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Consciousness and Cognition 17 (2008) 1040–1045
Consciousness and Cognition
www.elsevier.com/locate/concog

Short Report

Self-memory biases in explicit and incidental encoding of trait adjectives

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Received 12 July 2007
Available online 18 April 2008

Abstract

An extensive literature has demonstrated that encoding information in a self-referential manner enhances subsequent memory performance. This 'self-reference effect' (i.e., better memory for self-referent than other-referent information) is generally elicited in paradigms that require participants to evaluate the self-descriptiveness of personality characteristics. Extending work of this kind, the current research explored the possibility that explicit evaluative processing is not a necessary precondition for the emergence of this effect. Rather, responses to self cues may enhance item encoding even in the absence of explicit evaluative instructions. We explored this hypothesis by testing memory for items encoded in either an evaluative or relational context. The relational context was achieved by requesting participants to report the spatial relationship between target stimuli, and visual or verbal referent cues. The results revealed a self-referent memory advantage, regardless of the encoding context or triggering cue. The theoretical implications of these findings are considered.

Keywords: Self; Memory; Self-reference effect; Social cognition

1. Introduction

As the self is a fundamental construct that guides key aspects of behavior (James, 1890; Neisser, 1988), it is unsurprising that considerable empirical efforts have been expended in attempts to chart the influence it exerts on cognition. Much of this work has focused on the manner in which self modulates memory function and has revealed an important memorial effect. When it comes to recollecting experiences from the past, self-referential thinking affords material a reliable advantage in memory (Symons & Johnson, 1997). Termed the *self-reference effect* (SRE), this memory bias emerges in task contexts in which people link to-be-encoded items with self through explicit experimental instruction (Rogers, Kuiper, & Kirker, 1977). For example, in the standard self-referencing paradigm, participants are required to report whether personality characteristics are descriptive of self or another person, usually a familiar celebrity (e.g., '*are you creative?*', '*is George W. Bush reli-*

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1053-8100/$ - see front matter
doi:10.1016/j.concog.2008.02.004

able?'). When memory is subsequently tested for the presented items, a recognition (and recall) advantage is found for material that was encoded with reference to self (i.e., self memory > other memory).

It has been argued that the SRE is underpinned by the enhanced elaboration and organization of material that is encoded in relation to self (Klein & Loftus, 1988). This process distinguishes self-referential encoding from other types of associative processing (Keenan, Golding, & Brown, 1992; Rogers et al., 1977; Symons & Johnson, 1997), perhaps linking the SRE to differences in depth of processing (Craik & Lockhart, 1972). However, recent neuroimaging studies suggest that self-referential mental activity may be functionally distinct from other-referential processing (see Northoff et al., 2006). Specifically, self-referential processing is associated with activity in medial prefrontal cortex (Heatherton et al., 2006; Kelley et al., 2002; Macrae, Moran, Heatherton, Banfield, & Kelley, 2004; Moran, Macrae, Heatherton, Wyland, & Kelley, 2006). In addition, functional imaging data also speak against the levels of processing account for the memory bias (Kelley et al., 2002). If the SRE is not a standard depth of processing phenomenon, it may emerge under conditions that do not necessitate the explicit evaluative appraisal of self-relevant information. That is, self-memory effects may emerge under encoding conditions in which non-elaborative associations are forged between self and to-be-processed items. The extant literature focuses largely on encoding contexts in which self-cues are explicitly linked with to-be-remembered items, but such directed associations may not be a necessary prerequisite for enhanced memory. Incidental links between self and stimuli would better reflect the incidental, undirected contexts in which self and external stimuli become associated in everyday life (see Cloutier & Macrae, 2008; Cunningham, Turk, MacDonald, & Macrae, 2008). The extent to which self-memory effects might emerge under such indirect encoding conditions was the subject of the current investigation.

