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Sensory Information Sensory Integration and Strategic Functioning

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Abstract

Our eight sensory systems provide us with information about the body, self, and the environment. The brain constantly selects which information it attends to, enhances, and inhibits, to enable us to function. How we process this information determines our behaviour and affects our capacity to engage with others. Sensory processing dysfunction may result in problems with detection, modulation, and interpretation of sensation. This in turn leads to the emergence of behavioural patterns and strategies. Consideration will be given to strategic functioning from a sensory processing perspective, and for the need to differentiate sensory-based behaviours from attachment-based behaviours in our assessments and interventions. The current practice is to assess sensory processing and attachment patterns separately. The emergence of integrating sensory coding and attachment coding into the same assessment is leading to a broader understanding of presenting behaviours of both parents and children. It is also helping the clinician to more accurately predict which activities dysregulate and which promote regulation.

Sensory Information

"Sensation is the brain's source of information."
(Dunn 2009 p18)

Sensation is detected by specialised receptors that react to internal and external physical stimuli. These receptors form part of our sensory systems. They code and transmit information to the brain to be interpreted and acted upon. Four aspects of sensation are coded: type (modality), threshold and arousal levels (intensity), location (spatial), and duration (temporal). We have eight sensory systems: tactile, proprioceptive, vestibular, gustatory, interoception, visual, auditory and olfactory. These systems can be categorized into proximal and distal senses. The proximal senses, (tactile, proprioception, vestibular, gustatory and interoception) inform us what is happening internally and externally to our bodies. The distal systems, (olfactory, auditory and visual) inform us about the environment we are in, enabling us to plan our responses as opposed to 'reacting' when a stimulus affects the body. For example if we are standing chatting in a car park and we hear the start of an engine nearby, we automatically check to see where it is. Based on our interpretation of that information we then decide whether we need to stay put, or move to avoid being knocked down. In other words our auditory and visual system link in with our proximal senses to enable us to take anticipatory action.

Receptors	
Tactile	Light pressure Deep pressure Stretch Vibration Pain Temperature Itch
Proprioceptive	Static and Dynamic Stretch - most effective means of recruiting proprioception is active stretch and resistance against gravity pull + Corollary Discharge Internal correlates of motor signals that are sent to the muscles after an action is planned
Vestibular	Activated by movement of the head Gravity pull. Vibration Stationary to slow movement of head Acceleration Deceleration Linear Movement Rotational Movement
Gustatory	Sweet Sour Salty Bitter Umami Note the tactile (temperature, texture), proprioception (tongue & jaw movements), olfactory (smell) visual (colour, presentation etc) and auditory (sound of crunching) systems contribute to the sensory experience of eating.
Interoception	Thirst Hunger Nausea Muscle tension Temperature Pain Sexual arousal Heart Rate Breathing
Olfactory	Contributes to sense of taste Fragrant Woody Citrus Smoky Pungent Astringent Nauseous
Auditory	Sound pitch Amplitude
Visual	Light Dark Colour Movement Edge

Sensory Integration

The brain processes and integrates multiple sources of information to enable optimal functioning. The term sensory integration defines this process, but it also describes a clinical theory and treatment model developed by Dr. A. Jean Ayres; an Occupational Therapist with advanced training in neuroscience and educational psychology. Her theory was based on brain and behaviour research in the 1960's and 1970's. She defined sensory integration 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 brain must select, enhance, inhibit, compare and associate the sensory information in a flexible, constantly changing pattern: in other words the brain must integrate it."* (Ayres 1989 p11).

Sensory Integration Theory breaks down sensory processing into Modulation and Discrimination. These will be discussed in turn.

Sensory Modulation - Responsiveness to Environmental Stimuli
The brain makes regulating adjustments to incoming stimuli to achieve the just right balance of excitatory (up regulating) and inhibitory (down regulating) stimuli, whatever is appropriate to the situation. This dynamic process is influenced by our sensory thresholds, i.e. the intensity of stimulation required for a response. It also involves *"the ability to regulate and organise reactions to sensory inputs in a graded and adaptive manner."* (McIntosh et al 1999 p1). Modulation includes the process of prioritizing incoming sensory information by inhibiting or suppressing irrelevant information (Murray-Slutsky & Paris 2000). This allows the brain to focus on what it deems to be relevant information. However what we deem to be relevant is subjective, and is dependent on our previous experiences, the task in hand, where we are, and whom we are with.

