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Theory of own mind and autobiographical memory in adults with ASD

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ABSTRACT

While there is solid evidence of other-related theory of mind (ToM) deficits in autism, there is less research addressing self-related ToM impairments. To date, relations between self-related ToM and other cognitive skills related to representing own mental states such as autobiographical memory have scarcely been investigated. Thus, the purpose of this study was to investigate the differential relations of self- and other-related theory of mind skills and autobiographical memory in $n = 20$ adults with Autism Spectrum Disorder and $n = 20$ matched controls using standardized measures. The overall results indicated a specific relation between recalled episodic autobiographical memories on the episodic and semantic autobiographical memory interview and the performance on the mind-mindedness for oneself task in adults with ASD, which proved to be largely independent of verbal and nonverbal IQ.

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1. Introduction

To promote autistic individuals' self-knowledge and to strengthen their memory system through intervention, it seems crucial to study relations between their comprehension of their own mental life and their ability to construe and retrieve autobiographical memories.

Autobiographical memories are always self-referential. They include memories of personally experienced events (autobiographical episodic memories) and other self-related information such as one's address and name (autobiographical semantic memories). Not surprisingly, most theorists assume that there is a positive connection between the self and autobiographical memory (cf. [Baddeley, 1992](#)). One account that brings the self and memory especially close together, by means of mental constructions, is the self-memory system theory (cf. [Conway & Pleydell-Pearce, 2000](#)). One of its main premises is that autobiographical memories are transitory dynamic mental constructions generated from an underlying knowledge base. What is derived from this assumption is that mental representations about the self are part of this knowledge system and are thus necessary for the construction of autobiographical memory. This brings theory of mind into play. Theory of mind (ToM) is the cognitive ability to recognize specific internal states, such as beliefs, intentions, knowledge and thought processes in oneself and others. Theory of mind for others, as well as the cognitive ability to monitor one's own internal states (ToM for self), have both been discussed by cognitive psychologists ([Carruthers, 2009, 2011](#); [Fletcher & Carruthers, 2012](#); [Goldman, 2006](#); [Nichols & Stich, 2003](#)).

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Thereby, while there is hardly any empirical evidence for specific links, ToM has been linked theoretically to the construction, as well as retrieval of autobiographical memory (cf. Boucher & Bowler, 2008). Since there is ample evidence for a deficit in ToM for others in Autism Spectrum Disorders (ASD) (see Baron-Cohen, 2001; Frith & Happé, 1999, for reviews), research in autism has contributed importantly to theories on ToM for others and autobiographical memory in demonstrating specific theoretically predicted impairments in both ToM in others and episodic autobiographical memories and in showing specific relations between both constructs (e.g., Crane & Goddard, 2008; Crane, Pring, Jukes, & Goddard, 2012; Lind & Bowler, 2010; Millward, Powell, Messer, & Jordan, 2000; Tanweer, Rathbone, & Souchay, 2010). However, in regard to ToM for self, while studies indicate severe and specific deficits in self-knowledge in ASD (see Uddin, 2011; Williams & Happé, 2009a, 2009b; Williams, 2010a, 2010b), to date, few studies have previously investigated self-descriptions in ASD and if so, not from the point of view of mental state attribution (Bauminger, Shulman, & Agam, 2004; Lee & Hobson, 1998; Tanweer et al., 2010). In contrast, in developmental research, mentalistic person conceptions have been investigated. These conceptions signify the ratio of mentalistic descriptors one uses when mentally representing and describing their friends or romantic partners. A greater number of mental terms (e.g., “*He is reflective*”) instead of behavioural terms (e.g., “*He likes to ride his bike*”), physical (e.g., “*He has brown hair*”) or general terms (e.g., “*He is my neighbour*”) indicate a higher degree of mindedness in regard to others’ mind (mind-mindedness) (cf. Meins & Fernyhough, 2010). In this study, we employed this methodology to assess ToM for self and asked people to describe themselves to see how mind-minded they are in regard to themselves. We hypothesized that, because mind-mindedness constitutes evidence for a coherently constructed semantic network in regard to one’s self, a high ratio of mentalistic descriptions should be critical for episodic autobiographical memory in ASD.

