

Memory for Object Details in Self- and Other-Referencing

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ABSTRACT

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Self-referencing benefits item memory, but few studies have investigated the level of detail accurately encoded in these memories. Experiment 1a tested the hypothesis that self-referencing would not only enhance general memory for objects but also memory for specific details of objects. Thirty-two American participants encoded objects in reference to either the self, a close other (one's mother), or a familiar other (Bill Clinton). Following a two-day retention interval, participants indicated whether objects were the same as a previously encoded object, similar to an encoded object, or new. Main effects of encoding Condition and Memory type (Specific, General) emerged. General memory was significantly better than specific memory and objects encoded with the self or mother were better remembered than objects encoded with Clinton. Experiment 1b replicated the study with an East Asian sample and results were compared across culture. Americans performed better than Asians in specific memory but both cultures

showed the same memory pattern across encoding conditions. We conclude that self- and mother-referencing only enhance memory for object details for Americans.

TABLE OF CONTENTS

Experiment 1a	
Introduction.....	1
Method.....	8
Results.....	12
Discussion.....	14
Experiment 1b	
Introduction.....	19
Method.....	22
Results.....	24
Discussion.....	26
References.....	32
Appendices	
Appendix A – Post-task Encoding Questionnaire.....	38
Appendix B – Post-task Recognition Questionnaire.....	40
Tables.....	41
Figures.....	44

Memory for Object Details in Self- and Other-Referencing

The self-reference effect, or the tendency for people to remember better information when it has been encoded in reference to the self (Rogers, Kuiper, & Kirker, 1977), has received great attention in psychology over the past thirty years. The effect has been found in a variety of tasks, including studies in which people are instructed to remember stimuli, like personality traits, nouns, and definitions (see Symons & Johnson, 1997, for review), in people who suffer from mild depression as well as in healthy individuals (Derry & Kuiper, 1981), and across age groups, including children as young as five (Sui & Zhu, 2005) and older adults (Gutchess, Kensinger, Yoon, & Schacter, 2007; Mueller, Wonderlich, & Dugan, 1986). Although a few studies have failed to produce the self-reference effect (Bellezza & Hoyt, 1992; Keenan & Baillet, 1980; Klein & Kihlstrom, 1986; Lord, 1980), the effect is robust, occurring across the majority of self-referencing studies (Symons & Johnson, 1997).

The literature includes speculation on the reasons for the self-reference effect and its implications for the concept of the self in human memory (Symons & Johnson, 1997). Rogers, Kuiper, and Kirker (1977) and others have proposed that the self is a frequently used and thus highly elaborated schema that facilitates memory by offering additional retrieval routes. According to this model, processes involving the self and other frequently elaborated structures, like that of an intimate other, are more practiced and therefore offer an efficient and easy encoding and retrieval strategy (Symons & Johnson, 1997). Klein and colleagues

(Klein & Kilhstrom, 1986; Klein & Loftus, 1988; Klein, Loftus, & Schell, 1994) have argued that the self is not a unique structure but rather that the self elicits organizational processing, which enhances memory when the comparison condition does not facilitate organization (Symons & Johnson, 1997). It has also been suggested that the self encourages both organization and elaboration depending upon the degree to which encoded information is related to the self and the nature of the encoding task (Klein & Loftus, 1988). Recent neuroimaging studies have lent support to a view that the self invokes a unique memory structure through the recruitment of different brain regions, reflecting distinct cognitive processes for information referenced to the self versus other people. In these studies, self-judgments seem to engage a distinct region of medial prefrontal cortex (mPFC) compared to judgments of other people (Feinberg & Keenan, 2005; Kelley et al., 2002; Macrae, Moran, Heatherton, Banfield, & Kelly, 2004; Northoff et al., 2006; Turk et al., 2004, 2002; Turk, Heatherton, Macrae, Kelley, & Gazzaniga, 2003).

The benefits of self-referential processing for memory are less disputed than the potential explanations. The effect on memory is generally stronger in tasks involving recognition as compared with recall tasks. Most recent studies compare memory of self-referenced information to information encoded when thinking about another person. In these studies, self-referenced information is better remembered than other-referenced information in both tasks of recognition and recall, and when remembering source information (Johnson, Hashtroudi, & Lindsay, 1993; Klein & Loftus, 1988). In their meta-analysis of these studies,

Symons and Johnson (1997) found that self-referencing in most studies was superior to encoding semantic information, physical information, and in other-reference conditions. They proposed that relating information to the self in encoding is an especially advantageous strategy when the environment presents a great deal of information to remember.

In general, referencing the self while encoding information enhances general memory, or the ability to later recognize whether something is new or old. However, little research has investigated the amount of detail encoded, or specific memory, in self-referencing. Nearly all the experimental self-referencing tasks in previous studies have involved words. A meta-analysis of self-reference effect studies reports that approximately 80% of all studies used personality trait words, which people tend to naturally elaborate and relate to the self and others (Symons & Johnson, 1997). A reduced self-reference effect is found when nouns are used, which may result from our tendency to rely on nouns for semantic information (Symons & Johnson, 1997). Drawing from word paradigms, it is difficult to assess whether specific details are encoded and retrieved when we self-reference, because words are conceptual and lack rich perceptual details. When participants are asked to read words and reference the self, do people remember any details about the physical presentation of the words, such as the font or color, or do they solely benefit from linking the concept represented by the word to the self? People likely relate personality traits or descriptive adjectives to themselves on a frequent basis because these words describe a concept we generally associate with human characteristics. For example, when thinking about the word “outgoing”,

people tend to think of their own behavior or that of another person, rather than relating it to something nonhuman, like an outgoing dog. The tasks performed in most self-referencing studies require participants to do a highly practiced and familiar task, relating elaborated words to themselves, others, or considering semantic information about the words. The memory benefit of self-referencing may therefore result from a well-practiced task and this benefit may not extend to nonverbal domains.

A great deal of the literature has found the self-reference effect for general memory, in which participants must determine whether an item is old or new (e.g., was the word “outgoing” studied previously?). A preliminary study by Gutchess (2008) explored the self-reference effect in specific memory as well as general memory across age groups. In this study younger adults showed a larger self-reference effect than older adults in specific memory, which in this case was defined as source information (memory for the condition in which information had been studied previously), but no significant difference in age was found for general memory. This finding suggests that young adults may substantially benefit from self-referencing because memory for some specific information, in addition to general recognition, is accurately encoded and retrieved. Remembering the source of information, however, is only one type of specific detail and future studies are necessary to explore if other specific details are also remembered.

