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## Self-referential memory in autism spectrum disorder and typical development: Exploring the ownership effect

Emma Grisdale, Sophie E. Lind<sup>1</sup>, Madeline J. Eacott, David M. Williams\*

Department of Psychology, Durham University, Science Site, South Road, Durham DH1 3LE, United Kingdom

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### ABSTRACT

Owned objects occupy a privileged cognitive processing status and are viewed almost as extensions of the self. It has been demonstrated that items over which a sense of ownership is felt will be better remembered than other items (an example of the “self-reference effect”). As autism spectrum disorder (ASD) is characterised by an atypical self-concept, people with ASD may not demonstrate this “ownership effect”. Two experiments were conducted which replicate and extend Cunningham, Turk, MacDonald, and Macrae (2008). In Experiment 1, neurotypical adults completed a card sorting task and cards belonging to the ‘self’ were better remembered than cards belonging to another person. In Experiment 2, adults with ASD recalled self- and other owned items equally well. These results shed light both on the relation between sense of self and the ownership effect, and the nature of the self-concept in ASD.

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## 1. Introduction

### 1.1. The relation between memory and the self

Memory and the self appear to be intimately related. For example, Howe and Courage (1997) suggest that the presence of a self-concept is a pre-requisite for the emergence of autobiographical memory. Others (Conway & Pleydell-Pearce, 2000; Wang, 2001) have suggested the relationship between memory and the self is cyclical, whereby a fully-functional, dynamic self-concept depends upon the organisation and retrieval of personally meaningful events generated by autobiographical memory, yet in order for a person to encode and make sense of these autobiographical memories, a concept of self must be present to analyse and evaluate their content.

Our understanding of the nature of the self has therefore been informed by investigating the effects of self-related processing on memory and cognition. A prime example of this is the self-reference effect. The self-reference effect refers to the finding that stimuli relating to the self, either implicitly or explicitly, are processed preferentially to stimuli that do not relate to the self (Tversky & Kahneman, 1974). This effect is most clearly evident within the domain of memory and numerous studies have demonstrated that memory for personality trait adjectives which have been processed in relation to the self (for example by answering the question “Are you *clever*?”) are recalled or recognised with greater accuracy than trait adjectives processed in relation to another person (for example “Is Meryl Streep *clever*?”) (Rogers, Kuiper, & Kirker, 1977). Recent

\* Corresponding author. Present address: University of Kent, School of Psychology, Keynes College, Canterbury, Kent CT2 7NP, United Kingdom.

E-mail addresses: [emma.grisdale@durham.ac.uk](mailto:emma.grisdale@durham.ac.uk) (E. Grisdale), [sophie.lind.2@city.ac.uk](mailto:sophie.lind.2@city.ac.uk) (S.E. Lind), [m.j.eacott@durham.ac.uk](mailto:m.j.eacott@durham.ac.uk) (M.J. Eacott), [d.m.williams@kent.ac.uk](mailto:d.m.williams@kent.ac.uk) (D.M. Williams).

<sup>1</sup> Present address: Department of Psychology, City University London, Social Sciences Building, Whiskin Street, London EC1R 0JD, United Kingdom.

studies have suggested that this effect extends to physical objects, as well as verbal descriptors, with which an agent feels a sense of identification or over which an agent feels a sense of ownership (Cunningham, Turk, MacDonald, & Macrae, 2008). This form of the self-reference effect has been termed the “ownership effect” (Beggan, 1992).

### 1.2. The ownership effect

It has been suggested that owned objects (i.e., objects that a person feels a personal investment with and which are deemed to be relevant to the self in some way) occupy a privileged cognitive processing status, being treated almost as extensions of the self (Beggan, 1992). For example, the perceived value of owned objects is higher than that of non-owned objects (the “endowment effect”: Kahneman, Knetsch, & Thaler, 1991), and owned objects are considered to have more positive characteristics than non-owned objects (the “mere ownership effect”: Belk, 1991). Moreover, recent research has shown that the sense of ownership also has pronounced effects on memory. For example, adult participants who were told that they owned certain items were significantly more likely to later recognise these items than those they had been told were owned by a confederate (Cunningham et al., 2008). This ownership effect is apparent in memory among young children as well as adults. For example, children aged between 4 and 6 years who had sorted pictures of everyday objects between “their” basket and a confederate’s basket were more likely to recognise self-owned than other-owned items (Cunningham, Vergunst, Macrae, & Turk, 2012). This implies that sense of ownership is a relatively early developing *psychological* aspect of self that clearly affects memory and cognition.

