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ScienceDirect
Consciousness and Cognition 17 (2008) 312–318
Consciousness and Cognition
www.elsevier.com/locate/concog

Brief Report

# Yours or mine? Ownership and memory

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Received 11 September 2006
Available online 31 May 2007

**Abstract**

An important function of the self is to identify external objects that are potentially personally relevant. We suggest that such objects may be identified through mere ownership. Extant research suggests that encoding information in a self-relevant context enhances memory (the so-called 'self-reference effect'), thus an experiment was designed to test the impact of ownership on memory performance. Participants either moved or observed the movement of picture cards into two baskets; one of which belonged to self and one which belonged to another participant. A subsequent recognition test revealed that there was a significant memory advantage for objects that were owned by self. Acting on items (i.e., moving them) had no impact on memory. Results are discussed with reference to the importance of self-object associations in cognition.


*Keywords:* Self; Ownership; Memory; Social cognition

## 1. Introduction

> "A man's Self is the sum total of all that he CAN call his, not only his body and his psychic powers, but his clothes and his house, his wife and children, his ancestors and friends, his reputation and works, his lands and horses, and yacht and bank-account".
>
> (James, 1890, p.291)

The 'self' is a dauntingly complex construct, but consideration of its ecological purpose suggests some very rudimentary functions. In particular, a 'minimal' sense of self (Gallagher, 2000) has been proposed that serves to distinguish an organism from its immediate external environment (Boyer, Robbins, & Jack, 2005; Gallagher, 2000; Humphrey, 2000; Neisser, 1988). As people interact with the environment, this minimal self is central to the experience of owning a body that produces actions and processes external stimuli. The concept of self can also be extended beyond the body, however, to incorporate aspects of the environment or experiences that are relevant to self (Belk, 1991). Indeed, the early development of strong self-object associations (manifested in the perpetual "*Mine!*" cry of young toddlers—see Fasig, 2000; Ross, 1996) speaks to the importance

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1053-8100/$ - see front matter 
doi:10.1016/j.concog.2007.04.003

of ownership in cognition. The continual interaction between self and objects means that an important psychological function of the self may be to parse external stimuli into those items that are important for self to remember and those that can be treated lightly and processed less elaborately (see Tooby & Cosmides, 1995). The purpose of the present study was to investigate this proposed function by examining whether self-relevant objects are afforded a memory advantage.

The importance of self-relevance in item encoding is demonstrated by the 'self-reference effect' (SRE) in memory (Rogers, Kuiper, & Kirker, 1977; Symons & Johnson, 1997), the finding that information explicitly processed with reference to self (e.g., responding to the question "*are you creative?*") enjoys a memory advantage over material encoded in relation to another person (e.g., responding to the question "*is George Bush modest?*"). The SRE has been attributed to the particularly accessible and elaborate nature of the self-construct, which enriches representations, improving both item recognition and source memory performance (see Johnson, Hashtroudi, & Lindsay, 1993; Klein & Loftus, 1988; Mather, Shafir, & Johnson, 2003; Mitchell & Johnson, 2000; Symons & Johnson, 1997). Although self-memory research to date has focused almost exclusively on trait encoding (see Symons & Johnson, 1997), we suspect that a memory advantage may also arise when self forms associations with objects that have been identified as self-relevant through less explicit means. If operating, of course, such an effect gives rise to an important question. How is self-relevance ascribed to stimuli?

In everyday life, the self is involved with objects in at least two important ways. The self can act on objects (e.g., "*I* pick up the apple") and can form a psychological association with objects through ownership (e.g., "the apple is *mine*"). There is extant evidence to suggest that ownership in particular exerts a significant impact on cognition, although its effects on memory have not yet been explored. Owned objects are believed to enjoy a special processing status (Beggan, 1992) with such a strong association forming between self and owned objects that they are treated as psychological extensions of self and their perception is warped by pervasive self-protecting biases (Belk, 1988, 1991). This pattern is most clearly demonstrated by the 'mere ownership' effect, the tendency for objects arbitrarily assigned to self (i.e., owned but not chosen by self) to be imbued with more positive characteristics (Beggan, 1992; Belk, 1988, 1991) and to be perceived as more valuable (the endowment effect—Kahneman, Knetsch, & Thaler, 1991; Knetsch & Sinden, 1984) than identical items not assigned to self. Given these pervasive influences of ownership on cognition, its impact could be predicted to extend beyond evaluative processing to the encoding and storage of owned-object representations in memory. Thus, the first objective of the present study will be to explore the possibility that owned objects are afforded an advantage in memory.