Memory for perceptual information is another type of specific memory that should be assessed. Visual specificity, or memory for visual details, has been

an especially prominent topic in the emotion literature. Objects or pictures with negative emotional content seem to enhance not only memory for the general sort of object but also memory for visual details of the studied items, more than neutral and positive items (Kensinger, Garoff-Eaton, & Schacter, 2006, 2007). Memory for visual detail might be enhanced by the emotion associated with those details, however, it's also important to investigate other conditions in which rich perceptual detail is accurately remembered.

Although details of negative objects might be easier to remember, we frequently rely on our memory for specific details when dealing with more neutral everyday objects in our environment. Objects like tools, clothing, electronics, and food products contain rich specific details that must be remembered or at least recognized in daily life. Belk (1988, 1991) found that the self-concept may also lie outside the body and mind in how we process and represent physical objects, like our possessions, in relation to our selves. This extension of the self to self-relevant objects is apparent in the emphasis we place on ownership, which first emerges in young toddlers (Ross, 1996). Not only do we tend to consider owned items as extensions of the self (Belk, 1988, 1991), but people also evaluate objects randomly assigned to them in a more positive light (Beggan, 1992; Belk, 1988, 1991) and as more valuable than the same objects assigned to others, a phenomenon referred to as the endowment effect (Kahneman, Knetsch, & Thaler, 1991). In a recent study, Cunningham, Turk, Macdonald, and Macrae (2008) found a significant memory advantage for assigned owned objects. Participants were presented with pictures of supermarket items "belonging" to themselves or

to the confederate beside them. After encoding these pictures, they were asked to put their items into their own shopping basket. Participants later conducted a recognition task in which they determined whether the presented objects belonged to them or to the confederate. The superior memory for items belonging to themselves over others suggests that the self-reference effect appears not only with words but also with physical objects and that the memory advantage extends to the cognitive processes underlying ownership. Participants' interactions with the objects by moving them had no significant impact on memory. The memory advantage therefore resulted from self-referentially encoding the owned objects, which is a very robust finding given the brief presentation and categorical similarity of the objects in this study. Memory for specific details was not directly measured in the Cunningham et al. (2008) study, therefore, self-referential encoding appears to enhance at least general memory for both abstract concepts relevant to the self and physical objects owned by the self.

Although we know self-referencing benefits general memory, relatively little is known about the specific features of these memories or the level of detail encoded in these memories. In general, if participants are able to better remember the perceptual details of an object encoded in reference to the self than for objects encoded in a different way, than self-referential encoding might prove to be a beneficial technique for encoding and retrieving accurate memories, which would thereby offer support that the self leads to greater elaboration. If the reverse emerges, that self-referential encoding does *not* lead to the retrieval of accurate details in memory, it would suggest that encoding in reference to the self doesn't

preserve specific external details but operates only by strengthening the gist, or general thematic information, of memory. Similarly, if the details are forgotten or confused in retrieval (e.g., a red truck is misremembered as blue), the elaboration hypothesis might be threatened, suggesting that the self is not a reliable and efficient schema that facilitates memory.

Previous studies have shown that referencing others may also benefit memory, however, the benefit depends largely on whether or not the other is a person with a close personal relationship to the participant. In some of these studies, the self-reference effect is still superior (Lord, 1980; Klein et al., 1989; Heatherton et al., 2006) and in some cases the effect of referencing an intimate other provides nearly the same benefit as referencing the self (see Symons & Johnson, 1997; Bower & Gilligan, 1979). Evidence suggests that the mental processes underlying self-referencing and other-referencing differ (Turk et al., 2008), while others believe that the self-concept includes close others (Aron, Aron, Tudor, & Nelson, 1991).

The primary goal of our study was to explore how well specific memory was retained for objects encoded in the self versus other conditions. Cunningham et al. (2008) found a significant self-reference effect with object memory when compared with memory for objects assigned to an unknown other person. The current study aimed to further test the self-reference benefit for object memory by comparing it to encoding with reference to an intimate other person (one's mother) and also a familiar but not intimate person (former U.S. President Bill Clinton). Mother is a popular intimate-other condition in the self-referencing

literature and Bill Clinton was selected based on his relatively positive political reputation and for being internationally recognizable. These comparison conditions were chosen to ensure that the social entity was a consistent factor throughout the encoding task, thereby eliminating any potential nonsocial bias (Symons & Johnson, 1997).

Because intimacy, rather than familiarity, has been found to predict significant decreases in the magnitude of the self-reference effect (Symons & Johnson, 1997), we hypothesized that specific and general memory in the mother-reference effect would be superior than in the Bill Clinton condition. Additionally, in line with the findings of Gutchess (2008), we predicted that the self and mother conditions would not only enhance general memory but also memory for specific details of objects encoded in these conditions.

EXPERIMENT 1a

Method

Participants

American participants were 34 young adult students from Brandeis University who had been born in and had never lived more than five years outside the United States (see Table 1 for demographic information). Two participants were removed from analysis for misunderstanding the directions for the recognition task and responding with only two of the three response options, leaving a sample of 32 participants (6 males, 26 females; age range: 18-25). All participants were native English speakers and none reported being colorblind. Informed consent was obtained in a method approved by the Brandeis University

Institutional Review Board.

Materials

A series of 144 pairs of color photographs of familiar purchasable objects were used in this study. Each pair included two pictures of neutral objects of the same verbal label, for example, two bottles of water, but that differed in visual detail (e.g., color, size, orientation, number, shape). In an attempt to truly measure memory for objects and prevent any distraction from context, all objects were shown against a white background (see Figure 1). Purchasable objects were chosen in an attempt to create a realistic situation in which self- or mother-referencing might be employed and beneficial to a person. All object pairs were selected from a larger set of 180 object pairs presented to 4 additional American participants and 6 East Asian participants during a pilot study. Pilot participants rated each individual object by level of familiarity on a 5-point Likert scale and provided a name for each object. The 144 object pairs with the greatest familiarity ratings and highest conceptual agreement across both cultures were selected and used in the current study.

Insert Figure 1

Encoding Procedure

The study took place over the course of two days. On the first day, participants met with the experimenter on an individual basis and completed the encoding task in addition to half of the paper measures. Following a brief practice task with photographs of animals, participants were shown 108 of the object pictures on a computer monitor. Before viewing each object, participants saw one

of three questions on the screen for 2 seconds: “is this an object *you* would buy some time in the next year?”; “is this an object your *mother* would buy some time in the next year?”; or “is this an object *Bill Clinton* would buy some time in the next year?”. Following the question, an object was presented for 500 ms and participants were asked to answer “yes” or “no” to the question about the specific object as quickly as possible by a key press. To regulate encoding time, the next question and object were automatically presented 1,000 ms after each object’s presentation. Each participant viewed 36 objects in the self-reference encoding condition, 36 in the mother-referencing condition, and 36 in the Bill Clinton condition.

