to tactile sensation, are related.
- ❑ The sensory systems develop in an integrated and dependent manner.
- ❑ Visual and auditory processing depend on foundational body-centered senses.

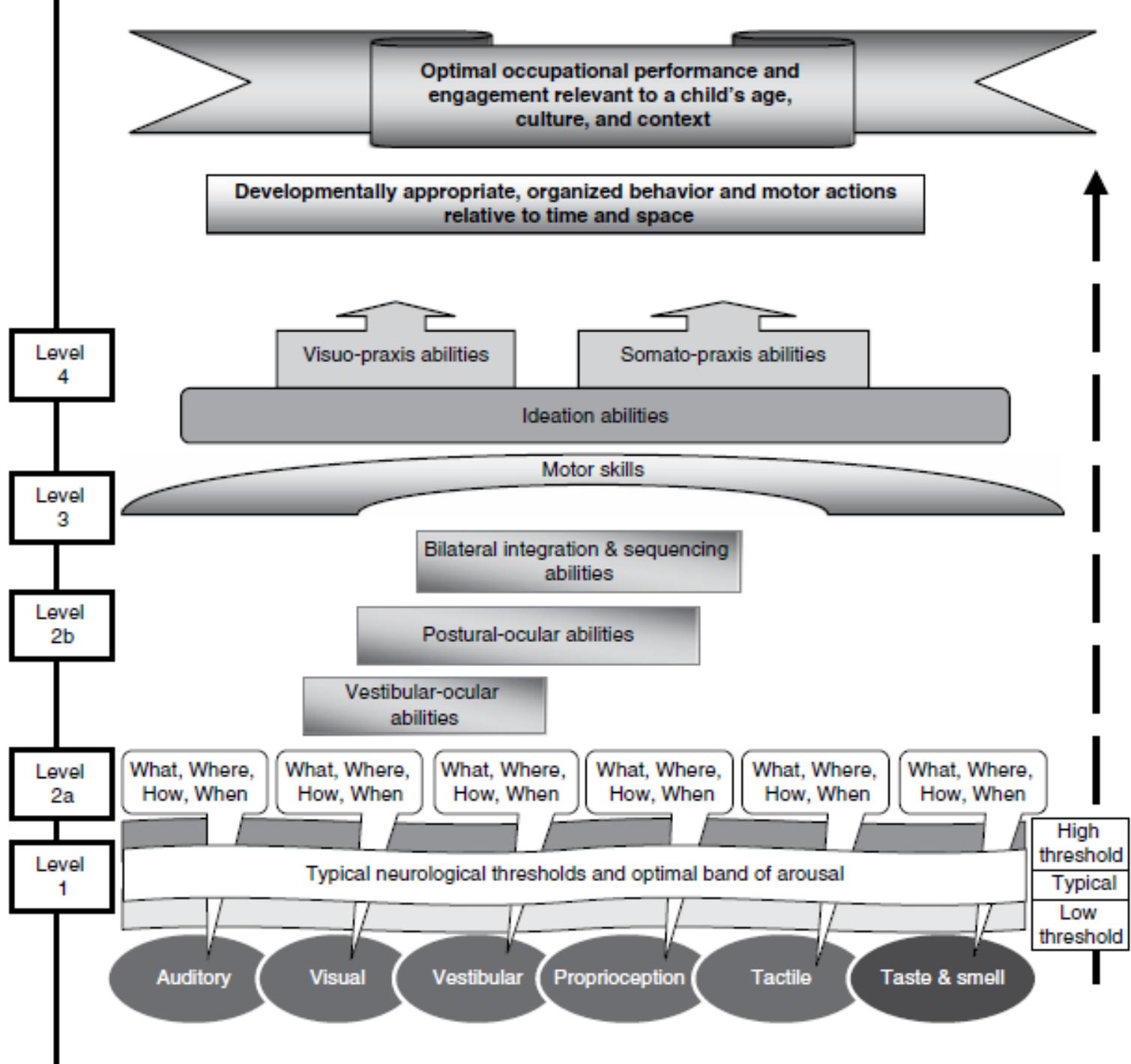


Levels of SI that support organised behaviour.

