



An exploration of sarcasm detection in children with attention hyperactivity deficit disorder



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ABSTRACT

The present research explored the ability of children with ADHD to distinguish between sarcasm and sincerity. Twenty-two children with a clinical diagnosis of ADHD were compared with 22 age and verbal IQ matched typically developing children using the Social Inference–Minimal Test from The Awareness of Social Inference Test (TASIT, McDonald, Flanagan, & Rollins, 2002). This test assesses an individual's ability to interpret naturalistic social interactions containing sincerity, simple sarcasm and paradoxical sarcasm. Children with ADHD demonstrated specific deficits in comprehending paradoxical sarcasm and they performed significantly less accurately than the typically developing children. While there were no significant differences between the children with ADHD and the typically developing children in their ability to comprehend sarcasm based on the speaker's intentions and beliefs, the children with ADHD were found to be significantly less accurate when basing their decision on the feelings of the speaker, but also on what the speaker had said. Results are discussed in light of difficulties in their understanding of complex cues of social interactions, and non-literal language being symptomatic of children with a clinical diagnosis of ADHD. The importance of pragmatic language skills in their ability to detect social and emotional information is highlighted.

1. Introduction

Attention-Deficit Hyperactivity Disorder (ADHD) is one of the most common mental disorders of childhood, affecting up to 5.29% of children internationally (Polanczyk, de Lima, Horta, Biederman & Rohde, 2007). The disorder is identified by three cognitive symptoms: inattention, hyperactivity and impulsivity. The inattention subtype is characterised by difficulty sustaining attention, being easily distracted and/or failure to follow instructions or to listen when spoken directly. In contrast, the hyperactive-impulsive subtype is characterised by someone who is in perpetual motion, has trouble waiting his or her turn and/or will often interrupt conversations by blurting out comments at inappropriate times (DSM-5, APA, 2013). While research has traditionally focussed on these cognitive deficits, recent research has emphasised the implicit social difficulties associated with ADHD. For example, children with ADHD are rated lower on cooperation, assertion, self-control and peer-approval, compared to children without ADHD (Kats-Gold & Priel, 2009). They are often rigid in different social situations and unresponsive to social cues (Da Fonseca, Segui, Santos, Francois & Deruelle, 2009), resulting in up to half of children with a diagnosis of ADHD experiencing peer rejection (Hoza et al., 2005).

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1.1. Social deficits in ADHD

The ability to accurately interpret the intentions and points of view of others is crucial for everyday social interaction. These abilities incorporate a range of skills, from the basic perception of affective prosody, facial expression and body posture, to the more complex skills of understanding others' perspectives ("Theory of Mind", [Harris & Pexman, 2003](#)). These understandings underpin more complex competencies including cooperation, assertion, and flexibility, which in turn are learned and honed through experience. As such, early impairments in basic understanding of social cues can act as a negative catalyst, increasing the frequency of negative social interactions ([Pelham & Fabiano, 2008](#)), and handicapping the development of more complex social skills. Further, emotional competence is implicitly endemic in social competence ([Denham et al., 2003](#); [Kats-Gold & Priel, 2009](#)). Everyday interactions demand the intuitive integration of all these skills; therefore simple deficits can affect all areas of social functioning.

The precise nature of social deficits in children with ADHD remains elusive, as the majority of research to date has traditionally focussed on the ability to recognise emotions from facial expressions. Past literature has consistently demonstrated deficits in basic facial affect recognition in children with ADHD ([Da Fonseca et al., 2009](#); [Yuill & Lyon, 2007](#); [Cadesky, Mota & Schachar, 2000](#); [Singh et al., 1998](#)), with deficits appearing to be particularly salient in the recognition of negative emotions ([Williams et al., 2008](#); [Pelc, Kornreich, Foisy, & Dan, 2006](#); [Cadesky et al., 2000](#); [Singh et al., 1998](#)). However, the simplicity of the typical research paradigm, where participants match affective labels or stories to facial expressions, is illustrated in the ceiling performance shown by both the ADHD and nonclinical participants ([Downs & Smith, 2004](#)). Therefore suggesting the task poorly replicates typical complex social interactions.

