neuropsychological profile of children with autistic spectrum disorders (ASD)...

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Tsatsanis (2005) writes that autism is characterised by considerable clinical variability and that any approach to understanding autism where a single construct is adopted is highly suspect. Core deficits in autism are those of social development, verbal and nonverbal communication and behavioural difficulties. However, at the root of these core symptoms are impairments in cognition including joint attention, perceptual processing, sensory perception, attention, memory and executive functioning, each of which can vary greatly between each child. Overall, children with autism and other related conditions may share certain core features but their individual cognitive profiles and pathways to learning are highly individual.

Intellectual Profile

Several papers have identified specific differences in the cognitive profiles of children with ASD. The popular conception is that children with autism have impaired verbal functioning when compared with good visuo-spatial skills; while children with Asperger's have impaired visuo-spatial skills relative to normal verbal functioning (Miller et al, 2000). It is also hypothesised that children with high functioning autism have a higher overall IQ, generally greater than 70, but still have a higher visuo-spatial IQ relative to their verbal IQ (Gunter et al, 2002). However these profile findings are inconsistent. Mayes et al (2003) found that such discrepancies in children on the autistic spectrum were a function of age which diminished over time. Ghaziuddin et al (2004) found no such IQ discrepancies when testing a cohort of children with high-functioning autism. Overall Tsatsanis (2005) suggested that IQ profiles in autism should be seen as "scattered" and highly variable between children and that one should be cautious when making diagnostic interpretations from such profiles.

Sensory Perception

Ornitz et al (1968) identified a range of hypo and hypersensitivities in 150 participants with autism. This was interpreted as an inability to modulate sensory input which would then manifest itself in excited states of behaviour (e.g. hand flapping, spinning), inhibition and disinhibited dysregulation. This inability to appropriately modulate, process and respond to external sensory stimuli is seen as one of the major factors that contribute to the social and communication deficits associated with autism (Ornitz et al, 1976).

High levels of variability in internal arousal states have also been identified as contributors to the responsiveness of children with autism to external stimuli. In 1992 Temple Grandin wrote about her profound hypersensitivity to touch and sound. When in a high state of arousal hand flapping and whirling can provide much needed sensory input when the present external environment is lacking. By the same token moments of significant inhibition, or "shutting down" as Tsatsanis (2005) describes it, can also provide the desired quiet for the child with autism when the environment is overstimulating.

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Rogers et al (2003) suggested that sensory perception is probably the most under researched area of autistic related behaviour, yet it is the one characteristic that consistently separates children with autism from developmentally matched controls. Behaviours include a preference for visual patterns, variability in reaction to sounds and sights, hypersensitivity to pain, cold, heat, and inappropriate use of objects such as licking, mouthing and peering. However, research has failed to find a significant relationship between sensory perceptual sensitivity and the severity of the autistic presentation but a relationship with adaptive behaviour has been demonstrated (Rogers, et al, 2003).

The neurological substrates thought to be responsible for sensory perception include the thalamus. The thalamus is traditionally referred to as the sensory gateway of the brain but it is also thought to be involved in multiple processes that take on the role of the transmission, tuning, and integrated processing of information (Tsatsanis, 2005). Tsatsanis et al (2003) found the thalamus does not develop to the expected size in relation to the rest of the cortex in children with autism. Using neuropsychological testing and functional MRI, Nair et al (2013) found results that indicate involvement of abnormal thalamocortical connectivity in sociocommunicative and cognitive impairments in autism spectrum disorder. Therefore there is the suggestion of thalamic involvement both at an anatomical and a connectivity level.

However, attentional systems and theories which also involve the thalamus are thought to have superseded the emphasis on sensory processes. Recent thinking aims to understand how children with autism attend and select relevant stimuli. Townsend et al (1994) proposed that attention was a major area of deficit in children with autism where the coordination of attention and arousal systems are abnormally developed.

Attention

Information comes in a continual flow of external and internal stimuli. Attentional capacities involve the ability to override the impulse to attend to what is most attractive, striking or novel and to attend to what is required to meet our external and internal goals. In autism the intense focus on certain stimuli already provides a bias in attentional processing at the expense of more socially salient information. The focus on intense and repetitive activities heavily biases selective attentional skills at the detriment of what is required from the world around the child.