In order to measure the impact of incidental self-referencing, associations between self and information must be forged in settings that do not demand the explicit appraisal of the self-descriptiveness of material, or even an explicit link to be formed between self and the to-be-encoded items. Extant research reveals that attention is automatically oriented self-relevant information such as one's own name (Bargh, 1982; Gray, Ambady, Lowenthal, & Deldin, 2004; Moray, 1959; Shapiro, Caldwell, & Sorensen, 1997) or one's own face (Tong & Nakayama, 1999; Sui, Zhu, & Han, 2006). As a result, we propose to utilise names and faces in an incidental context to activate the self-construct. To assess the conditions under which a self-memory effect may arise, we compared memory for trait adjectives associated with self through a standard explicit evaluation task, with similar information encoded in a task that linked self with stimuli in a more incidental manner. The explicit task involved a standard self-referencing paradigm (Kelley et al., 2002) in which participants rated the extent to which personality trait adjectives described both self and a familiar other (*Angelina Jolie*) following the presentation of self- and other-referent cues. The incidental task, in contrast, required participants to report whether trait adjectives appeared above or below self- and other-referent cues. Replicating previous work of this kind, a standard SRE was expected to emerge under conditions of explicit self-item association (see Symons & Johnson, 1997). We also predicted an SRE to emerge under conditions of incidental association, although overall memory performance in this perceptual-level task was expected to be lower (see Craik, 2002; Craik & Lockhart, 1972).

2. Method

2.1. Participants and design

Forty-eight females (mean age 20.7 years, range 18–25 years) took part in the experiment. All participants were native English speakers and had normal or corrected-to-normal visual acuity. Participants gave informed consent in accordance with the guidelines set by the University of Aberdeen's Psychology Ethics Committee. The experiment had a 2 (Target: self or other) $\times$ 2 (Encoding Condition: Explicit or Incidental) $\times$ 2 (Cue: face or name) mixed design, with repeated measures on the first factor.

2.2. Procedure and stimulus materials

Each participant was randomly assigned to either the Explicit or Incidental encoding condition and the face- or name-cued version of the task. All participants completed an encoding and a recognition memory task, both of which were presented on a PC using Superlab experimental software. For the encoding task, each trial began with a target being presented centrally for 2000 ms (e.g., a face or name). In the face-cue version of the task, self-referent trials were cued by presentation of a photographic image of the participant's own face. For other-referent trials, a photographic image of a sex-congruent familiar other (Hollywood actress *Angelina Jolie*) was presented. The images were all 300×300 pixel (resolution 72 dpi) frontal full-face digital photographs. In the name-cue version of the task, the referent cues comprised the participant's own full name for self-referent trials (e.g., '*Jennifer Smith*') and that of *Angelina Jolie* for other-referent trials. Names were presented centrally in black capital letters (Chicago size 48 font). The self- and other-relevant cues were each presented 60 times.

Five hundred milliseconds after the onset of the referent cue, a trait word was presented 20 mm either above or below the name, in red Arial size 48 font. A total of 180 trait words taken from Anderson's (1968) set were used in the experiment. These were divided into three equal lists matched for likeability, meaningfulness, word-length, and syllabic-length. Traits from two of the lists (i.e., 120 words) were presented in the encoding phase (one list being paired with self-referent cues and one with other-referent cues), with half of the list items presented above and half below each referent cue. The third list was retained for use as foils in the subsequent memory test. The order to which trait lists were assigned to experimental conditions was counterbalanced across participants.

Although all participants were presented with the same experimental materials, task instructions varied between experimental conditions. In the explicit encoding condition, participants were asked to decide whether each trait adjective described the referent person with which it was presented, responding '*yes*' or '*no*' by means of a keypress. This task replicated standard self-referencing encoding paradigms (e.g., Kelley et al., 2002). In contrast, participants in the incidental encoding condition were instructed simply to indicate whether the trait adjective appeared above the referent cue, again making a '*yes*' or '*no*' response using the keyboard. Following completion of this task, a surprise memory test was administered in which traits from all three lists (i.e., two presented in the encoding phase and one previously unseen) were presented in the centre of the computer screen in black Arial size 48 font. Participants were asked to make '*Old*' or '*New*' judgments using the keyboard. Following completion of the memory test, participants were thanked, debriefed and dismissed.

3. Results

Recognition memory data were converted into proportional accuracy scores and corrected for guessing by subtracting the proportion of false-alarms from the proportion of hits. These data were submitted to a 2 (Target: self or other) $\times$ 2 (Encoding Condition: Explicit or Incidental) $\times$ 2 (Cue: face or name) mixed model analysis of variance. This analysis revealed the expected main effect of Encoding Condition [$F(1,44) = 101.23$, $p < .001$], with memory performance being significantly higher in the explicit than the incidental encoding condition (*M*s: .49 *vs.* .19, respectively). A significant main effect of Target also emerged [$F(1,44) = 38.89$, $p < .001$], with traits paired with self cues better remembered than those presented with other-referent cues (*M*s: .38 *vs.* .29, respectively). There was no significant effect of Cue [$F(1,44) = 2.94$, *ns*].

In addition, a significant Target $\times$ Encoding interaction was observed [$F(1,44) = 4.10$, $p < .05$] (see Fig. 1). Simple main effects analysis revealed a significant effect of encoding condition on both self [$F(1,44) = 85.52$, $p < .05$], and other [$F(1,44) = 78.89$, $p < .001$] trials, such that memory was better in the explicit than incidental encoding condition. In addition, an effect of target was observed in both the explicit [$F(1,44) = 34.13$, $p < .001$] and incidental encoding condition [$F(1,44) = 8.87$, $p < .005$], revealing better memory for items paired with self than a familiar other. These results demonstrate that although both explicit and incidental forms of encoding generate a reliable self-memory advantage, the magnitude of this memory bias is larger under explicit forms of encoding.

4. Discussion

The current results demonstrate that both explicit and incidental associations between self and target stimuli can impact on memory performance. Target stimuli presented with self cues were subsequently better

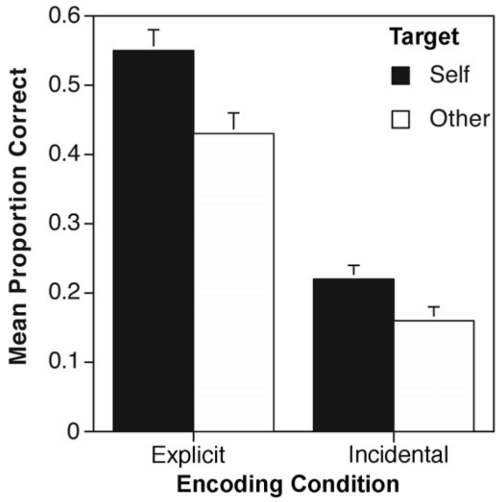

Fig. 1. Face-cued self-memory effects under explicit and incidental self-association conditions. The graph shows a significant Encoding × Target interaction. Error bars represent one standard error from the mean.

remembered than those presented with other-referent cues, regardless of cue-type (faces or names). This self-memory effect emerged under standard self-referencing conditions (i.e., when the task required explicit evaluation of the trait word in relation to each referent), and also under incidental encoding conditions (i.e., in which participants reported the spatial relationship between trait adjectives and target cues). Although the magnitude of the self-memory effect was greater in the explicit encoding condition, the emergence of a significant incidental self-memory effect is noteworthy because it reveals less direct conditions under which self can impact on cognition. Despite previous research suggesting that elaborative processing is required to produce a SRE (Keenan et al., 1992), the present findings show that incidental pairings between self and target stimuli are sufficient to enhance memory performance.

This incidental self-memory effect is important because it reflects the contexts in which self is likely to form associations with external stimuli in everyday life. Cognitive processing is guided by numerous heuristics that function to ensure important information (e.g., that which is goal-relevant or danger-signalling) is attended to and preferentially processed (Folk & Remington, 1998; Lipp & Waters, 2007; Postman, Bruner, & McGinnies, 1948). The current findings suggest that the mere presence of a self cue is sufficient to enhance encoding proficiency. There are clear advantages to such a system being in place, as it increases the likelihood that potentially important self-relevant information is retained.

The emergence of incidental self-memory effects points to inherent differences in the encoding of self- and other-relevant stimuli. One intuitive quality of self that might account for observed memory biases is its high level of affective importance (Bargh, 1982; Zajonc, 1980). Self is associated with positive affect, as demonstrated by such phenomena as the various self-serving biases that pervade social perception (e.g., Bradley, 1978; Klein, 2001; Miller & Ross, 1975) and the endowment of self-relevant objects with positive value (Kahneman, Knetsch, & Thaler, 1991; Knetsch & Sinden, 1984). These affective processing biases are paralleled by autonomic arousal to self-relevant stimuli, including increased galvanic skin response (GSR) in response to mirror reflections of self (Williams, Diehl, & Mahoney, 2002), and with activity in the neural systems associated with affective processing of self cues (Kircher et al., 2000; Kircher et al., 2001). Such affective responses enhance encoding by affecting limbic system neurobiology, increasing amygdala activity and hippocampal functioning (McGaugh, 2004, 2006). This may therefore provide a possible route through which the presentation of incidental self cues might impact on memory performance. It may also account for attenuation of the memory bias when self is contrasted with persons that evoke a similarly high affective response (e.g., *mother*—Bower & Gilligan, 1979).

The attentional capture associated with self cues presentation (e.g., Bargh, 1982; Brédart, Delchambre, & Laureys, 2006; Geller & Shaver, 1976; Gray et al., 2004; Moray, 1959; Shapiro et al., 1997) is also likely to be relevant to self-memory biases. As with arousal responses, an increase in attentional focus elicited by self cues should enhance encoding proficiency. Indeed, the two may be intrinsically interrelated, with fast affective responses triggering attentional capture. In combination, we suggest that they create an enhanced encoding context that can account for the incidental self-memory effects found in the current study. Future research should therefore attempt to explore the importance of affective and attentional processes in self-referential encoding and memory.

The existence of incidental self-memory effects raises the intriguing possibility that the standard SRE emerging from explicit evaluation tasks reflects a similar autonomic encoding enhancement, as well as the elaborative enriching of self-relevant material proposed elsewhere (see Klein & Loftus, 1988; Symons & Johnson, 1997). This reasoning is consistent with Kelley et al.'s (2002) argument that the encoding of self-relevant information is not just 'deeper' but is functionally distinct from other-referent processing. However, it is also possible that explicit and incidental self-memory biases comprise two completely separate channels through which self impacts on cognition. After all, several functionally distinct systems specialised for self-processing have been identified (see Boyer, Robbins, & Jack, 2005), from sensory feedback systems (Blakemore, Wolpert, & Frith, 2002) and perceptual biases (Tong & Nakayama, 1999) to higher-order social cognition heuristics (see Fiske & Taylor, 1991). A third possibility is participants in the incidental encoding condition engaged in spontaneous evaluative processing, rendering the incidental and evaluative self encoding tasks indistinguishable. While these participants' relatively poor memory performance, as well as their post-test debriefing reports, belie this explanation it cannot be excluded in the current design. The extent to which disparate or overlapping self-systems contribute to explicit and incidental self-memory effects remains an open question, towards which functional neuroimaging techniques may provide the best route for future research.

Notwithstanding this unresolved issue, what can be concluded from the current inquiry is that when it comes to memory enhancement, the self does not need directed evaluative processing; simple incidental presentation will suffice. Thus, the incidental self-memory effect exemplifies the fundamental importance of self in everyday cognition (James, 1890; Neisser, 1988). As self encounters incoming stimuli and information, it must identify that which is of potential relevance. Enhanced encoding of stimuli associated even incidentally with self constitutes one method of ensuring that potentially important information is retained. The incidental self-memory effect is in this sense a typical product of the biases that ensure cognitive processing remains "a servant of one's interests, needs and values" (Postman et al., 1948, p. 142).

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