### 1.3. The self and autism spectrum disorder

Autistic spectrum disorder (ASD) is a developmental disorder characterised by impairments in social-communication, and by restricted and repetitive behaviour and interests (American Psychiatric Association, 2013). It has been suggested that an impaired sense of self or self-concept may contribute to these core impairments (see Frith, 2003; Hobson, 1990).

Historically, autism has been linked to the self, with clinicians variously viewing the disorder both as an extreme form of egocentrism (Bleuler, 1905), and more recently a complete absence of the sense of self (Frith, 2003). Yet, in ASD, some aspects of self-awareness appear to be relatively intact. Williams (2010) has suggested that, whereas physical aspects of self may be intact in ASD, psychological aspects may be specifically impaired. Indeed, existing sources of evidence are largely consistent with this position. For example, children with ASD typically display mirror self-recognition (relying on awareness of physical appearance) once they have reached the mental age of 18 months (Ferrari & Matthews, 1983), in line with their typically developing peers. Equally, children with ASD are able to recognise delayed video images of themselves (Lind & Bowler, 2009a) and discriminate between self and other caused changes in their environment (Grainger, Williams, & Lind, 2014a), which relies on awareness of physical agency. In contrast, psychological aspects of self appear to be impaired in people with ASD. The high levels of alexithymia (an inability to describe one’s own emotions) (e.g., Hill, Berthoz, & Frith, 2004) and the unusual patterns of pronoun use (e.g., confusing “I” or “me” with “you”; Lee, Hobson, & Chiat, 1994) seen in those with ASD are consistent with this proposal. Indeed, sometimes impairments in psychological aspects in self can sometimes be revealed by mirror image enhancements in awareness of physical aspects of self (Spengler, Bird, & Brass, 2010). Similarly, children with ASD show a greater degree of impairment on “self-versions” of classic theory of mind tasks, in which they are required to recognise mental states, such as beliefs and intentions, in themselves (e.g., Williams & Happe, 2009; Williams & Happé, 2010; see also Grainger, Williams, & Lind, 2014b). Arguably, this all suggests that awareness of more psychological aspects of self may be diminished in ASD (Uddin, 2011; Williams, 2010).

Evidence concerning the self-reference effect (discussed above in Section 1.1) in ASD is particularly relevant to understanding psychological aspects of self in this disorder (see Lind, 2010, for a review). In the first study of this effect in ASD, it was found that participants with ASD failed to show the expected memory advantage for self-referent words (during the study phase, they had been presented with the words in the context of the following question: “Is the meaning of the word similar to – ?”), as compared to words which had been processed at the semantic level (at study they had been presented with the words in the context of the following question: “Does the word describe you?”) (Toichi et al., 2002). However, this study included no other-person reference condition and so did not directly compare self-referent and other-referent processing. As such, this study did not directly test the self-reference effect and the results could potentially have been explained in terms of a more general “person reference effect”. On the one hand, this study demonstrates that people with autism may make no cognitive distinction between information relating to the self and to semantic information, but it does not necessarily indicate that people with ASD make no cognitive distinction between the self and the other. Therefore, the self-reference effect may still be present, if reduced. On the other hand, Lombardo, Barnes, Wheelwright, & Baron-Cohen (2007) directly compared self-referent and other-referent processing, asking participants whether a number of trait adjectives could be used to describe either themselves, their best friend, or a fictional character (e.g., Harry Potter). In a standard recognition task, both participants with ASD and neurotypical comparison participants recognised a greater number of words from the self-referential condition than from the best friend and Harry Potter conditions. However, the differences in the numbers of words recognised in each of the three conditions were reduced in ASD, and, in particular, the difference between the self and the Harry Potter conditions was very small, implying that the self-reference effect is reduced in ASD. In a subsequent study, employing children rather than adults, Henderson et al. (2009) partially replicated this finding, demonstrating that children with ASD displayed an almost complete absence of the self-reference effect. However, while the Harry Potter condition was present, this study did

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