Sustained attention for repetitive visual information is thought to be relatively intact in children with autism (Garretson et al, 2001). However, Fantie et al (1998) found that attention was variable in children with Asperger's Syndrome which presented as inconsistent response patterns on attentional tasks. Attentional deficits in autism are typically displayed during more complex tasks that require selective attention and attentional shifts. Townsend et al (1996) found that adults with autism had significant difficulties in attentional shifting and ignoring irrelevant stimuli. Tsatsanis (2005) reported that this was interpreted as perseverative and an impairment in the ability to shift from one task modality to another. Mann & Walker (2003) suggested that

speed and expectancy were major factors. The idea was proposed that individuals with autism find it difficult to make rapid changes in their expectations so when stimuli and the necessary response changes they still perseveratively respond in the set way they have before.

This can of course be linked at an executive functioning level where there is an overall deficit in the central executive. Burack et al (1997) identified impairments in efficient task performance where deficits were found in the ability to selectively attend to what is relevant in the context of ignoring what is extraneous.

Developmentally, the concept of joint attention is significant for children with autism. Joint attention, acts to bring together attention for both environmental stimuli and other people the child is socialising with at the time. Deficits in both attention and social domains are theoretically proposed by Tsatsanis (2005) to be due to neuropsychological and cognitive deficits (Ozonoff et al, 1994). Adamson (1995) proposes that as infants coordinate their attention to objects and people (joint attention) this has significant implications for their ability to obtain a consistent means for expressing themselves, developing language, and other aspects of development. As a result, it is proposed that each child's attentional profile will be different, with varying levels of deficit on all aspects of attention including sustained, selective, divided, visual and verbal attention. Differing levels of processing speed, cognitive switching and impulsivity will also present. Therefore, due to the implications for cognitive ability, education and social skills, it is vital that a thorough cognitive profile is obtained to maximise treatment and outcomes for children with autism.

Memory

Children with autism are thought to learn best through rote learning and classical conditioning but show limited capacity for flexibility, abstraction and generalisability. For example, digit span and word list performance for unrelated words has been found to be normal (Bennetto et al, 1996) however recall of a semantically related list of words was impaired (Tager-Flusberg, 1991). When semantic cues are given, retrieval improves. This suggests that these word list impairments are not deficits in encoding but in free recall. Tsatsanis (2005) suggested that individuals with autism may encode words and their meanings but due to executive and attentional deficits, they employ inefficient encoding and retrieval strategies. Minshew et al (2001) found that tasks requiring a greater level of sematic organisation impact negatively on participants with autism.

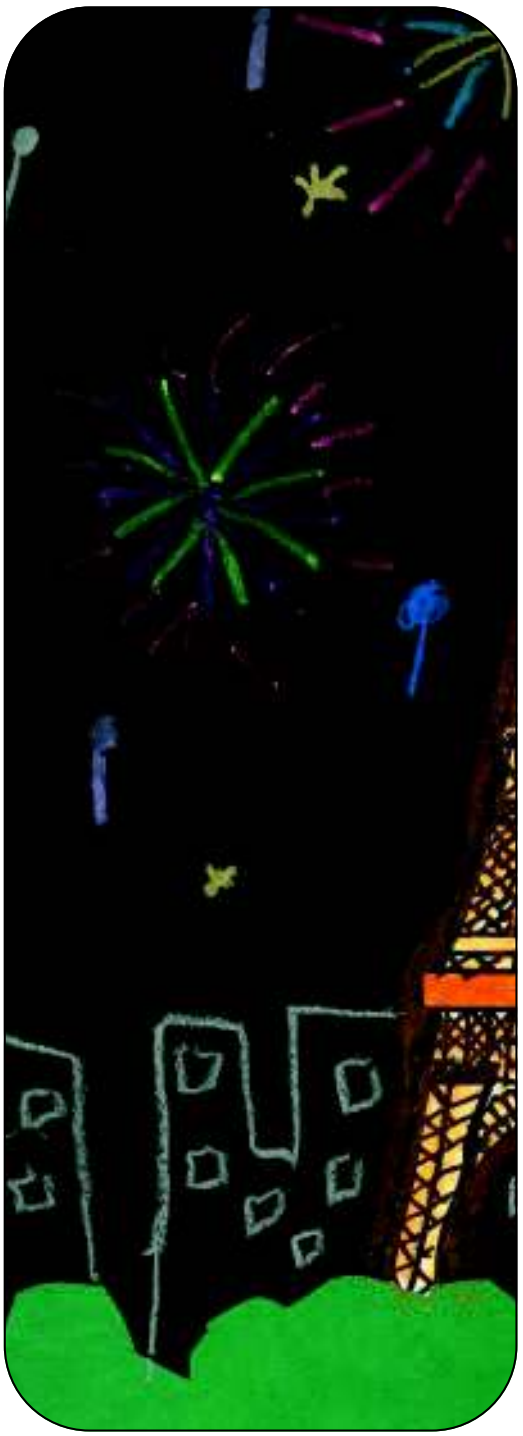
Bennetto et al (1996) examined whether children with autism performed similarly to children with frontal lobe lesions. The participants consisted of children with high functioning autism and children with intellectual disability. The children all performed similarly but those with autism made more intrusion errors and overall profiled in a similar way to those with a frontal lobe head injury. Therefore, there may not be a problem with semantic or episodic memory per se but with organisation during encoding and retrieval and internal intrusions during encoding due to disinhibition. Renner et al (2003) found that children with autism had different encoding and retrieval styles as implicit and explicit memory was normal but pattern of recall was atypical. This is supported by Cabexa et al, 2000) who found in PET studies that episodic memory is associated with increased blood flow in the right frontal lobe.

Executive Function

The executive control theory has been used to explain executive dysfunction in children with autism. The executive control theory proposes that our ability to understand the mental states of others is a result of the development and use of executive functioning (Cundall, 2007). Cundall gave an example of this with the thought; 'I believe my friend sees my chocolate in the bowl'. This type of thought requires higher order functioning, including the ability to self-monitor, to monitor the behaviour of others, and to be able to plan and predict others' feelings, thoughts and behaviours. Cundall claimed that everyday behavioural, emotional, or social encounters such as these are generally presented as 'problems' to be solved by one's executive functions. Therefore, as children with autism commonly have difficulties in these areas, Cundall suggested that the primary deficit in the disorder is with executive functioning. Several studies have investigated executive functioning in children with autism and a mixed profile of difficulties has emerged, including difficulties with cognitive flexibility and planning.

Cognitive flexibility is the ability to adapt cognitive processing strategies to face new and unexpected conditions in the environment (Cañas, et al, 2003). It is also required to multi-task. Turner (1997) suggested that as restrictive, repetitive patterns of behaviour are key features of autism, one would predict that children with autism would have significant difficulties with cognitive flexibility. Kleinhans, et al (2005) administered selected tests from the Delis-Kaplan Executive Function System (D-KEFS; Delis et al, 2001) and found that tasks requiring cognitive flexibility produced the most consistent deficits.

These findings have been supported elsewhere. Russell et al (2003) found that children with autism showed consistent failures in cognitive flexibility and perseverative behaviour. Rinehart et al (2001) suggested that the findings implicate the basal-ganglia and thalamocortical circuits which may underpin executive functioning in these children. This proposal was based on the work of Alexander et al (1986) who claimed that this brain region



plays a role in generating unique or novel responses and a range of studies has found that cognitive flexibility is a consistent deficit in children with autism.

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Planning abilities have also been highlighted as an executive dysfunction in children with autism (Hill, 2004). Hill suggested that planning requires an individual to create a plan of action for a task while simultaneously self-monitoring and maintaining that plan to ensure it is being executed. Hill also suggested that planning involves the ability to re-evaluate and update one's actions. Rumsey et al (1988) found deficits in planning and organisation on the Rey-Osterrieth Complex Figure test despite children showing an adequate ability to copy its component parts. Booth et al (2003) also used a drawing task to measure planning ability and found that children with autism tended to show both a detail-focused drawing style and planning deficits. Similarly, Ozonoff et al. (1991) administered two measures of planning - the Wisconsin Card Sorting Test (WCST; Berg, 1948) and the Tower Test (Boyrs et al, 1982). In this study 96% of the participants with autism were found to have executive functioning deficits compared with the control group. In particular, a lack of efficiency and poor planning were found.