The understanding of contextual cues has also been found to be more difficult for children with ADHD compared to typically developing peers. For example, [Da Fonseca and colleagues \(2009\)](#) demonstrated the importance of context on our ability to recognise emotions by asking participants to detect the emotion of masked faces, presented in an array of different visual scenes. Results showed that children with ADHD were worse than the typically developing control children at identifying the correct emotions. In addition, more recent findings have reported children with ADHD to perform less well at recognising cues of emotion compared to children with mild to moderate learning difficulties matched for age and intelligence. Importantly, the task used in this study more closely resembled real emotional expression than conventional static stimuli ([Ludlow, Garrood, Lawrence & Gutierrez, 2014](#)). These results highlight that difficulties in recognising contextual information may also form part of the emotion recognition deficits reported in individuals with ADHD.

1.2. Pragmatic language difficulties

Parents and teachers of children with ADHD frequently report children with ADHD to have language problems ([Bignell & Cain, 2007](#); [Bishop & Baird, 2001](#)), with as many as half of these children reported as having difficulties with language ([Cohen et al., 2000](#); [Tirosh & Cohen, 1998](#)). Furthermore, research findings have revealed that many children with ADHD are delayed in their development of spoken language and self-speech ([Berk & Potts, 1991](#); [Rankin et al., 2009](#)).

Pragmatic language difficulties are also well documented in children with ADHD. These difficulties include social and emotional aspects of social exchanges, such as screaming or yelling ([Adams, Baxendale, Lloyd, & Aldred, 2005](#); [Martin & McDonald, 2003](#)), in addition to behaviours associated to spoken language, such as topic initiation, the ability to wait one's turn, the amount and fluency of discourse, and the volume and tone of language ([Prutting & Kitchner, 1987](#)). Furthermore, receptive pragmatic deficits in ADHD have been characterised by overly literal language comprehension, unusual emotional interpretations, and trouble understanding humour. Regarding expressive pragmatics, reported problems have included the use of facial expressions and gestures, difficulty in making and maintaining conversation, lack of prosody, and difficulties with the use of pronouns ([Staikova, Gomes, Tartter, McCabe, & Halperin, 2013](#); [Geurts and Embrechts, 2008a](#); [Lord, Rutter, & LeCouteur, 1994](#)).

The importance of pragmatic ability for social understanding in children with ADHD has been illustrated by [Leonard, Milich and Lorch \(2011\)](#), who investigated the relationship between pragmatic language ability, as assessed by the Children's Communication Checklist ([Bishop, 1998](#)), and levels of hyperactivity and inattention. Their results found that the significant relationship between the levels of hyperactivity and deficits in social skills was fully mediated by pragmatic language ability. However, pragmatic language ability only partially mediated the relationship between levels of inattention and deficits in social skills. In addition, children with ADHD have been shown to score higher on ratings of pragmatic deficits and social difficulties compared with typically developing children ([Bishop & Baird, 2001](#)), but have been found to be more similar to children with Autism Spectrum Disorder (ASD), in showing more problems with pragmatics compared to their structural language ([Geurts and Embrechts, 2008](#); [Geurts et al., 2004](#)).

1.3. Conversational inference

Real-life interactions are embedded in a context that requires the interpretation of social information. Indeed, findings have shown that situational/contextual cues can be more helpful when judging emotional information than facial expressions alone ([Kolb, Wilson & Taylor, 1992](#); [Barrett, Lindquist & Gendron, 2007](#)). Successful social interactions also require the understanding of non-literal language. For example, verbal irony and sarcasm are often used to either indirectly convey attitudes and beliefs, or for the purposes of generating humour ([Harris & Pexman, 2003](#); [Pexman et al., 2011](#)).

While in most situations there is concordance between linguistic and affective prosody (e.g., sad words are paired with sad language), there are situations where they differ. The differentiation of sarcasm and sincerity provides a good example of this, and thus provides a pertinent insight into the comprehension of affective prosody. In addition, affective prosody provides important

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