The order of object presentation was randomized and the condition for each object was determined through a counterbalancing scheme. Objects were divided into four lists of 36 object pairs and any especially masculine or feminine objects, as determined by the experimenter, were equally distributed among the lists. The same item within each pair of objects was presented to every participant during the encoding phase but each participant was only shown three out of the four object lists during encoding. Objects from the fourth list, not shown during encoding, were presented as new items during the recognition phase. For each participant, the order of the lists presented during the encoding and recognition phases followed one of eight counterbalancing orders, such that items were presented in different conditions across subjects. Four Americans were assigned to each counterbalancing order.

Memory Procedure

Participants met with the experimenter two days (approximately 48 hours) after the first session. This retention interval was chosen through a series of pilot studies. Participants performed a practice task, like that in the encoding phase, but participants determined whether each animal was same, similar, or new to objects studied on Day 1. During the surprise recognition task participants were shown 54 of the same objects shown in encoding (18 from each encoding condition), 54 objects similar to items previously seen in encoding (the matched pair of the item that was not shown to the participant in the initial encoding presentation), and 36 new objects. Participants saw each object for 1,000 ms but the response interval was self-paced during which they pressed a key to indicate whether they felt each object was the same, similar, or new (see Figure 1 for an example). Participants were instructed to respond whether the object was (1) exactly the same as an object seen in the last task; (2) similar to an object previously seen, but slightly different (for example: the object could be given the same name but the details of the object (size, shape, #, etc.) are different than remembered); or (3) a completely new object. Much of this procedure was borrowed from that of Kensinger, et al (2007) in their exploration of memory for same, similar, and new emotional objects across age groups. Encoding and recognition tasks were presented with E-Prime software (Psychology Software Tools, Pittsburgh, PA).

A series of demographic and cognitive measures (described in Experiment 1b) were also administered during the two sessions. Following completion on the second day, participants were debriefed with the purpose of the study, informed of the hypotheses, thanked, and presented with the promised incentive for their

participation.

Results

Table 1a shows the proportion of objects given a *same*, *similar*, or *new* response, reported as a function of correct response (same, similar, or new) and condition (self, mother, Bill Clinton).

Insert Table 1.

We calculated six memory scores for each participant to assess specific and general memory for each of the three conditions (self, mother, and Bill Clinton). Specific recognition scores were calculated based on the equation used in much of the emotion and memory research (Garoff, Slotnick, & Schacter, 2005; Kensinger et al., 2007; Payne, Stickgold, Swanberg, & Kensinger, 2008). Specific memory was the proportion of correct “same” responses given to the same objects; in other words this score reflects accurate memory for those exact objects studied in encoding and presented again during recognition. To examine general memory, we used the equation from Payne et al. (2008), which accounts for the fact that “similar” and “same” responses are mutually exclusive. Similar responses were used when participants could not remember specific details of a studied object and therefore this response type is constrained by the number of “same” responses. General memory was the proportion of “similar” responses given to same objects, after excluding the number of “same” responses, or specific memory. Our equation was the proportion of “similar” responses to same objects/(1 –proportion of “same” responses to same objects). Our primary concern in this study was the effect of self- and other-referencing on memory for studied (same) objects,

therefore responses to similar and new objects were of less importance and therefore not factored into the specific and general memory scores. Although a “similar” response to a similar object is a correct response, we cannot directly interpret whether this response classifies as specific or general recognition; for instance, this response could signal that a participant remembered specific details of the exact object studied during encoding and correctly identified this similar exemplar as “similar”, or this response could result from a feeling of familiarity with this object but no real memory of its details. Therefore, responses to similar objects weren’t factored into the memory scores.

A 2 x 3 within-subjects analysis of variance (ANOVA) was conducted to compare response accuracy by memory type (specific, general) and condition (self, mother, Bill Clinton). Results are displayed in Figure 2. The ANOVA revealed a significant main effect of memory type, $F(1, 31) = 4.21, p < .05$, partial $\eta^2 = .12$. General memory performance ($M = .67$) was significantly better than specific memory ($M = .60$). The main effect of condition also reached significance, $F(2, 62) = 4.17, p < .05$, partial $\eta^2 = .12$. Overall, mother-encoded objects ($M = .66$) and self-encoded objects ($M = .65$) were remembered better than objects encoded with reference to Bill Clinton ($M = .58$). We conducted a series of contrasts between the levels of Condition in order to clarify the nature of the Condition main effect. A main effect contrast collapsing across Culture and Memory type revealed that objects encoded with Bill Clinton ($M = .58$) were remembered significantly worse than objects encoded with either the self ($M = .65$), $F(1, 31) = 6.16, p < .05$, partial $\eta^2 = .17$, or the mother ($M = .66$), $F(1, 31) =$

7.44, $p < .01$, partial $\eta^2 = .19$. No significant differences were found in memory for self and mother objects, $F(1, 31) = .04$, $p = .84$, partial $\eta^2 = .00$. The two-way interaction between memory type and condition did not reach significance, $F(2, 62) = .12$, $p = .89$, partial $\eta^2 = .00$.

Insert Figure 2.

Discussion

The comparison of specific and general recognition in self- and other-referencing presents a novel and important direction toward understanding the process of self-referential encoding and its benefits. Our results suggest that self-referencing and referencing an intimate other person, like the mother, benefit not only memory for the “gist” of objects but also help to accurately encode some complex visual details of those objects. Because specific recognition was calculated as the proportion of “same” responses provided to the same objects studied in encoding, this measure reflects participants’ accuracy for remembering previously seen objects. Across all three conditions, specific recognition scores were lower than the corresponding general memory scores but still relatively strong (above 50%), which suggests that specific details of the objects, like color, shape, and other perceptual features, were successfully encoded through these referencing techniques and later retrieved in the memory task. General memory scores reflect participants’ ability to remember the general idea of a previously seen object, for example, remembering the type of object. The lower specific and general memory scores for objects encoded in the Bill Clinton condition indicate that this encoding condition was less effective than the self or mother conditions

because the details of objects in this condition were not remembered as clearly, which is consistent with the literature for self versus familiar but not intimate others (reviewed by Symons & Johnson, 1997). Encoding non-intimate others seems to produce less accurate and vivid memories than self- and intimate other-encoding. Although our hypothesis was only partially supported because self-memory was not significantly better than mother-memory, these results further propose that self-referencing and mother-referencing are encoding techniques that can assist in retrieval of detailed memories with a high degree of accuracy.

Although the paradigm used in this study was borrowed from the emotion literature based on the work of Kensinger et al (2007), the findings of the current study reflect the differences emotion and self-referencing have on memory. In their study, Kensinger et al. (2007) found specific memory was enhanced only when the objects were negative (as compared with positive and neutral objects), whereas in our study, manipulation of the encoding condition enhanced specific memory for both self- and mother-referenced objects, even though all objects were neutral. Our results indicate the distinct effect social encoding has on specific memory.

Another notable contribution of this study was its use of objects instead of words to assess visual specificity in self-referential memories. The results of our study are the first to suggest that the self- and intimate other-reference effects previously shown with word stimuli also extend to object memory. Prior to the current study the self-reference effect was predominately found in studies involving the encoding and recognition of words, especially personality traits

(reviewed by Symons & Johnson, 1997). These types of words are frequently used to describe people and therefore, the self-reference effect found in these studies may reflect a well-practiced task like linking adjectives and traits to the self-concept. Although the effect has been fairly robust, these studies have only provided insight into the accuracy of self-referential memories at the general level. In this study, we chose to ask participants whether they or someone else would buy certain purchasable objects in order to create a realistic experience in which self- or other-referencing might be useful, thus exploring the ecological validity of the self-reference effect. Additionally, using these relatively neutral but richly detailed objects provided a concrete measure of the amount of detail encoded in self-referential memories. Although specific memory could have been assessed in previous studies by measuring memory for visual details of presented words, like font type and color, testing memory for complexly detailed everyday objects provides a more meaningful and stringent assessment. By presenting participants with objects very similar to ones they'd seen two days earlier, we were able to measure whether these details were remembered or forgotten. Additionally, unlike trait adjectives, these objects are unlikely to be part of the pre-existing self-concept or the concept one has about their mother or Bill Clinton. By presenting objects with little or no emotional content, the memory benefit in our study does not likely reflect an emotional attachment between the self or mother and the recognized objects. Furthermore, the pictures used in our study were of generic objects with no discernable brand-associated details or labels, making it highly unlikely that participants had previously seen these exact

objects and thereby decreasing the chance that viewing these objects would activate pre-existing associations between these objects and the self or others.

Although the majority of studies show a self-reference effect above and beyond the benefits of referencing an intimately-known other (see Symons & Johnson, 1997), we found equivalent memory in these two conditions (in fact, with numerically higher performance in the mother condition than the self condition). Because ours is one of the first studies to explore whether the self-reference effect extends to benefit memory for objects instead of words, these results might suggest that in the real world we receive equal benefit from self-referencing and from referencing intimately known people when encoding complex visual information. The lack of a dominant self-reference effect could result from a distinct difference between self-referencing words versus objects, although a few previous studies with words found results similar to ours (Bower & Gilligan, 1979; Kuiper, 1982; Kuiper & Rogers, 1979). The results of previous studies exploring the self- versus other-reference effects suggest that personal closeness with the other person might impact its memory benefit (Aron et al., 1991). Most of our participants (94%) strongly agreed (as measured by a 5-point Likert scale with 1= strongly disagree, 3= neither agree nor disagree, 5=strongly agree) with the statement “I have positive feelings about my mother”, from which we can assume most participants have a close relationship with their mother. Therefore, our results would support the theory presented by Aron et al. (1991), which argues that the self-concept might include intimate others, like one’s mother. The significant differences found between the mother and Bill Clinton

conditions suggest that intimacy strongly influences the magnitude of the other-reference effect for object memory and this result is consistent with the other-referencing literature (Symons & Johnson, 1997).

Another possible explanation for the superior memory benefits for self and mother (relative to Clinton) could result from the nature of the task. Our encoding task required participants to look at an object and quickly consider the self, their mother, or the former U.S. President while judging this person's current needs, wants, personal preferences, shopping behavior and spending habits. Answering these questions about the self is fairly easy because the self is so familiar and most people shop for themselves. In fact, the majority of participants (86%) felt that deciding whether or not they would buy an object was the easiest situation. Similarly, participants probably also had some experience shopping for or with their mother and were able to make quick judgments about their mother's wants, needs, and buying behavior. Therefore, the self and mother conditions in this study presented realistic scenarios with answerable questions. Unlike these conditions, shopping for Bill Clinton is an unrealistic and unfamiliar experience and little is known about his shopping behavior. Most participants (88%) indicated that the Bill Clinton questions were the hardest to answer. The similar memory performance for self and mother encoded objects could result from the more realistic nature of the self and mother encoding manipulation in the task. Participants may have examined the self and mother objects with a more critical eye and exerted more effort in answering these questions because participants had more of an idea of what they or their mother would and would not buy, while

questions about Bill Clinton were more likely just guesses.

Although the lack of difference in memory performance between the self and mother conditions was unusual for an American sample, this trend is frequently found in the cross-cultural self-referencing studies, especially in those with East Asian samples (Wagar & Cohen, 2003; Zhu & Zhang, 2002). Some propose that the self-concept of people from collectivist cultures, like those in East Asian countries, might include close others (Heine, 2001). In addition, some literature suggests that the type, or amount, of detail encoded into memory may differ across Western and Eastern cultures (Chiu, 1972; Gutchess et al., 2006; Gutchess, Yoon et al., 2006; Masuda & Nisbett, 2001; Unsworth, Sears, & Pexman, 2005). Given these potential cultural differences, specific and general memory might also be differentially affected by the different encoding conditions in this study. Therefore, an additional goal of this study was to extend the cross-cultural research on self- and other-referencing by comparing our American sample with an East Asian sample on the current tasks in Experiment 1b.

EXPERIMENT 1b

Studies with participants from collectivist Eastern cultures, like those in East Asia, reveal enhanced memory for material encoded in reference to an intimate other person, like the mother, as equal or even greater than memory for self-referenced material (Wagar & Cohen, 2003; Zhu & Zhang, 2002). This finding may reflect differences between people in collectivist versus individualist cultures or the contrast between an interdependent and independent self, such that Western culture emphasizes the importance of the independent self and

individuality and Eastern cultures tend to focus more on the interconnectedness of the self with others (Heine, 2001; Markus & Kitayama, 1991). Zhu, Zhang, Fan, and Han (2007) found very similar activation of the medial prefrontal cortex in self- and mother-referencing in Chinese participants while activation of this region was significantly greater for self-referencing, relative to other-referencing, for Americans. This finding suggests that the concept of the self may differ across cultures both behaviorally and neurally.

Studies with East Asians and Americans have also revealed differences in the processing and memory of objects. When shown complex visual scenes both groups tend to remember a similar amount of detail about the primary object but East Asians tend to pay attention to the object in relation to its context and therefore also remember details about the object's background (Masuda & Nisbett, 2001). Americans focus more on object-based information, and engage more object-processing regions when studying pictures of complex scenes (Gutchess et al., 2006). Studies have also shown differences in categorization, which could impact the way that objects are encoded: Americans tend to compartmentalize information into “categories” based on semantic information, while Chinese focus on grouping things that “belong together” through relationships or context (Chiu, 1972). East Asians focus on the similarities and relationships between individual pieces of information and thus make fewer abstractions than Americans (Chiu, 1972; Gutchess, Yoon et al., 2006; Unsworth, Sears, & Pexman, 2005). A study with older adults found that older adult Americans rely more on categories to organize and recall information in their memory than Chinese older adults

however, there were no significant differences among the young participants (Gutchess, Yoon et al., 2006). According to a theory proposed by Nisbett and colleagues (2001), these cognitive differences may reflect deeply-rooted differences in the systems of thought emphasized by the early civilizations of the East and West. Eastern cultures were influenced by a holistic way of thinking that emphasizes collectivism, as promoted in the teachings of Taoism, Chinese Buddhism, and Confucianism, while Western cultures value analytic thought, which stems from the traditions of ancient Greece. Cultural differences in processing and retrieving information about objects may reflect these different styles of thinking. Research suggests that the holistic outlook on life emphasized in Asian cultures forms a wider lens through which the physical world is navigated and perceived, thus affecting attention and other cognitive processes (Masuda & Nisbett, 2001).

Additional cross-cultural research on the self- and close-other reference effects is necessary to further explore the mental representation and the similarities and differences of the self-concept across cultures. The current study aimed to do this by exploring cultural differences in specific and general memory in self- and other referencing of objects. Given the previous research with East Asians on self- versus other-referencing (Wagar & Cohen, 2003; Zhu & Zhang, 2002), we hypothesized that East Asians would replicate previous findings and perform at least similarly in the mother-reference condition and the self-reference condition for general memory and that general memory in both of these conditions would be superior to the Bill Clinton condition. Although this pattern

was surprisingly shown by the American sample for both specific and general memory, we expected that some cultural differences might emerge when comparing specific memory performance across the three conditions. Americans attend more to objects and are better at recognizing focal objects than East Asians and this is surprisingly true even when objects contain no background or contextual information for Asians to attend to (Gutchess et al., 2006), therefore we hypothesized to find a culture by memory type interaction, with Asians remembering fewer visual details about all objects and performing worse than the American sample overall on specific memory. Based on the previous hypothesis, we also predicted that the poorer specific memory would inhibit East Asians' performance in all three conditions and we hypothesized that no significant differences would emerge between self, mother, and Clinton on specific memory.

Method

Participants

East Asian participants were 16 students recruited from Brandeis University or other schools in the Boston area (5 males, 11 females; age range: 18-29). Participants in the Asian sample were from East Asian countries (8 Chinese, 5 Korean, and 2 Japanese), with the exception of one Malaysian, and had lived in the United States for less than five years. All participants were fluent in English, based on self-report and enrollment in US universities. Informed consent was obtained in a method approved by the Brandeis University Institutional Review Board. Participants either met with the experimenter in the laboratory at Brandeis University or at a local coffee shop or library.

Materials and procedures

All materials and procedures were the same as in Experiment 1a. Bill Clinton was used as the familiar but not intimate other condition because previous cross-cultural self-referencing studies have also used internationally-recognized public figures to represent a familiar but not intimate other-reference condition (Zhu & Zhang, 2002). Two items on a post-task questionnaire asked participants to indicate on a 5-point Likert scale (1=strongly disagree, 3= neither agree nor disagree, 5= strongly agree) the level to which they agreed with the statement: “I have positive feelings about my mother (or Bill Clinton)”. Results indicate that both Americans and Asians had relatively positive feelings about these people, with 94% of Americans ($M = 4.81$) and 87% of Asians ($M = 4.19$) either agreeing or strongly agreeing about the mother and nearly all participants, with the exception of one disagreeing American, remaining at least neutral about Bill Clinton (American $M = 3.72$, Asian $M = 3.75$).

In addition to the primary memory tasks, a series of cultural and demographic measures were administered to all participants over the two sessions, including a general demographic questionnaire, two post-task questionnaires, the Self-Construal Scale (Singelis, 1994), and the abridged General Ethnicity Questionnaire developed by Tsai, Ying, and Lee (2000) to measure the strength of participants’ acculturation to American and Chinese cultures. For Japanese, Korean, and Malaysian participants, this measure was slightly modified by replacing their native culture with the Chinese references. American participants completed only those questions on American culture.

Participants also completed Digit Comparison (Hedden, Park, Nisbett, Li, & Jing, 2002) and Dot Comparison tasks (based on Hedden et al., 2002) to measure processing speed. The 50-item version of the International Personality Item Pool (Goldberg, 1999) was selected as the Five-factor model of personality measure because of its length, relative invariance across gender and ethnic groups (Ehrhardt, Roesch, Ehrhardt, & Kilian, 2008), and comparable validity scores to other Big Five measures (Donnellan, Oswald, Baird, & Lucas, 2006).

Results

Participant Characteristics

Table 2 provides a summary of the demographic, cognitive, and cultural measures used to compare the overall equivalence of the American and Asian samples. Both Americans and Asians were closely matched on age and formal education (both samples indicated they had 12-21 years of formal full-time education). As expected, Americans scored significantly higher than Asians on the American cultural questions of the Tsai Bicultural Identity Scale, $t(46) = 4.70, p < .001$, indicating that the American participants agreed more with statements associated with American culture than the Asian sample. Asian participants agreed that they behave in ways considered culturally Chinese, Japanese, Korean, or Malaysian (depending upon each participant's country of origin) more than they agreed with the American cultural statements, $t(46) = 3.17, p < .01$. No significant differences were found between the mean scores of Americans and Asians in either the independent (Americans = 4.76, Asians = 4.65) or interdependent (Americans = 4.90, Asians = 5.13) self-construal scales,

although Americans scored somewhat higher on the independent scale and Asians had slightly higher interdependent scores. As measured by the digit and dot comparison tasks no significant differences were found between Americans and Asians on speed of processing (p 's > .25).

Insert Table 2

Memory Performance

To explore the influence of culture, the East Asian sample was compared with the American sample from Experiment 1a. The means and standard deviations of the Asian sample for “same”, “similar”, and “new” responses to same, similar, and new items in each condition are displayed in Table 1b.