Sensory Modulation Dysfunction
"The term modulation refers to both the physiological reactions and behavioural responses to sensation" (Miller et al., in Smith-Roley; Blanche & Schaaf 2001 p57). This paper will however just focus on the behavioural response to external sensation.

Individuals with sensory modulation dysfunction may display an over-responsiveness (low threshold), under-responsiveness (high threshold) or a fluctuating response to sensation. (Parham & Mailloux 1996). Sensory Integration Theory suggests observations of these behaviours indicate that neural modulation of sensory information is faulty (Lane 2002). In addition to this individuals may have a High/Low Threshold pattern e.g. under-responsiveness to movement and over responsiveness to touch. The behavioural presentation thus may alternate between a slow even dull responsiveness to agitated and aggressive behaviour, depending on the sensory trigger.

Over-responsiveness
Over-responsiveness to sensation may include difficulty in filtering out sensory information in the environment, as the sensory environment (and those in it) poses a (perceived) threat. Typical behaviours include intolerance to: certain types of food, messy play, social interactions that involve touch, being in busy noisy public spaces, play/fairground rides, certain smells such as perfume, aftershave, and so on. Individuals with a low threshold quickly become overwhelmed. This leads to avoidant defensive behaviours, which may include flight, fight, or freeze

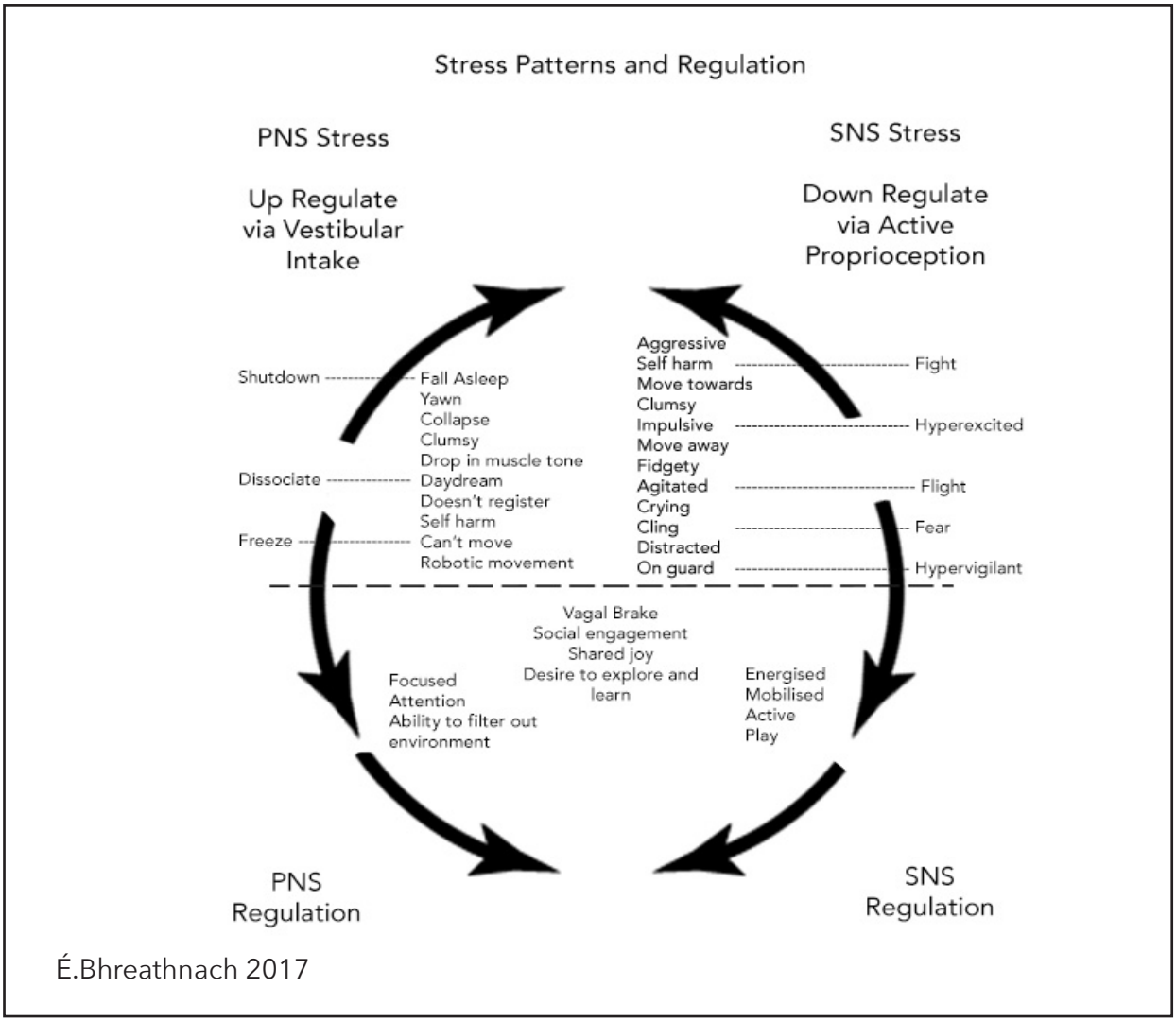
behaviours (Miller et al 1999). There are a whole range of available interventions to regulate the sensory systems involved, however proprioception is recognized as a key modulator across the sensory systems (Kranowitz 1998; Blanche & Schaaf 2001) Opportunities to climb, hang, crawl, lift, carry, push pull, and stretch facilitate the optimal state of arousal for engagement. These proprioceptive activities facilitate the shift from operating in survival mode to active exploration of the environment.