Of course, to own an object one must first come in contact with the item in question. What, then, are the cognitive consequences of acting on (i.e., reaching out and making contact with) objects? Although there is an extensive literature detailing the memorability of self-produced actions (for review, see Tsakiris & Haggard, 2005), whether this effect extends to the product of the action (i.e., the object with which contact is made) is unknown. There is a clear ecological value of monitoring physical contact with the external environment (Boyer et al., 2005), and memory representations should be enhanced by the profusion of afferent and efferent signals elicited by reaching out and making contact with objects (see Blakemore, Wolpert, & Frith, 1998; Blakemore & Frith, 2003; Farrer & Frith, 2002). Together, these qualities raise the possibility that acting on objects may enhance subsequent memory performance. As well as examining the memorial impact of self-object associations formed through ownership, the current study will also investigate the effect of self-object contact on memory performance.

To investigate these issues, we designed a shopping experiment in which participants owned and acted on external objects. Participants each moved stimulus items, placing half of the items in a basket owned by self and half in a basket owned by another participant. Memory for the items in the baskets was then assessed.

## 2. Participants and design

Thirty undergraduate psychology students (27 female, mean age 20 years) took part in the experiment in return for partial course credits. The research was conducted in accordance with the guidelines and approval of the University of Aberdeen's Psychology Ethics Committee. The experiment had a 2 (Ownership: self-owned or other-owned) $\times$ 2 (Action: self-moved or other-moved) repeated-measures design.

## 3. Procedure and stimulus materials

Participants entered the laboratory with a confederate posing as a second participant. They were both invited to sit at a table on which a red and a blue shopping basket were placed side by side. The experimenter sat at the other side of the table and told the pair of participants that each owned the basket nearest to them. Participants were asked to imagine that they had each won a basket of shopping items, represented in the experiment by picture cards. Their task was to sort cards marked with red and blue stickers into the red and blue baskets, by matching the color of the sticker with the relevant basket.

The stimulus set comprised 216 photographic images of items available for purchase in a large supermarket (e.g., food, clothing, electrical items), printed on 95 mm $\times$ 125 mm laminated cards. These items were divided into three equal sets (matched for item type, word length and number of syllables). One of the three sets was marked with a red sticker on the front of each card, one was marked with blue stickers, and the third set was set aside for use as foils in a subsequent surprise recognition test. The location of the stickers was varied to ensure that participants attended to the item depicted on the card. The assignment of the three sets as red items, blue items and foils was counterbalanced across the experiment. Each of the three sets was further divided into two (again, matched for item type, word length and number of syllables), and the cards were marked on the back with an 'A' or 'B,' so that the experimenter could assign each card to the appropriate recipient. In this way, the cards each participant owned and acted on were pre-arranged, although item order was randomised.

The experimenter held up the cards individually, named the item pictured on the card, then handed it to the relevant participant (i.e., the actor) to put in the correct basket. Card recipient order was randomised so that participants attended to the item before they knew whether or not they would be moving it. After all the cards had been sorted, the participants were seated at two Apple Macintosh computers where they simultaneously completed a surprise recognition memory test of the shopping items. In this test, each item was presented individually onscreen using Psyscope experimental software (Cohen, MacWhinney, Flatt, & Provost, 1993), with the photographic image (250 $\times$ 250 pixels/65 mm $\times$ 65 mm) from the cards presented centrally, and the label presented underneath in lower-case black script. Each item remained onscreen until the participant provided an 'Old' (i.e., previously seen) or 'New' (i.e., previously unseen) response using the keyboard. Presentation order of the 144 old items and 72 foils was randomised by the experimental program. When participants had completed the recognition test, they were debriefed, thanked and dismissed.

## 4. Results

Each participant's recognition score was corrected for baseline false alarm rate by subtracting the proportion of 'Old' responses to foils from the proportion of 'Old' responses to previously presented items (see Fig. 1, upper panel). Overall, false alarms comprised 7.2% of participants' responses to foils. Participants' corrected scores were submitted to a 2 (Ownership: self-owned or other-owned) $\times$ 2 (Action: self-moved or other-moved) repeated measures analysis of variance (ANOVA). The analysis revealed a significant main effect of Ownership ($F(1,29) = 8.56$, $p < .01$), such that more self-owned than other-owned items were correctly recognised (means .65 (*SD* .16) and .59 (*SD* .15) respectively)[1]. No effect of Action emerged ($F(1,29) = 0.85$, ns, self-moved and other-moved means: .63 (*SD* .16) and .62 (*SD* .16) respectively) and the interaction between the two factors was not significant ($F(1,29) = 2.68$, ns).

Participants' response latencies in the recognition task were analysed by submitting the median latencies of correct responses (see Fig. 1, lower panel) to a 2 (Ownership: self-owned or other-owned) $\times$ 2 (Action: self-moved or other-moved) repeated measures ANOVA. A main effect of Ownership again emerged

[1] In the current design, all self-owned items were consigned to the basket closest to self. To ensure that the effect of ownership was not driven by basket proximity, additional data were collected from 22 participants who completed the sorting task without basket ownership being manipulated. Specifically, the experimental procedure was repeated but with the important difference that participants were not asked to imagine that they owned the contents of either basket. A subsequent recognition memory test revealed no effect of basket proximity on memory performance ($F(1,21) < 1$, ns), suggesting that the effects observed in the main experiment were moderated by ownership alone.

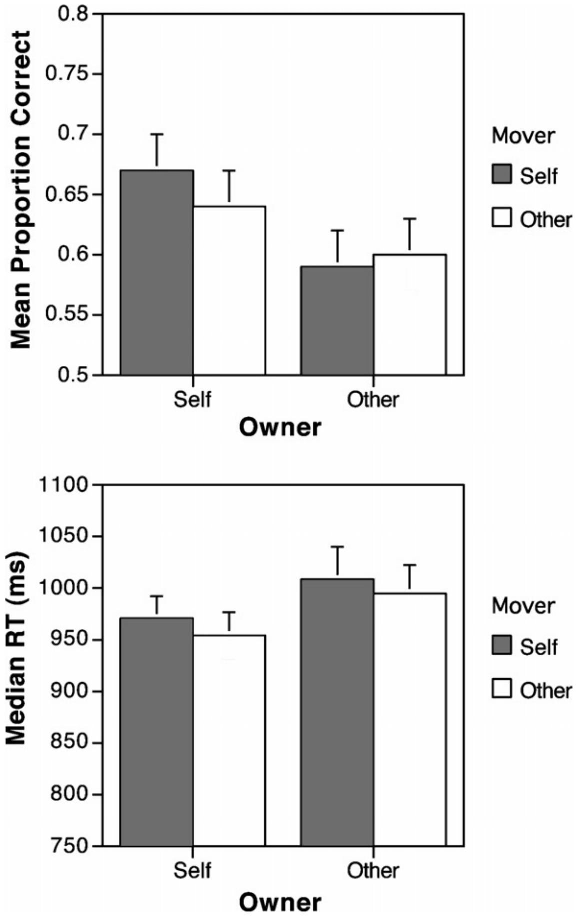


Fig. 1. Effects of moving and owning items on recognition memory accuracy (upper panel) and response latency (lower panel).

($F(1,29) = 8.35$, $p < .01$), with self-owned items recognised more quickly than other-owned items (means 962 ms (*SD* 113.3) and 1001 ms (*SD* 146.0) respectively). No effect of Action ($F(1,29) = 1.16$, ns) or interaction between Action and Ownership ($F(1,29) < 1$, ns) emerged from the analysis.

## 5. Discussion

The current experiment manipulated self-object associations formed through ownership and action, investigating the effects of these factors on recognition memory. It was found that ownership had a significant impact on memory performance, with participants correctly recognising more of the items consigned to their own basket than those in another's basket. Participants also recognised self-owned items more quickly than those that were other-owned, suggesting that ownership elicits a strong memory trace (Hockley & Murdock, 1987; Ratcliff, 1978). Interestingly, these ownership effects emerged regardless of who moved the item—acting on the objects was not found to impact on memory.

The finding that there was better memory for self-owned than other-owned objects is important as it extends the self-referencing literature by demonstrating a SRE in a context other than the standard trait-rating paradigm, thereby suggesting that self-referential encoding applies to a broader range of stimuli and task contexts. The effect is also noteworthy because of the temporary nature of item ownership created in the experiment (i.e., participants knew that they would not take home the items that were in their basket). This feature of the current paradigm differs from previous ownership research, in which owned items are given to participants and genuinely belong to them after the experiment is over (see Beggan, 1992). The emergence of a transient ownership effect reveals that the existence of an ownership context at encoding is sufficient to produce a significant impact on cognition; specifically, enhanced item memory.