Conclusions

There appears to be no doubt that children with autism present with a range of cognitive deficits. All facets of cognitive functioning have been found to be involved including memory, attention, intellectual ability and executive functioning. However, the research shows that there is no fixed neuropsychological profile for disorders on the autistic spectrum. Therefore, while the diagnostic requirements are fixed it is clear that each child's pattern of cognitive deficits is not. As a result, the only thing one can say with certainty is that each child with autism will likely have some form or a pattern of cognitive deficits. Exactly what that pattern or profile of deficits looks like will require further investigation.

Please visit www.schoolink.chw.edu.au for the references to this article.

neuroscience of caregiving: a seminar with Dr Daniel Hughes...

By Anders Hansson, Statewide Behaviour Intervention Service

Dan Hughes is a clinical psychologist from Pennsylvania, United States, who has been a pioneer in using attachment and neuroscience in resourcing adaptive and positive connections between traumatised children and their parents or caregivers. His approach is family centred and offers very practical strategies for a wide range of professionals who work with vulnerable children and their relationship contexts. The principles of his approach apply to any context where social engagement is desired.

Dan's seminar was organised by the *Australian Childhood Foundation* and was held at Sydney Convention Centre in Darling Harbour. I think most would agree with me when I say the event was exceptionally worthwhile and stimulating.

The first day focused on the brain in relation to the development of secure attachment relationships and how developmental trauma or chronic stress can interfere with this development. We learned that this can result in the affected person living in fear, distrusting others and being *defensive* rather than being *socially engaged* in their relationships. This can be devastating, with persistent feelings of shame and low self-worth stifling the person's ability to live their life as they would like.

The good news is that Dan's therapeutic approach, which focuses on the whole family, provides hope for breaking this pattern. The approach provides the person and their attachment figures (e.g. parents, carers, teachers, partners, therapist) with a therapeutic framework that promotes playfulness, acceptance, curiosity and empathy in their relationships.

Dan refers to this as PACE (Playfulness, Acceptance, Curiosity, Empathy), A playful stance provides a sense of safety from which the child can re-engage with the world and most importantly with their attachment figures. Acceptance refers to being able to engage non-judgementally with the person and accepting their subjective experience. This encourages a sense of trust and respect within the relationship.

A sense of curiosity within the PACE therapeutic model is vital to enable the exploration of presenting and emerging themes and introducing new meanings to the narrative for the person and their attachment figure/s.

The last "ingredient" of PACE – empathy – is required to enable the attachment figure to "empathise with" the person and allow the person to experience this.

This *intersubjective* experience is considered the central agent of change (Hughes, 2007).

On the second day, Dan explored the PACE therapeutic model further and shared his therapeutic experiences anecdotally using several video clips of PACE in action. This was invaluable and definitely the highlight of two wonderful days of professional development.

Dan is the author and co-author of several excellent books on the use of a brain-based attachment approach in therapy, parenting and relating, including

Hughes, D. A. (2006). Building the Bonds of Attachment: Awakening Love in Deeply Troubled Children. NJ: Jason Aronson Inc.

Hughes, D. A. (2007). Attachment-Focused Family Therapy. NY: W. W. Norton & Co.

Hughes, D. A. (2009). Principles of Attachment-Focused Parenting: Effective Ways to Care for Children. NY: W. W. Norton & Co.

Hughes, D. A. (2011). Attachment-Focused Family Therapy Workbook. NY: W. W. Norton & Co.

Hughes, D. A. & Baylin, J. (2012). Brain-Based Parenting: The Neuroscience of Caregiving for Healthy Attachment. NY: W. W. Norton & Co.

For more information about Dan and resources visit www.danielhughes.org.

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The Regents of the University of California. (2013). Picture of Dan Hughes, retrieved September 9 from https://www.uclaextension.edu/attachment/Pages/Gallery/hughes.jpg