Sensory Integration

This briefing explains sensory integration, how it is used and how it relates to occupational therapy practice. It is one of a number of approaches an occupational therapist can use.

What is Sensory Integration?
Sensory integration refers to both a theory and an intervention developed by A. Jean Ayres (1972). It is based on the relationship between the brain and behaviour, and is described as ‘the organisation of sensory input for use’ (Ayres 1979, p1). Sensory processing disorder is a term used to describe dysfunction in the sensory integrative process (Miller et al 2007). Ayres sensory integration (ASI®) is the term used to describe the specific intervention based on this theory.

The sensory integrative process can be considered through 3 different aspects: registering sensory input; discriminating and interpreting the input in light of previous experiences; and finally organizing action appropriate to the environment. The sensory inputs that we are most commonly aware of include vision, hearing, smell, taste and touch (tactile). However there are two important hidden senses that are largely unconscious. These are vestibular (balance and movement) and proprioception (feedback from muscles and joints). Our sensory systems provide the information that is needed to successfully adapt to and interact with the environment. Adequate sensory processing enables us to regulate, gain and use information about ourselves and the environment. This lays the foundations for successful participation in daily occupations throughout life (Anzalone and Lane 2012).

Difficulties in sensory processing and integration may be described as:

**Sensory Modulation Disorder (SMD)** – SMDs are impairments in regulating the degree, intensity, and nature of responses to sensory input, resulting in considerable problems with daily roles and routines (Miller 2006). For example a child who is over responsive to tactile sensation may exhibit extreme distress at hair washing or messy play. Individuals may be over, or under responsive to different sensory modalities. Sensory seeking or avoidance behaviours may be observed as an outcome of SMD.

**Sensory Discrimination Disorder (SDD)** - People with SDD have difficulty interpreting the qualities of sensory stimuli and are unable to perceive similarities and differences between them. They can only perceive that stimuli are present. They can regulate their responses to stimuli but cannot tell precisely what or where the stimulus is. For example a person with poor body awareness, due to poor discrimination of proprioceptive information, may experience frequent trips and falls.

**Sensory Based Motor Disorder (SBMD)** - Individuals may have postural difficulties, resulting in difficulties stabilizing the body during movement or at rest, making it hard to meet the demands of the environment or of a given motor task. Alternatively individuals may have problems with volitional or praxic movement (planned movement). Dyspraxia is an impaired ability to conceive of, plan, sequence or execute novel actions. For example difficulty with tying shoe laces, producing handwriting, ball skills, or riding a bicycle.
Whilst sensory integration theory and intervention has traditionally been used with children with specific learning and motor performance difficulties, it is being applied to children with autistic spectrum disorder (Pfeiffer et al 2011) and those with attention deficit and hyperactivity disorder (Lane et al, 2010). Sensory processing disorders have been observed and SI intervention successfully applied to adults and adolescents, those with learning disabilities (Urwin and Ballinger 2005), and those with mental health difficulties (Champagne and Koomar 2012), including borderline personality disorders (Smith et al 2005, Brown et al 2009).

Reliability of sensory integration
The Ayres Sensory Integration Fidelity Measure was designed to measure and verify how closely intervention used in research accurately represents the principles of ASI intervention. Usable in practice, the tool defines structural and process elements that ensure compliance with this level of reliability (Parham et al 2011).

A systematic review (May-Benson and Koomar 2011) examining the effectiveness of the SI approach concluded that it may result in positive outcomes in the areas of sensorimotor skills and motor planning; socialization, attention and behavioural regulation; reading and reading-related skills; and individualised goals. Other emerging evidence also lends support (Miller et al 2007, Pfeiffer et al 2011, Watling et al 2011). Some studies (Lang et al 2012) fail to discriminate between Sensory Integration treatment that meets the fidelity criteria and alternative therapies such as imposed or single modality treatment strategies (Schaaf 2011) that do not meet the fidelity criteria.

A policy statement from the American Academy of Pediatrics makes a number of recommendations regarding the use of sensory integration. Amongst these it suggests setting explicit treatment goals, a time limited intervention period and monitoring the effectiveness of the intervention against the stated goals (American Academy of paediatrics 2012).

How is Sensory Integration used?
When difficulties with sensory integration and processing interfere with the ability to participate in daily occupations, it becomes the concern of occupational therapists. Practitioners need to assess functional abilities and the contribution of sensory integration and processing to the outcome.