An ANOVA was conducted on response accuracy with Culture as a between-subjects factor and Memory type (specific, general) and Condition (self, mother, Bill Clinton) as within-subject factors. Results are shown in Figure 3. The ANOVA revealed a main effect of Culture, $F(1, 46) = 4.00, p < .05$, partial $\eta^2 = .08$, with Americans ($M = .63$) performing more accurately on the recognition task than Asians ($M = .56$). The main effect of Memory type was also significant, $F(1, 46) = 15.77, p < .001$, partial $\eta^2 = .26$, with higher performance for general recognition ($M = .66$) than for specific recognition ($M = .53$). A significant main effect of Condition also emerged, $F(2, 92) = 4.56, p < .01$, partial $\eta^2 = .09$.

To further investigate the main effect of Condition, we performed a series of contrasts between the levels of Condition. Contrast comparisons collapsing across Culture and Memory type revealed that objects encoded in the self condition ($M = .62$) were remembered better than objects encoded in the Bill

Clinton ($M = .56$) condition, $F(1, 47) = 6.65, p < .01$, partial $\eta^2 = .012$, and memory for objects encoded in the mother condition ($M = .63$) was also significantly better than memory for Bill Clinton-encoded objects, $F(1, 47) = 9.18, p < .01$, partial $\eta^2 = .16$, but no differences were found between the self and mother conditions, $F(1, 47) = .26, p = .62$, partial $\eta^2 = .01$.

Insert Figure 3

A marginal interaction between Culture and Memory type, $F(1, 46) = 2.85, p < .10$, partial $\eta^2 = .06$, revealed significant differences between cultures in specific memory, $t(46) = 2.89, p < .01$, with Americans ($M = .56$) performing significantly better than Asians ($M = .43$) across conditions, but no significant differences between cultures in general memory, $t(46) = .39, p = .70$ (Americans $M = .62$; Asians $M = .58$). None of the other interactions approached significance, p 's $> .90$.

Discussion

The results of this second study reveal some interesting similarities and differences between American and East Asian cultures on this task. East Asians performed significantly worse overall than Americans on the recognition task. The marginal interaction between Culture and Memory type showed that this discrepancy resulted from the lower scores of East Asians on specific recognition across all three encoding conditions and that general memory performance was similar across cultures. This result supported our hypothesis and suggests that, when compared with Americans, East Asians might not accurately encode object details as well in self- and other-referencing. Regardless of culture, general

memory performance was fairly strong (66% accurate) and better than memory for specific objects, suggesting that self- and other-referential encoding are effective strategies to use when trying to remember at least the “gist” of visual information, like a type of object, even as long as two days after encoding.

This discrepancy found in specific recognition performance between the samples may result from true cultural differences in object processing. As suggested by the literature, Americans and other Westerners attend more to objects in the foreground, remember more details about focal objects (Masuda & Nisbett, 2001), and engage more object-processing regions than East Asians (Gutchess et al., 2006); therefore, this bias for attending to objects may increase Americans’ ability to effectively encode specific visual details of objects during self- and other-referencing. Because East Asians seem to process objects in relation to their background or context and appear to engage fewer object-processing regions (Gutchess et al., 2006), when shown only a focal object with no background or context, like in our encoding task, this processing bias might still have affected the East Asian participants’ ability to perceive and encode the same amount of object details encoded by the Americans.

Another possible explanation is that cultural differences could result from different levels of familiarity with the encoded stimuli. Objects used in our study were chosen from a larger list based on familiarity ratings provided by East Asians and Americans in a pilot study. Although the 144 object pairs with the highest familiarity ratings were used, some of these objects were rated as more familiar than others by the Asian pilot sample. In addition, by generalizing these

ratings across Chinese, Japanese, and Korean cultures in this study, it is likely that some participants were not familiar with every object shown in the tasks. We will evaluate this possibility through additional analysis of the familiarity pilot ratings.

Based on the mean scores reported in Table 2, our American and Asian samples were cognitively equivalent, as measured by speed of processing, and had very similar demographics (age and years of formal education). As intended, the only real difference between the American and Asian sample was their cultural identification, as measured by the abridged General Ethnicity Questionnaire (Tsai et al., 2000). Thus, our results are unlikely to reflect sampling from different ability levels across the two cultures. In addition, the lower specific memory scores don't seem to result from a misunderstanding of the recognition task instructions or from a response bias, as evidenced by comparable false alarm rates for "same" responses to new items across the cultures (although East Asians showed larger variance in their false alarm rates for "similar" responses given to new items). Given the novel aspects of our study, these results suggest that encoding objects while thinking about the self or another person is an effective strategy for Americans to later remember visual details, however, the effectiveness of these strategies to encode details may be moderated by culture.

Interestingly, Americans and East Asians showed the same pattern across the three encoding conditions. Both groups remembered objects encoded with the self or mother much better than objects encoded with Bill Clinton. Because the American sample showed the pattern across conditions that we hypothesized for the Asians, it's difficult to assess how exposure to collectivist culture impacted

the East Asians' performance in our study. It's important to acknowledge that the Asian sample consisted of East Asians currently living and studying in the U.S. Their exposure to American culture may have affected the results of our study and reduced the magnitude of the cultural differences. Given the previous findings in which Americans typically show at least a slight self-reference effect over that of the mother (Lord, 1980; Klein et al., 1989; Heatherton et al., 2006), the current findings suggest that the self-reference effect might not always be the most beneficial strategy for Americans. The self-reference effect typically found for Americans might reflect a unique memory benefit provided when words, as opposed to other stimuli like objects, are processed in relation to the self. The similar memory benefit afforded through self- and mother-referencing in our study appeared to be the same for Americans and Asians, which could result from the fact that these strategies were used to encode objects instead of words. Importantly, these results suggest that cultural differences found in self- and other-referencing could vary based on the encoded stimuli.

Another potential limitation of this study is the task. No participants indicated that they felt awkward answering questions about the self or their mother during the encoding task, however, 60% of American and 60% of Asian participants reported that they found the Bill Clinton questions awkward to answer. The unrealistic nature of our familiar other condition could have affected memory for objects encoded with Bill Clinton. This issue should be addressed in a follow-up study. Additionally, the cultural appropriateness of our task is of concern because there may be major cultural differences between American and

Asian cultures on shopping behavior; for example, in some cultures women might do most of the shopping for men, or it might be considered inappropriate in a culture to think about another person's purchasing habits. These potential cultural issues should be investigated before conducting a follow-up study.

The findings of our study offer an important contribution to the self-referencing literature. Other studies have demonstrated that culture may affect the magnitude of the self-reference effect (Wagar & Cohen, 2003; Zhu & Zhang, 2002) and that object processing and memory appear to differ across Western and Eastern cultures (Gutchess et al., 2006; Masuda & Nisbett, 2001). Linking these two lines of research, the results of our study challenge the cultural differences usually found in self- and other-referencing studies by exposing the important role that the nature of the encoded stimulus may play in self-referencing. Through an examination of memory for objects, our study found that Americans and East Asians show the same benefit when referencing the self and the mother, however, only Americans truly benefit from these processes by remembering specific visual details about the objects.