In contrast with the effect of ownership, there was no memory enhancement for objects on which self acted. It was speculated that such action may impact on memory because reaching for and grasping an object elicits a gamut of afferent and efferent signals associated with enhanced memory (see Tsakiris & Haggard, 2005), as well as forging a basic level of association between self and the object. It is perhaps significant that in the current paradigm the action produced was identical for all stimuli, as contact was made with a card rather than the individually sized, shaped and textured object itself. Further, this uniform action was produced in response to an external trigger (i.e., the cue of a card being presented), unlike the internally generated, complex actions that dominate action-memory research (e.g., performing a piano recital—see Flach, Knoblich, & Prinz, 2003; Leube, Knoblich, Erb, & Kircher, 2003; Repp & Knoblich, 2004). It is possible that self-object associations may be modulated by the level of agentic processing (i.e., self generation and goal-directed intentionality) that is involved in the production of an action. Specifically, actions that involve a higher degree of agency may be deemed to be more self-relevant than simple repetitive acts that are triggered by the environment (see Wegner, 2002). Accordingly, if participants were granted a choice over which cards they placed in their own basket, an increased encoding advantage may have resulted (see Mather et al., 2003). One useful task for future research would be to explore this possibility.

The interesting question that arises from the current findings is why ownership has such an impact on memory. Clearly, there is an ecological advantage in preferentially encoding owned items, as they are likely to require future recognition (for example, it pays to remember which of an array of cups of coffee belongs to self). But what underlying processes might be driving this effect? From the source monitoring perspective often applied to SRE findings, it could be postulated that representations of owned items are enriched by extant self-knowledge (see Klein & Loftus, 1988; Symons & Johnson, 1997). However, the positive bias for owned objects demonstrated by the mere ownership literature suggests that additional factors may also be involved. For example, owned objects may preferentially capture visual attention, or prompt attentional resources to be directed towards their encoding or retrieval. Further, affective responses towards owned items may facilitate recognition performance (see D'Argembeau, Comblain, & Van der Linden, 2005; Maljkovic & Martini, 2005; Ochsner, 2000). Another unexamined factor in the emergence of ownership effects is the importance of social context. For example, an intimate relationship with the other owner may attenuate the memory advantage for self-owned items, analogous to the pattern found in standard SRE paradigms (see Symons & Johnson, 1997). Further, the self-specificity of the effect could be examined by investigating whether an ownership effect emerges when self is shopping for someone else, intimate or otherwise. The current paradigm provides a means through which such manipulations may be investigated in the future.

Neuroimaging techniques may also be invaluable in the further investigation of the impact of self-object associations on cognition, allowing as they do an examination of potentially dissociable self-relevant networks in the brain (Feinberg & Keenan, 2005; Turk et al., 2004, 2002, Turk, Heatherton, Macrae, Kelley, & Gazzaniga, 2003). Currently, research into explicit self-referential cognition is focused strongly on medial prefrontal cortex (mPFC), an area associated with higher activation for self-referent over other-referent processing (for review, see Northoff et al., 2006). However, the self-association task used in the current study differs substantially from the trait recall task associated with mPFC activation (e.g. Kelley et al., 2002; Macrae, Moran, Heatherton, Banfield, & Kelley, 2004). In particular, the current task did not require evaluative processing of the self-concept, but generated an incidental link between self and an external item through ownership. Since ownership increases perceived item value and positivity (Beggan, 1992; Belk, 1988, 1991; Kahneman et al., 1991; Knetsch & Sinden, 1984), brain areas associated with reward or hedonic relevance might also be expected distinguish owned from not-owned items (Breiter & Rosen, 1999). Future research to investigate these possibilities would provide a valuable contribution to the issue of whether self-relevant information is simply processed with exceptional depth, or is somehow 'special', involving qualitatively different processes (for review, see Gillihan & Farah, 2005).

In conclusion, the results of the present study suggest that the nature of the association between self and external objects plays an important role in determining their memorability. Even transient self-ownership of items had a significant cognitive impact, improving recognition memory in a pattern akin to the SRE. Thus, it seems that we have developed a sense of self-relevance that allows us to identify external stimuli that are potentially important for us to know, ensuring that such items are retained for future use.

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