Clinical reasoning is best supported by multiple assessment strategies across environments, including standardised tests (e.g. Sensory Integration and Praxis Tests (SIPT)), clinical observations and carer/client questionnaires (e.g. Sensory Processing Measure or Sensory Profile tools). Physiological and EEG measures of sensory modulation have been used but are not accessible to most clinical practitioners (e.g. Davis and Gavin 2007, Lane et al 2010).

Sensory Integration theory supports the delivery of occupational therapy intervention in a number of ways:

1. **Direct sensory integration treatment (ASI®)**. ASI is child-focused, and play-driven, using activities tailored to the individual’s sensory and motor needs. A key element of this approach is active participation ensuring that adaptive responses are elicited. This is a process-oriented approach to intervention aimed at improving underlying neurological processing and organization. (Lane and Schaaf 2011, Parham et al 2011). Direct sensory integration treatment demonstrates improvements in play, individualised goals, social interaction and a decrease in sensory symptoms (Schaaf 2011). Recent studies have used short burst, high intensity treatment (2 to 3 sessions/week over 6 to 10 weeks) based on evidence of neuroplastic changes (Schaaf et al 2012b).
2. **Sensory Strategies.** These strategies are based on SI Theory but do not meet the fidelity criteria of ASI®. They include the use of off-the-shelf tools such as The Alert Programme (Williams and Shellenberger, 1996) or Sensory Toolkits (Henry 2004); and environmental adaptations (e.g. sitting on ball chair) and use of specific equipment used adaptively or therapeutically (e.g. ear phones for those with over-responsiveness to sound, or chewing gum as a proprioceptive aid to increase attention and concentration). The evidence base for these strategies is varied. It is recommend the sensory based interventions are based on thorough assessment and individualised according to the child’s sensory modulation and integration problems. For longer term use periodical evaluation for their effect on the individual’s participation in daily life is recommended (Case-Smith and Schaaf 2012).

3. **Consultation / Coaching -**
   
   Bundy et al (2002) suggest that consultation involves stages:
   i. Formulating expectations and setting goals
   ii. Establishing the partnership (refining and reframing the problem)
   iii. Planning strategies
   
   Consultation or coaching (Dunn et al 2012) is dependent on the clinical reasoning skills of the occupational therapist and requires adequate knowledge and understanding. The evidence base for these approaches is evolving and is therefore based on adequate training, experience and the clinical reasoning of the individual occupational therapist.

**Who can use Sensory Integration?**

The College of Occupational Therapists advises all occupational therapists to only provide services and use techniques for which they are qualified by education, training and/or experience and that are within their competence (COT 2010).

Occupational therapists seeking to practice in an area such as sensory integration must ensure that they are competent to do so. Such work would be deemed as extended scope practice (COT 2013). The Sensory Integration Network recommends that any occupational therapist using Sensory Integration should have received accredited postgraduate training in sensory integration theory and treatment and have pursued continued education in this area. The ASI® fidelity tool requires the therapist to have postgraduate training minimum 50 hours, and regular mentoring equivalent to 1 hour per month.

**How does Sensory Integration relate to occupational therapy practice?**

Central to sensory integration and processing disorders is a disruption to the ability to engage and participate in everyday occupation, and addressing this issue is therefore the core of occupational therapy (Anzalone and Lane 2012). Occupational therapy enables people to achieve health, well-being, and life satisfaction through participation in occupation (COT, 2004). Sensory processing impacts on all key areas of occupation: productivity, self-care and leisure. Examples of this are available in the work of Jasmin et al (2009), Koenig and Rudney (2010).

**To find out more:**

- **Sensory Integration Network (UK and Ireland)** Web: [www.sensoryintegration.org.uk](http://www.sensoryintegration.org.uk)
  Email: info@sensoryintegration.org.uk
  Aims to promote education, good practice and research in sensory integration theory and practice.
- **Sensory Integration Global Network** Web: [http://www.siglobalnetwork.org/](http://www.siglobalnetwork.org/)
  Aims to provide information to consumers, policy makers, and funding sources; establish guidelines of practice and ethics for therapists; increase public awareness; and facilitate networking opportunities across the globe for those interested in Ayres Sensory Integration.
• SPD foundation  Web: www.sinetwork.org
Aims to improve the lives of children with Sensory Processing Disorder (SPD) and their families by conducting research, educating caregivers, paediatric professionals, and educators, and empowering scientists throughout the world to study the diagnosis and treatment of SPD.

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References:


