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Mine to remember: The impact of ownership on recollective experience

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Evaluating information with reference to self is associated with enhanced memory, the "self-reference effect". The effect is found in recognition accompanied by recollective experience (remembering), but not in recognition based on a feeling of knowing. The current research employed an ownership procedure to investigate whether less evaluative forms of self-referential cognition produce similar enhancement of recollective experience. Participants were asked to sort items into baskets that belonged to themselves or a fictitious other. A subsequent remember–know recognition test showed that items encoded in the context of self-ownership were more likely to be correctly recognized than other-owned items. This ownership effect was found in remember, but not know, responses. This finding suggests that creating a self-referential encoding context leads to elaborative representations in episodic memory, even in the absence of explicit self-evaluation.

Keywords: Self; Ownership; Recollective experience; Remember–know; Self-reference effect.

Research into the effects of self on memory has shown that using the self-construct as an encoding device enhances recognition (e.g., Conway, 1990, 1992; Conway & Dewhurst, 1995; Rogers, Kuiper, & Kirker, 1977; Symons & Johnston, 1997). This pattern is exemplified by the "self-reference effect" (SRE) on memory (Rogers et al., 1977; Symons & Johnson, 1997)—the tendency for personality traits encoded with reference to the self (e.g., *"Am I intelligent/reliable/friendly?"*) to be better remembered than traits encoded about another referent (e.g., *"Is Barack Obama calm/tidy/modest?"*).

The SRE is a reliable and somewhat compelling effect as, after all, there is an obvious need to remember self-relevant information, as it may be of future

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importance. However, the ways in which self impacts on cognition may not always follow the conscious, intentional route exploited by the typical SRE paradigm (see Cloutier & Macrae, 2008). Thus, there is a need to investigate the generality of the SRE in less explicit forms of self-referential cognition, which is the focus of the current article.

Self and memory

It has been suggested that the elaborate and accessible nature of self-schemata underlies the SRE, by organizing and enriching self-referential representations (e.g., Conway & Dewhurst, 1995; Rogers et al., 1977; Symons & Johnson, 1997). According to this account, self-referential cognition benefits from the particularly elaborative nature of the self-construct, through which incoming information is comparatively easily encoded, organized, and enriched by extant knowledge (for review, see Symons & Johnston, 1997). This feature of self-referential encoding gives rise to subjective and detailed episodic representations of the original event and the associated thoughts and feelings (Conway & Dewhurst, 1995; Conway, Dewhurst, Pearson, & Sapute, 2001). As a result, retrieval of self-referential memory tends to be accompanied by subjective recollective experience. This has been examined using the remember–know (RK) paradigm (Gardiner & Richardson-Klavehn, 2000; Tulving, 1985). Applying an RK paradigm to the trait-evaluation task, Conway and Dewhurst demonstrated that the SRE emerges in recognition accompanied by recollective experience, but not in recognition accompanied by a feeling of "just knowing". Conway et al. (2001) termed this pattern of memory performance the *self reference recollection effect* (SRRE).

The SRRE provides an insight into self-referential cognition because remember and know judgements are argued to reflect distinct subjective states of awareness (see Gardiner, 2008). In the RK paradigm, participants are asked to give "remember" responses to items for which they have a specific recollection of seeing in the study phase (e.g., they can retrieve sensory aspects of the event or thoughts and feelings they had at the time). In contrast, "know" responses should be given if recognition is based on a feeling of having seen the item previously, with no recollective experience of its presentation. While the functional independence of these states of awareness has been questioned (see Dunn, 2008), Conway & Pleydell-Pearce (2000) argue that recollective experience is unique as it links current consciousness with "*a sense of self in the past*" (p. 272). Conway et al. therefore imply that "remember" responses should always be evoked by self-referential cognition.

While this reasoning fits with Conway and Dewhurst's (1995) SRRE finding, it is yet to be established whether recollective experience is associated with other forms of self-referential cognition. In the standard SRE task, participants are asked to judge the applicability of personality traits to themselves and another referent. This task therefore requires participants to consciously evaluate the self, allowing the elaborate and organized self-concept to support encoding to a greater degree than the comparatively poor knowledge structures pertaining to other people. However, research has shown that cognition can be influenced by the self in many ways without conscious activation of this support structure. (e.g., Cloutier & Macrae, 2008; Cunningham, Turk, Macdonald, & Macrae, 2008; Greenwald & Banaji, 1989; Turk, Cunningham, & Macrae, 2008). For example, Turk et al. (2008) demonstrated that simply presenting participants' own names or faces on screen during a target location task increases subsequent target recognition. Further, Mood (1979) showed that even in young children, the inclusion of self-referential pronouns improves language comprehension. What these studies have in common is facilitated processing of self-referential material, in the absence of conscious self-evaluation. They raise the important question of whether such "incidental" self tasks evoke recollective experience in line with Conway and Dewhurst's SRRE.

Triggering self-referential encoding

One empirically useful method of creating self- and other-relevant encoding contexts is ownership, which has been shown to elicit a self-referential memory bias (Cunningham et al., 2008). Radvansky, Wyer, Curiel, and Lutz (1997) have shown that ownership relations can be used to organize information in memory, as single situational models are created when multiple objects are encoded in the context of purchase by one referent. To investigate whether the identity of the referent (i.e., self or other) impacts on the efficacy of object encoding, Cunningham et al. (2008) compared recognition for items encoded under conditions of imagined ownership by self or another person. Pairs of participants sorted grocery items into two baskets, one of which "belonged" to each participant. A subsequent surprise recognition memory test showed that items encoded as self-owned were more likely to be remembered than other-owned items. This suggests that using ownership to create a self-relevant encoding context can elicit self memory biases.

The impact of ownership on memory is particularly interesting because of the inherent association between self and owned objects (Beggan, 1992). There are many examples of humans displaying affective reactions towards owned objects that go beyond what would be expected if objects were regarded as mere tools suitable for a particular purpose. Corresponding with this anecdotal evidence, research has shown that possessions are sometimes used to define self or as extensions of self and that owned objects are incorporated into the self-construct (Beggan, 1992). Therefore, the need to protect one's positive self-image colours the perception and valuation of owned objects, even when ownership is transient and hypothetical, as is often the case in experimental contexts (the "*mere ownership effect";* Beggan, 1992).

The extent to which episodic recollection might similarly underpin self-memory biases under incidental encoding conditions remains unclear. Given the importance of possessions to the self, ownership offers a useful mechanism to explore incidental self-referential encoding in everyday cognition. We predicted that reported recognition memory enhancement afforded by temporary ownership (Cunningham et al., 2008) would be reflected in a pattern of recollective experience similar to that reported by Conway and colleagues (Conway & Dewhurst, 1995; Conway et al., 2001), with increased remember responses associated with the recognition of self- compared to other-owned objects.

Method

Participants and design

A total of 28 undergraduate students (21 females, mean age 20.4 years) at the University of Aberdeen took part in the experiment in return for course credits. All participants had normal or corrected-to-normal eyesight. Participants gave informed consent in accordance with the guidelines set by the University of Aberdeen's Psychology Ethics Committee. The experiment had a single-factor (ownership: self-owned and other-owned) within-subjects design.

Stimuli and apparatus

The stimulus set comprised 150 photographic images of grocery items (e.g., food, electrical items) adapted from online supermarket databases. The images (250 × 250 pixels/72 pixels per inch) were presented on a white background with a 5-mm black border. This border was later changed to red or blue to signify ownership. The 150 pictures were divided into three equal sets that were matched for item type (e.g., fruit, confectionery). For each participant, one of three sets was used as self-owned targets (50 items), another set was used as other-owned targets (50 items), and the third set was used as foils (50 items) at recognition. Use of the three sets in these three conditions was counterbalanced across participants. The experiment was programmed using E-prime Version 1.1 experimental software (Psychology Software Tools Inc., Pittsburgh, PA).

Procedure

Participants were tested individually and were seated at a PC and monitor, which showed a blank screen with a coloured shopping basket in each of the two bottom corners. Participants were told that they were taking part in a shopping experiment and that they had to imagine that they and a fictitious other ("John") had each won their own basket with shopping items. The baskets were red and blue, respectively, and remained onscreen throughout the experiment. Participants were informed that either the red or the blue basket was theirs (i.e., "self-owned") and were asked to imagine that everything that went into that basket would belong to them. The other basket, along with its contents, was designated as belonging to John (i.e., "other-owned"). The colour of the self-owned basket and on-screen location of the red and blue baskets (bottom left or right) were counterbalanced across participants.

In the encoding phase an item was presented in the centre of the screen for 1,500 ms, after which a 5-mm red or blue border appeared around the item, also for 1,500 ms. Participants were instructed to use labelled buttons on the keyboard to place the item in the red basket if the border was red, or in the blue basket if the border was blue. The next item was presented after an interstimulus interval of 500 ms. Presentation order of the self-owned and other-owned items was randomized by the computer.

After all of the items had been presented, participants received instructions for responding to a two-step (old/new followed by remember/know/guess) recognition memory test (Gardiner & Richardson-Klavehn, 2000). Participants were told to use labelled buttons on the keyboard to respond "yes" if they recognized the item from the study phase and "no" if they did not. If a "yes" response was selected, they were asked to specify the basis for their response. If they could consciously recollect having seen the item and could retrieve any information about this event (e.g., they could remember what they thought at the time) they were instructed to press "remember". If recognition was based purely on the basis of a feeling of knowing that the item had been presented, in the absence of being able to recollect any further details, they were instructed to press the "know" button. Lastly, if their "yes" response had been a complete guess, they were instructed to press "guess".

The experimenter checked whether the instructions were understood by asking participants to explain the difference between the three response options in their own words. She made sure that participants did not regard the remember and know response options as "sure" and "unsure", respectively. The average length of time between the completion of the study phase and the start of the recognition test was five minutes. In the recognition test, 100 previously seen items and 50 unseen distractors were presented individually in the centre of the screen in a random order. Each item remained on screen for 1,500 ms, during which time participants gave their initial "yes" or "no" recognition response. Following a "no" response, the next item was presented. Following a "yes" response, participants were asked to indicate the basis of their response: "remember", "know", or "guess", after which the next item was presented. When the recognition test was completed, participants were debriefed and were thanked for taking part.

Results

Participants' hit rates and false-alarm rates were calculated by computing the proportion of previously presented items correctly or incorrectly recognized, respectively (Table 1). False-alarm

Table 1. *Mean raw hit rates and false-alarm rates*

	Remember		*Know*		*Guess*	
	Self	*Other*	*Self*	*Other*	*Self*	*Other*
HTR	.561 (.221)	.479 (.235)	.178 (.128)	.218 (.178)	.042 (.066)	.050 (.060)
FAR	.009 (.018)		.042 (.064)		.026 (.040)	

Note. Means; standard deviations in parentheses. HTR = raw hit rates; FAR = false-alarm rates.

rates were subtracted from hit rates for each response type. (Note that there was no separate false-alarm rate per ownership condition.) These corrected hit rates were submitted to a single-factor (ownership: self or other) repeated measures analysis of variance (ANOVA), which revealed a significant effect of ownership, $F(1, 27) = 6.389$, $MSE = 0.003$, $p = .018$. This effect reflected participants' recognition of a higher proportion of self-owned ($M = .676$, $SD = .226$) than other-owned items ($M = .641$, $SD = .210$).

To analyse the type of memory awareness associated with ownership, participants' corrected hits then were divided into those classified as "remember" and those classified as "know" responses. The number of "guess" responses was low (3.8%), and these were not included in the analysis (see Conway et al., 2001). A 2 (ownership: self or other) × 2 (memory awareness: remember or know) ANOVA[1] was applied to remember and know hit rates, which revealed an interaction between ownership and memory awareness, $F(1, 27) = 11.422$, $MSE = 0.009$, $p < .002$. Analysis of simple effects revealed that this interaction emerged because of an ownership effect in remember responses, $F(1, 27) = 10.444$, $p < .003$, such that more self-owned than other-owned items were recognized (see Figure 1). In line with Conway and Dewhurst (1995), more other-owned than self-owned items received a know response, but this trend did not reach significance, $F(1, 27) = 2.444$, *ns*.

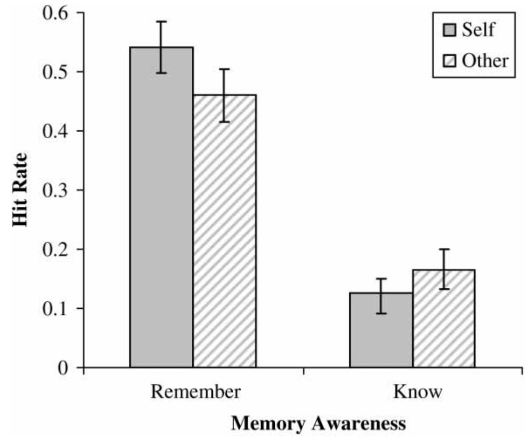

Figure 1. *Remember and know hit rates for self-owned and other-owned items.*

Discussion

The results of the current inquiry replicate Cunningham et al.'s (2008) finding that encoding items in the context of self-ownership elicits a memory advantage. The findings also identify two states of awareness at retrieval that are affected differently by ownership (see Gardiner, Java, & Richardson-Klavehn, 1996; Gardiner & Richardson-Klavehn, 2000; Roediger, Dudai, & Fitzpatrick, 2007). Specifically, an ownership effect was observed for responses that were accompanied by recollective experience (remember responses) but not for responses that were based on feelings of just knowing (know responses).

These results are consistent with the SRRE described by Conway, Dewhurst, and colleagues (Conway & Dewhurst, 1995; Conway et al., 2001). Previously, the SRRE has been explored through the standard SRE trait evaluation task that requires participants to encode items with a conscious reference to self and others. The current findings extend this work by showing that the self-referential recognition advantage applies to a broader range of encoding contexts. In the present study, participants were asked

[1]In standard remember/know tasks, the recognition classifications are not independent as a "yes" response that does not lead to a remember response necessarily elicits a know response. However, in the present experiment the inclusion of a guess category removed this dependency, allowing memory awareness to be included as a factor in the ANOVA (for similar analyses, see Conway & Dewhurst, 1995; Conway et al., 2001; see also Gardiner, 2008). However, to show that the pattern of memory performance for remember and know responses is reliable, we also conducted *t* tests on these responses separately. These analyses showed a significant effect of ownership for remember responses, $t(27) = 3.814$, $p = .001$, and a reverse ownership effect for know responses, $t(27) = 2.398$, $p = .024$, confirming the reported interaction and replicating Conway et al.'s (2001) findings.

simply to divide items into a self and other category, a task that does not direct any elaborative self-referential encoding. The correspondence between the memorial pattern that emerges from this task and that formed through directed self-evaluation speaks to the basic and profound influence of self on cognitive functioning, through which material that is identified as self-relevant is subject to enhanced encoding (Cloutier & Macrae, 2008; Turk et al., 2008).

These findings suggest that multifarious cues of self-relevance can trigger increased elaborative encoding, but by what means? It has been argued that the SRRE reflects encoding elaborated through reference to activated self-schemas, so participants may have applied extant self-knowledge to representations of self-owned items at encoding. However, other systems associated with increased elaborative encoding also may contribute to the SRRE. In particular, participants are likely to attend more to self-owned items and experience affective arousal in response to the ownership cue, both of which elicit increased elaboration at encoding (LaBar & Cabeza, 2006; Turk et al., 2008). Future work might address the relative contributions of these sources of enhanced elaboration.

An interesting aspect of the current inquiry is that it concerns self-referential encoding in an everyday context, highlighting the practical advantages of basic self-processing biases (Bjorklund & Green, 1992; Boyer, Robbins, & Jack, 2005). The concept of ownership has been of considerable importance to humans since prehistoric times (Ingold & Gibson, 1993) as, after all, one needs to remember specifically which dwelling place, weapon, or piece of food is one's own if one is to utilize or protect it effectively. In the case of ownership, familiarity is not enough. That the minimal, temporary form of ownership manipulated in the current inquiry gives rise to an SRRE speaks to the efficacy of ownership cues at evoking the elaborative systems that give rise to enhanced encoding.

In sum, the present study supports Cunningham et al.'s (2008) finding that encoding items in the context of self-ownership increases recognition memory. Extending this finding, the enhancing effect of ownership was found in remember but not in know judgements. These results demonstrate that the SRRE is not limited to the trait-evaluation task through which it was first identified, but may be the hallmark of self-relevant encoding in general.

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