Under-responsiveness

Under-responsiveness is associated with low arousal and often low muscle tone. Low functional muscle tone is described as muscle that is soft, and that has difficulty generating and sustaining muscle activity (Murray-Slutsky & Paris 2000). Children who are under-responsive in any number of systems may fail to notice what is happening around them and miss salient cues in their environment. They may present with dull affect. Ocular motor control may also be compromised because of the inseparable link with the vestibular system (Kawar 2002). They struggle to take down information from the classroom whiteboard as they have difficulty alternating focus from peripheral vision to central vision. Children with poor tactile awareness may fail to notice that food is dribbling down their chin. They fail to register pain when they bump or trip. When asked how they got the bruises, they are unable tell you, as they didn't register pain at the time of injury. Miller et al (2007) state *"This lack of initial awareness may lead to apathy, lethargy, and a seeming lack of inner drive to initiate socialization and exploration. However… inaction is not due to a lack of motivation but rather a failure to notice the possibilities for action."* Provision of high intensity stimulation facilitates the optimal state of arousal and muscle tone required for engaging in a task or engaging with others. Fast movement activates arousal and facilitates vocalisation. Movement stimulation changes the child from appearing distant and disinterested into smiling and engaged.

Fluctuating Responsivity to Sensation

Fluctuating Responsivity to sensation (Lane, Miller & Hanft 2000) refers to rapidly shifting from under–responsiveness to over-responsiveness. The individual may initially display a dulled delayed response to sensation but as alerting stimuli is applied the individual may become defensive and/or aggressive. Consideration should be given to the possibility the individual may be in 'shutdown' as a result of being overwhelmed by stimuli in the environment. Likewise the individual may go from being in a heightened state of arousal to collapsing/sleeping. This would indicate over stimulation has occurred which has then led to shutdown. Sleeping after assessment sessions, therapy sessions, or after school, is a possible indication that the neurological threshold level has been exceeded. Professionals have a duty of care to ensure this does not reoccur, once identified, as it is traumatizing.



Sensory Seeking

All humans sensory seek as a means of regulation. Individuals who fit into this category seek excessive amounts of and specific types of stimulation in an attempt to regulate. (Miller & Anzalone 2007). Sensory Seeking will be more fully explored in terms of strategic functioning.

Sensory Discrimination (including Praxis)

Sensory discrimination is the ability to interpret sensory information for use. It informs us of the similarities and differences in sensation. (Murray-Slutsky & Paris 2000 pp151-214). For example touch discrimination allows us to identify shape, size, and texture. Proprioception provides us with information about the position of body and limbs in space, the rate and timing of movements and the amount of force being exerted (Murray-Slutsky & Paris 2000 p152). The vestibular system provides information on speed of movement (acceleration and deceleration) and orientation of the body in space. Vestibular and Proprioceptive processing are thought to jointly contribute to the perception of active movement; the development of body scheme[1]; and the development and use of postural responses (Bundy, Lane & Murray 2002 p477). For example ball play requires balance, co-ordination, timing and sequencing of movements. It also involves forward planning in that the brain has to anticipate when and where the ball will land, the amount of force being used, and the weight of the ball, then adjust; body position, grading, and timing of movement accordingly.

1 An unconscious mechanism underlying spatial motor coordination that provides the central nervous system about the relationship of the body and it's parts to environmental space (Bundy, Lane & Murray 2002)

Discrimination	
Tactile	Size Form Contour Texture Movement across the skin Location **Role in:** **Shape and form perception** **Exploration of surfaces** **Fine motor skills**
Proprioceptive	Position of body and limbs in space Grading of movement/ Amount of force being exerted. Rate and timing of movement **Role in:** **Fine motor skills** **Active manipulation and exploration of objects and adaptive organised behaviour.** Note: While Tactile and Proprioception information travel up the same pathway, i.e. Dorsal Column Medial Leminscal, they provide a different source of information. Proprioception is defined as movement sensation that arises as a result of the individual's own movement. Tactile pertains to awareness of location, or change in position, of external stimulation applied to the skin.
Vestibular	Dynamic postural control Co-ordination of body, eyes and head Speed of movement. Timing Direction of movement Spatial orientation of Self in relation to the environment **Role in:** **Postural control (static and dynamic)** **Visual attention (eye gaze, tracking)** **Co-ordination of movement**
Gustatory	Noting differences and intensity of flavours. Freshness of food Safe/unsafe to consume. Note: the tactile (temperature, texture), proprioception (tongue & jaw movements), olfactory (smell) visual (colour, presentation etc) and auditory (sound of crunching) systems contribute to the sensory experience of eating. **Role in:** **Nutritional needs** **Attachment** **Social engagement.**
Interoception	Recognises the need to: Eat and drink Defecate and urinate To rest when body is tired or ill. Awareness of arousal state Emotional awareness **Role in:** **Self awareness** **Self care** **Emotional connection**
Olfactory	Direction & Location Intensity Contrast **Role in:** **Attachment (infant recognises mother's smell)** **Contributes to sense of taste**

Discrimination	
Auditory	Direction and location Speed and timing Foreground /background Differences, identifying sounds **Role in:** **Spatial orientation** **Receptive language** **Attachment (new born infant identifies mother's voice)**
Visual	Day/night Contrast Speed and distance Boundary Direction and location. **Role in:** **Space and form perception** **Circadian rhythms** **Attachment** **Social engagement**

Dysfunction in Discrimination
Dysfunction in discrimination may involve difficulties with co-ordination, grading and sequencing of movement. It may also be having a poor sense of direction, difficulty following written or verbal instructions, difficulty retaining sequences of information (spelling, people's names, mathematical formulae). Limited sensory information in turn impacts on the ability to come up with ideas, and to plan novel or alternative ways of doing things. There is an over reliance on familiar patterns which in turn limits the capacity for adaptive behaviour. The key to intervention is providing 'sensory-rich' activities to enhance feedback and provide the brain with more information about the body self and the environment. Exploration is child led and has to be fun so when things go "wrong" shame isn't elicited; instead it leads to laughter and shared joy. Encourage the child to come up with his/her own plan (ideation). Get the child to physically explore how many ways an object or a piece of play equipment could be used. Standing and balancing on swings, climbing, hanging, crawling through spaces such as a tunnel maze, moving fast through an obstacle course on a scooter board. All of these activities provide enriching experiences. The child is expected to figure out what to do next if the plan doesn't work in order to promote adaptive behaviour.

Nature and garden spaces provide wonderful opportunities to develop spatial temporal awareness. Encourage children to listen to, identify and locate nature sounds (auditory discrimination), and to forage (visual discrimination, olfactory, and grading movement); Opportunities are endless and exciting.

Strategic Functioning

Ayres believed (1989) if we let the child follow their inner drive they will usually do what is best for their nervous system. *"The brain is designed to give itself the experiences that are necessary for it's own development."* (Ayres 1989 p140).

Strategic behaviour involves actions that either inhibit or enhance sensory input, as a means of achieving the appropriate state of arousal. They should be distinguished from 'survival behaviours' which are instinctive and reflexive. There are a whole range of strategic behaviours that are used for self regulation purposes. Here are some examples of these behaviours.

Sensory Seeking
Down regulation to counteract a heightened state of arousal

Proprioceptive Seeking
Active sensory seeking can often lead to what is deemed to be 'risk taking behaviour', in that seeking involves climbing high, hanging, jumping, crashing, and bashing (intense active proprioception). This behaviour is seen as demanding and attention seeking. They are frequently labelled "troublemaker," "risk taker" and "dangerous" (Miller et al 2007). Sensory Seeking children can become impulsive and aggressive in unstructured settings or where their sensory needs are not understood. They present as giddy and agitated in environments where they are expected to be quiet and still. Telling these children to sit still and pay attention activates anxiety as they know that is impossible for them. Those that try, ultimately 'explode'. Unfortunately that may well be at the school gate, where parents bear the brunt of this anxiety

and could even be accused of poor parental management. There is a danger in seeing this behaviour as simply a strategy to activate a response from the parent, where it is actually the brain's attempt to regulate. These children need structured opportunities for intense proprioception, which includes intake of foods that are crunchy and chewy. Focused attention is achieved once the proper amount of sensory input has been accumulated i.e. they have reached their threshold. Movement breaks should be provided in school, and opportunities for active play and a regulating snack at home, before they do their homework or other activities.

Tactile Seeking

Temple Grandin describes in her book *Emergence: Labelled Autistic* (Grandin & Scariano 1986) how she longed for the good feeling of been hugged but stiffened when people hugged her. She felt overwhelmed and described the sensation as feeling 'engulfed in a tidal wave'. She went onto develop a hug machine as a result of seeing how her Aunt's cattle calmed when placed in the cattle crush. Temple found that the machine also calmed her, and reduced her levels of aggression. An alternative to this is 'kid sandwiching'. This involves a child being sandwiched in-between two cushions, and being squashed by an adult. Double decker sandwiches involves two children being the 'fillings' for the sandwich.

Enhancing awareness to facilitate higher level functioning

Sensory seeking is also used to enhance awareness when there is reduced perception of sensation (Miller & Anzalone 2007). This may take the form of fiddling with objects. Until adequate perception is achieved to successfully complete a task. Pushing up and down the top of a pen builds up joint awareness which is required for handwriting or squeezing and feeling a ball before throwing it.

Up Regulation to counteract Low Arousal

Vestibular Seeking

This may often support up regulation to counteract low arousal. Fast movement activates arousal, increases muscle tone, and facilitates vocalisation. Think of the effects of fairground rides where you hear people screaming; you see them smiling yet clinging on the safety bar as if their life depended on it. Children's instincts are to run and play chasing when they are let out of the classroom at break times. The noise levels correspondingly increase as they run around. Adults similarly elect to go running or cycling after a day's work.

Calming and Alerting to Facilitate the Optimal State of Arousal for Engagement

Coming fast down a hill (alerting) and manoeuvering through space (organizing movement) on a 'Shark' Board[2] is both thrilling and organising. It increases muscle tone, facilitates holding and staying put and requires spatial temporal organisation.

2 A wheeled toy similar to a scooter board which the child kneels on, and can steer and break using a bar on the front.

Avoiding Strategies

Individuals with low thresholds may use avoiding strategies to control the amount, duration and intensity of stimulation in the environment. They easily become overwhelmed and uncomfortable in the presence of what they perceive to be noxious stimuli. One sensory avoidant adult has described going shopping as akin to being in a war zone. This was in a small but busy local grocery store. The unpredictability of accidental touch from shopping baskets, and being in close proximity to people standing in a queue was too much for her nervous system. Online shopping was the best strategy for this adult. Dunn (2009) describes the profile of those with low sensory thresholds as wanting; order, routine, and needing to know plans in advance. Schedules and predictability are key strategies for managing input. (Dunn 2009). Activities of daily living are organized around avoidance e.g. choosing quiet spaces, avoiding escalators or elevators, avoiding or limiting time spent at large family gatherings. They also tend to pick friends who have compatible nervous systems. The challenge arises if a parent's pattern is incongruent to their child's pattern or vice versa.

The Impact of Sensory Integration Dysfunction on Attachment Relationships

The impact of sensory integration dysfunction[3] on the attachment relationship needs to be considered. Parents may feel their child's lack of responsiveness or avoidance as a form of rejection. They may feel incompetent as they struggle to regulate their distraught child. If their child has both modulation and discriminative dysfunction they are likely to receive complaints about their child's aggressive behaviours. Children who are sensory defensive may accuse a child, who has lightly brushed passed them, as having assaulted them (because that is how they experience it) and respond accordingly. Children with poor grading roughly handle people and objects, which again can lead to complaints from other parents and school. Attachment work, or well-meaning advice from family and friends, doesn't work because the child's nervous system is atypical and therefore needs specific type of sensory input to regulate.

Parents also need to undergo sensory profiling to identify if there are sensory issues that are impacting their ability to parent their child. Parents can profile themselves and their families in Dunn's *Living Sensationally* book (2009) and learn about how their sensory systems work. Dunn (2009) provides regulating strategies for home, work, leisure and relationships.

3 Since the theory of sensory integration was first proposed in 1963, Ayres' work has been continued and expanded upon by many theorists, researchers, and clinicians. In addition, an increasing number of investigations of sensory integration theory and intervention and new empirical evidence have emerged, including new models of function and dysfunction. Each model has specific strenghts and weaknesses, and further research is needed to validate these models and sub-types." (p.7 Occupational Therapy Practice Guidelines)

The Impact of Attachment Trauma on Sensory Processing

It is important to differentiate whether the child is triggered by the sensory experience or by the attachment experience. Children may tolerate everyday touch experiences but become frozen or aggressive if nurturing touch is provided due to their previous experiences of abuse. Assessments and interventions which involve feeding the child may trigger trauma memories of oral abuse or of being roughly fed. Shame, grief, and loss activates a drop in muscle tone. Foster Carers often report children becoming clumsy around family contact time. If the OT isn't trained in Sensory Attachment Intervention (Bhreathnach 2003)[4], he or she may elect to provide fast movement to counteract the presentation of low muscle tone and low arousal. The child may become aggressive as a result; their presenting difficulties are not of sensory causation, but attachment. Inadequate profiling/ assessment can easily lead to misinterpretation. There are also children who are automatically activated when exposed to fast movement or activities that involves hitting, punching or kicking e.g. ball play. These movements replicate the flight fight response (Bhreathnach 2008). Schore (1994) suggests that during pregnancy the mother's stress pattern may support an approach avoidance response and a predisposition to heightened expressions of intense emotionality (sympathetic nervous system bias) and a susceptibility to under regulation. Schore (2003) also states that children who experience emotionally labile and inconsistently available parents are susceptible to 'under regulation' disturbance and to undercontrolled, externalizing developmental psychopathology. The author's clinical observations of over 30 years have found that these children usually have a history of violence during pregnancy and early childhood. These children constantly get into trouble for attacking others when playing in the playground or playing football, they then are subsequently shamed for their actions. Neither attachment work nor sensory regulation strategies works on it's own. Treatment in these cases require the integration of attachment intervention and sensory regulation i.e. sensory attachment intervention. In other words provision of down regulation, through intense provision of proprioceptive activities (hanging, climbing, crawling, etc), alongside empathetic attachment informed care.

When it comes to attachment based behaviours, sensory regulation on its own is at best insufficient and at worst retraumatising, as the therapist may inadvertently trigger a trauma memory when providing sensory input.

4 Sensory Attachment Intervention is an integrative treatment approach for the treatment of trauma and abuse. It uses an adapted, trauma informed, form of Sensory Integration and combines it with the Dynamic-Maturational Model of Attachment.

An Integrative Approach to Assessment and Intervention

The Dynamic-Maturation Model of Attachment and Adaptation looks at transformation of information from a psychological perspective. The model involves two basic transformations of information, cognition and affect, and two basic psychological processes: association and disassociation (Crittenden & Landini 2011). These processes generate representations of attachment relationships and are defined as dispositional representations, because they dispose individuals to behave in particular ways.

Ayres SI theory is based on the concept that central nervous system processing and integration of sensation create a foundation upon which functional behaviour develops. (AOTA Guidelines series). Behaviour is defined as the capacity to respond appropriately to environmental demands (Ayres 1972) A major postulate of sensory integration is that sensation can be intentionally and strategically used to enhance the individual's capacity for adaptive behaviour (Ayres 1972). Evaluation of function and dysfunction allows the therapist to create an enriched environment that is tailored to the needs of the child. It will typically include opportunities to hang, swing, climb and crawl. The intention is to activate the child's inner drive to seek out experiences that are ultimately organising. In other words the environment disposes the child to behave in particular ways. Ayres (1972) states *"The ultimate goal of sensory integration treatment is a being which wants to, can, and will direct himself meaningfully and with satisfaction in response to the environmental demands."*

Crittenden and Ayres models respectively provide a conceptual and a pragmatic framework for analysing the complexities of behaviour. Each model provides assessment methodologies that enables the clinician to differentiate causality thus more reliably informing intervention. There is a danger however in behaviour being misinterpreted because of the omission of information in this case sensory or attachment. Crittenden (2016) states that "*we must all carefully differentiate behaviour from its meanings because the former is objective i.e. we can all agree what happened, and the latter is unique to each viewer*." In Sensory Integration literature over-expression of affection, or risk-taking behaviour is regarded as being symptomatic of sensory seeking. Excess or flattened emotional responses are hypothesised to be indicative of poor sensory registration and inadequate self-regulation. (Dahl Reeves 2001; Miller et al 2007) Risk taking in the DMM literature is perceived to be a coercive strategy to elicit a response from the parent (Crittenden 2008). Flat affect might be considered to be a 'Type A' protective strategy where the individual inhibits the display of negative affect.

There are two key questions that need to be addressed when observing behaviour. Firstly what are the core fears of the individual? Are they attachment based i.e. fear of rejection (Type A), fear of abandonment (Type C), or are they sensory i.e. fear of sensation such as touch or movement (modulation) or fear arising from the incapacity to organise sensation for use (dyspraxia). The former is triggered by who is present in the environment the latter is triggered by the experience of sensation. The second question is what is the function of behaviour. Is it an attachment strategy to elicit approval or to maintain the attention of the parent, or is it a sensory strategy to enhance or inhibit sensation in order to regulate? Crittenden & Landini (2011) states *"Each individual constructs his or her own dispositional representation from his or her own experience"* Theorists and clinicians need to consider what is the individual's dispositional

representation of sensory experiences alongside attachment. One could argue that assessment of sensory processing and attachment should not be carried out in parallel as is the current practice. There needs to be assessments that integrate both perspectives.

Sensory Attachment Intervention (Bhreathnach 2008) combines the theories of Sensory Integration and the DMM. It requires SAI therapists to have training in both Ayres Sensory Integration and in Crittenden's Dynamic Model of Attachment and Adaptation. Therapists are now being encouraged to become trained coders in the DMM classification system. The intention is they will be able to systematically analyse both aspects of information processing and thus provide a more reliable differential diagnosis in their assessments.

The ability to reliably analyse and interpret either sensory or attachment behaviour is highly specialised and requires years of post graduate training and experience. There is a growing recognition that a transdisciplinary approach is needed when working with families.
An encouraging development is now taking place in Britain and Ireland. DMM coders, researchers and clinicians, are joining forces with Occupational Therapists who have advanced training in Sensory Integration and a basic knowledge of DMM theory. We are at the exploratory stage of integrating these methods of analysis. Steve Farnfield, Senior Lecturer in Attachment Studies at the University of Roehampton, London, has approached the author of this paper to look at the idea of developing a sensory coding system for his Child Attachment and Play Assessment (CAPA, Farnfield, 2015). The first step is to train SAI Occupational Therapists in the administration of the CAPA. Thirty OT's from Ireland, Britain, South Africa and Finland immediately signed up with the prospect of being part of the development of a reliable sensory coding tool, the first of its kind. A coding system for identifying arousal states is also being evaluated (Bhreathnach & Breen 2017). This involves Therapists observing behaviours and identifying the physiological pattern being activated i.e. regulated, sympathetic (flight, fight) or parasympathetic (freeze, dissociation, shutdown). Blind coding of arousal states are compared with ECG findings. Cathal Breen, Clinical Lecturer in Clinical Physiology at Ulster University is assisting in this process. Steve Farnfield has also submitted a research proposal for Ethics approval at the University of Roehampton. The research will involve an exploration of the relationship between physiological arousal, sensory processing and attachment behaviour.

The process of jointly analysing current attachment assessments is both exciting and fascinating. Combining expertise has led to the realisation that behaviour is even more complex than anticipated. Crittenden (2016) suggests the balance between what is understood and new information that is not fully understood may lead to feelings of frustration or exhilaration. I would suggest a feeling of eagerness and even impatience to learn what will emerge, and exhilaration at the prospect of discovering new patterns.

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