Why for episodic memory, in specifically? According to Tulving (1972, 1985) the essential component of episodic autobiographical retrieval (“remembering”) as opposed to semantic autobiographical memory is the involvement of auto-noetic (self-knowing) consciousness. Auto-noetic consciousness enables us to vividly re-experience past events by putting oneself in one’s own shoes again. In contrast, semantic retrieval (“knowing”) involves noetic consciousness and is therefore limited to retrieval of timeless facts that are rather unconnected to the semantic or spatial context they have been acquired in (cf. Wheeler, Stuss, & Tulving, 1997). Perner (1990) and colleagues (Perner & Ruffman, 1995) argued that the recognition of an episodic autobiographical memory as something previously experienced presupposes an understanding of the causal connection between perceptual informational access and knowledge (experiential awareness). Any re-experience of past events requires an explicit representation of earlier experiences and thus involves metarepresentational abilities (cf. Naito, 2003; Perner, Kloo, & Gornik, 2007). Thus, the episodic autobiographical memory deficit in adults with autism might be due to a diminished level of self-consciousness at encoding during development (cf. Lind, 2010).

While it seems likely that impairments in the ability to represent own mental states might be quite specifically related to episodic autobiographical memory deficits that require auto-noetic consciousness in ASD, to date, this relationship has not been specifically seen in adults. Interestingly, while Lind and Bowler (2009) showed that autistic children have diminished self-other source-memory, these deficits proved to be unrelated to concurrent theory of mind-task performance (Lind & Bowler, 2009). However, both typically developing and autistic children demonstrated significantly better source memory for self-performed actions versus other-person performed actions. It was suggested that due to the task format (memory of picture cards) children might have encoded self-source memory consciously through action-monitoring. Thus, autistic children’s retrieval was assumed to depend less heavily on the ability to become auto-noetically aware of their own memories, weakening the link to children’s theory of mind-skills. Further, while there is no direct evidence for links between ToM for self and episodic autobiographical memory, two recent studies have reported a link between ToM for other and episodic autobiographical memory in ASD (Adler, Nadler, Eviatar, & Shamay-Tsoory, 2010; Crane, Goddard, & Pring, 2014). However, the results revealed no homogeneous relationship pattern. In particular, the positive correlation has not been consistent for the same ToM tasks in different samples. More specifically, Adler et al. (2010) found that performance on the reading the mind in the eyes test (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) was positively related to episodic autobiographical memory in the ASD group, while in controls a positive correlation occurred between performance on the strange stories task and episodic autobiographical memory. In contrast, Crane et al. (2014) have found a positive correlation between the strange stories task (Happé, 1994) and episodic autobiographical memory in the ASD group only. To draw a more coherent picture, more research is needed.

1.1. The present study

The present study addresses impairments in ToM for self (measured with the mind-mindedness task) in adults with ASD and investigates the hypothesized link between ToM for self and episodic autobiographical versus semantic autobiographical memory. To test for the specificity of the presumed relationship, we controlled for intellectual ability and also assessed mental state attribution to others using a socio-perceptual theory of mind task (i.e., the reading the mind in the eyes task) (Baron-Cohen, Wheelwright, Hill, et al., 2001) and an adaptation of the strange stories task (short stories task) (cf. Happé, 1994). In sum, in line with Perner (1990), relations between autobiographical memory and theory of mind were expected to be quite specific. Based on this, several predictions were made. First, it was predicted that autistic adults would be impaired in their episodic autobiographical, but not in their semantic autobiographical memory. Likewise, autistic adults’ episodic autobiographical memory, but not their semantic autobiographical memory, was expected to be related to theory of mind skills. Finally, relations between autistic adults’ episodic autobiographical memory and their mind-mindedness for self

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