In order to increase the ecological validity of the self-referencing literature, future studies should explore the effect self- and other-referencing have on specific and general memory for other non-verbal stimuli. Conducting additional studies that model situations in which self-referencing is likely to be used in the real world, as ours did with shopping, would provide additional insight into when the self, but not close others, benefits memory and whether the self includes close others. Culture appears to influence the self-concept as well as

cognitive processing. Future cross-cultural research on the self-reference effect should strive to create culture-fair tests that involve familiar stimuli and realistic encoding manipulations. If possible, cross-cultural research should attempt to recruit and run participants in their native cultures. Additionally, to further explore how culture influences perception of and attention to object detail, it would be useful to extend the literature to include peoples from other regions of the world.

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APPENDIX A

Post-task Questionnaire I - Encoding

Please circle the response that best describes your experience during the two computer tasks you recently completed.

1. In the computer task you just completed, approximately how often did you really remember having seen an object?
 - a. 75-100%, MOST OF THE TIME
 - b. 50-75%, FAIRLY OFTEN
 - c. 25-50%, SOME OF THE TIME
 - d. LESS THAN 25%, NOT VERY OFTEN

2. When you couldn't remember if you had previously seen an object or not, what type of information did you usually have trouble remembering?

3. For the first task, when you were asked about your father, whom did you think of?
 - a. YOUR FATHER
 - b. YOUR MOTHER
 - c. SOMEONE ELSE

4. Check the circle of the statement that best describes your answer.

I have positive feelings about my father (refer to person in Question 3).

- | | | | | |
|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |

5. When asked if your father (or this other person) would purchase the object, how often did you actually think about that person?
 - a. NEVER
 - b. A FEW TIMES
 - c. SOME OF THE TIME
 - d. MOST OF THE TIME
 - e. ALWAYS

6. When asked if you would buy an object, how often did you actually think about your self?
- a. NEVER
 - b. A FEW TIMES
 - c. SOME OF THE TIME
 - d. MOST OF THE TIME
 - e. ALWAYS

7. Please describe the professor you thought about in the first task (for example, when you met, how well you know him or her, what class they teach, etc.).
-
-
-

8. Check the circle of the statement that best describes your answer.
I have positive feelings about this professor (refer to person in Question 7).

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

9. When asked if your father (or this other person) would purchase the object, how often did you actually think about that person?
- a. NEVER
 - b. A FEW TIMES
 - c. SOME OF THE TIME
 - d. MOST OF THE TIME
 - e. ALWAYS

10. In the first task, which question do you think was usually the hardest to answer?
- a. WOULD YOU BUY THE OBJECT?
 - b. WOULD YOUR FATHER BUY THE OBJECT?
 - c. WOULD YOUR PROFESSOR BUY THE OBJECT?

APPENDIX B

Post-task Questionnaire II - Recognition

Please circle the response that best describes your experience during the two computer tasks you recently completed.

1. In the computer task you just completed, approximately how often did you really remember having seen an object?
 - a. 75-100% MOST OF THE TIME
 - b. 50-75% FAIRLY OFTEN
 - c. 25-50% SOME OF THE TIME
 - d. LESS THAN 25%, NOT VERY OFTEN

2. When you couldn't remember if you had previously seen an object or not, what type of information did you usually have trouble remembering?

3. For objects you saw the first day, which ones did you remember the best?
 - a. Objects you said you would/wouldn't buy
 - b. Objects you said your mother would/wouldn't buy
 - c. Objects you said Bill Clinton would/wouldn't buy

Table 1a.

Proportion of Same, Similar, and New Responses as a Function of Item Type and Condition for Americans.

Response Type	"Same"	"Similar"	"New"
Americans			
Self			
Same	.62 (.03)	.27 (.02)	.11 (.01)
Similar	.14 (.02)	.46 (.02)	.40 (.03)
Mother			
Same	.61 (.03)	.26 (.02)	.12 (.02)
Similar	.12 (.01)	.47 (.03)	.41 (.03)
Bill Clinton			
Same	.55 (.04)	.25 (.02)	.19 (.02)
Similar	.10 (.02)	.42 (.03)	.48 (.03)
New	.04 (.01)	.21 (.02)	.76 (.02)

Table 1b.

Proportion of Same, Similar, and New Responses as a Function of Item Type and Condition for East Asians.

Response Type	"Same"	"Similar"	"New"
East Asians			
Self			
Same	.49 (.05)	.33 (.04)	.18 (.03)
Similar	.13 (.03)	.46 (.05)	.42 (.05)
Mother			
Same	.48 (.04)	.35 (.03)	.16 (.02)
Similar	.09 (.03)	.48 (.04)	.39 (.03)
Bill Clinton			
Same	.44 (.04)	.33 (.04)	.23 (.04)
Similar	.08 (.02)	.43 (.06)	.49 (.06)
New	.04 (.01)	.25 (.03)	.71 (.04)

Table 2.
Demographic information and mean (standard deviation) test scores for participants.

	<u>American</u>	<u>Asian</u>	<u>Significance</u>
Age	20.00 (1.79)	22.31 (3.36)	
American Identity ^a	3.80 (.46)	3.17 (.40)	$p < .0001$
English Language ^a	4.71 (.26)	3.77 (.53)	$p < .0001$
Asian Identity ^a		3.71 (.52)	
Independent Self			
Construal ^b	4.76 (.78)	4.65 (.63)	$p = .63$
Interdependent Self			
Construal ^b	4.90 (.57)	5.13 (.66)	$p = .23$
Digit Comparison ^c	80.72 (13.66)	85.00 (7.58)	$p = .25$
Dot Comparison ^c	51.87 (8.58)	54.64 (9.50)	$p = .34$
Extraversion ^d	31.91 (8.89)	33.06 (7.45)	$p = .66$
Agreeableness ^d	42.59 (4.88)	38.69 (3.63)	$p < .01$
Conscientiousness ^d	38.47 (7.07)	33.25 (5.59)	$p < .05$
Neuroticism ^d	30.06 (9.12)	31.06 (6.04)	$p = .65$
Openness ^d	39.31 (4.22)	33.88 (5.75)	$p < .001$

^a Sub-scales of the abridged General Ethnicity Questionnaire (Tsai, Ying, and Lee, 2000) All questions are answered on a 5-point Likert scale, with 1= strongly disagree, 3= neutral, 5= strongly agree. American Identity denotes the mean score

of answers provided to the 25 questions asking about acculturation to American culture; English Language includes all 12 questions about acculturation to English; for Asian participants, Asian Identity is the mean score to 25 questions on Chinese/Japanese/Korean acculturation; Asian Language includes 12 questions about the use of one's native language. ^b The Self Construal Scale (Singelis, 1994) includes 30 questions about the self (15 independent, 15 interdependent) answered on a 7-point Likert scale, with 1= strongly disagree, 3= somewhat disagree, 4= neither agree nor disagree, 7= strongly agree. ^c Measures by or based on Hedden, Park, Nisbett, Li, & Jing (2002). ^d Scales from the International Personality Item Pool – Five Factor Model, 50 Item version, adapted from Goldberg (1999).