- The first level in Figure represents **registration, arousal and modulation** which are viewed as overarching modulation although it can be debated whether registration is part of modulation. For sensory information to be modulated, it needs to be registered, and for the purpose of this model, **registration of sensory information is seen as the first part in the process of modulation. When sensory information is modulated, it contributes to the ability to focus on and concentrate and engage in those activities that are in the foreground at a given moment in time.**

- The second and next level of SI is that of **discrimination and perception that provides information on spatial and temporal qualities of sensory information** received. Discrimination and perceptual abilities allow for a ‘higher’ and more involved level of participation in activities as cognitive involvement is also required. An example would be ‘**what** am I touching?’, ‘what are the qualities of the object that I am touching?’ and also ‘**when** did I touch it?’ and then ‘**how** do I need to react?’ **Cognitive recognition, meaning and decision-taking now form an important part of the process.**

- Following on that, is the third level that represents **refined use** that is possible when integration of sensory information contributes and **supports motor skills and praxis**. **On this level, more advanced motor and cognitive functioning are required for successful interaction and engagement in activities**. The requirements for successful participation also become more complex.
- An example of **skilled action** could be the ability to ride a bicycle, and that of **praxis the ability to perform new motor actions with a fair amount of success**, for example, to attempt to jump with a skipping rope for the first time. As soon as the action becomes learnt because of practice and repetition, it becomes a skill and no longer requires praxis abilities.



- Level 1: Registration and modulation of sensory information are functional outcomes observed at this level.
- Level 2a: Basic discrimination and perceptual functions are functional outcomes observed at this level.
- Level 2b: More advanced discriminatory and perceptual abilities and functional use are outcomes observed at this level, with signs of skilled motor actions starting to develop. Discrimination of spatial and temporal qualities becomes more accurate and advanced.
- Level 3: Motor actions become more and more skilled as well as praxis abilities for executing novel motor actions.

- **Sensory registration level 1:**
- Sensory registration refers to the **point where the brain registers sensory information/becomes aware of incoming sensory information.** IT is referred to as the neurological threshold. Neurological thresholds are viewed to be on a continuum, where on the one side of the continuum, a low neurological threshold would imply that very little sensory information is needed before the brain registers it, whereas on the other side, a high neurological threshold would imply that a lot of sensory information is needed before the brain registers it.

- Low neurological thresholds can result in avoidant or sensitive behaviours pertaining to that specific sensory system, and high neurological thresholds can result in poor registration or seeking/craving behaviour. An example of this could be that a child could crave for movement activities due to the high neurological threshold for movement, but would not want to play in a group on play equipment due to a low neurological threshold for auditory information. All the screaming and shouting bothers the child, and playing on play equipment alone or with only a few friends present would be preferred.

- Neurological thresholds can differ within each sensory system with the implication that an individual's sensory profile is in a certain sense like a fingerprint. No two individual's sensory profiles are exactly the same.
- **Sensory modulation level 1:**
- Sensory modulation refers to the brain's ability to adapt to sensory information (from inside the body or from the environment) in such a way that it supports optimal engagement in meaningful daily activities. It includes the brain's ability to habituate to non-threatening/unimportant sensory information or sensitisation to threatening/ harmful sensory information.

- Modulation is also a brain function that needs to happen within all the different sensory systems. Sensory modulation plays an important role in daily functioning especially in terms of the ability to focus, concentrate and be ready for engagement in the task at hand.
- Adequate modulation of sensory information supports the capability of the individual to sustain engagement in activities despite variability within the body and/or the environment, and it is thus of great importance in the learning process of a child.
- Sensory modulation also supports optimal levels of arousal to engage in activities. It further contributes to not only stability in emotions but also impacts on behaviour.