Figure Captions.

Figure 1. Encoding task: Participants view a total of 108 objects for 500 ms each. One third of these objects are randomly encoded by answering the question “is this an object you would buy some time in the next year?”, while participants must answer this question about their mother or Bill Clinton for the remaining two thirds. Recognition task: Participants view a total of 144 objects for 1,000 ms each and indicated whether each item was the same as a studied item (same), similar to an item in encoding (similar), or new.

Figure 2. Recognition accuracy of Americans for specific and general memory across the encoding conditions. Overall, general memory scores were significantly higher than specific memory scores. Self and mother objects were remembered significantly better than objects encoded with Bill Clinton.

Figure 3. Recognition accuracy of specific and general memory for American and East Asian participants. Americans performed significantly better than Asians in specific memory but the cultural groups did not perform significantly different for general memory.

Figure 1.

Encoding



Recognition

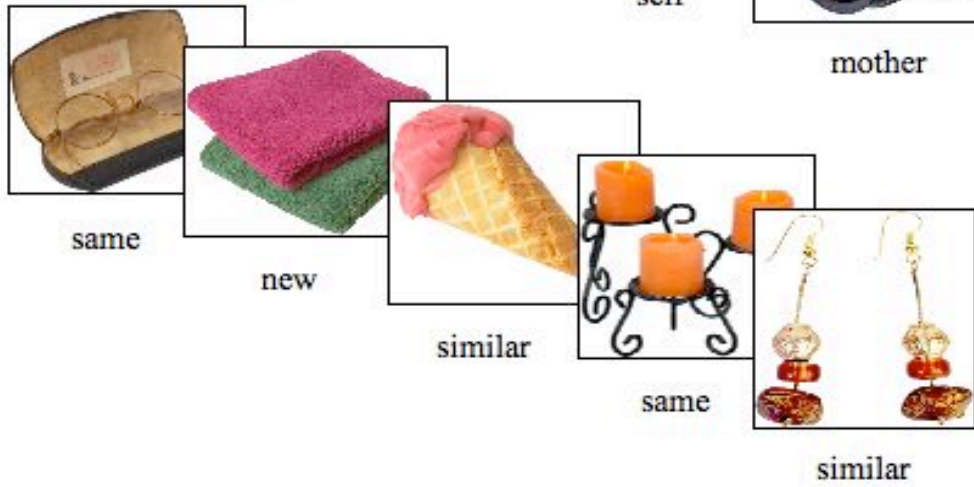


Figure 2.

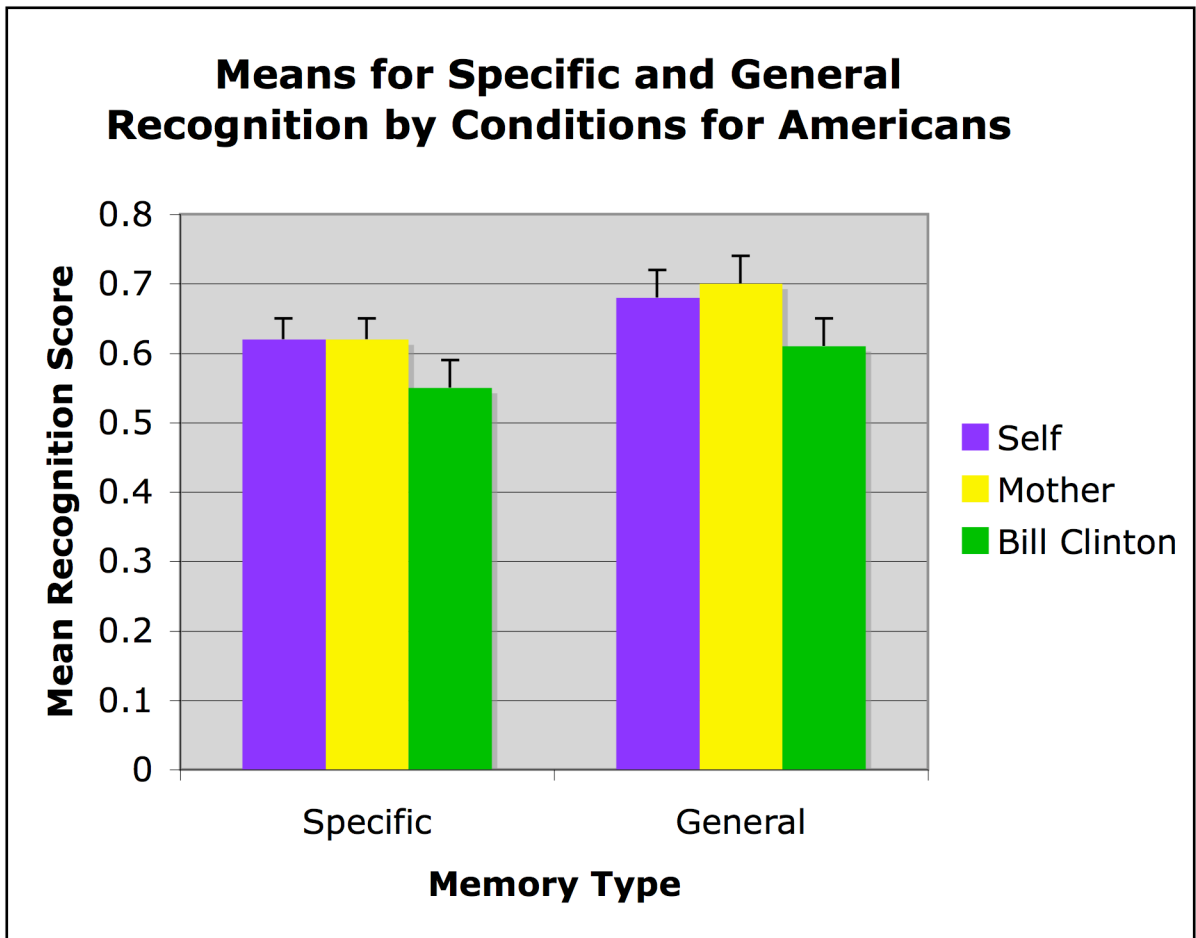


Figure 3.

