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## A Spontaneous Self-Reference Effect in Memory : Why Some Birthdays Are Harder to Remember Than Others

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#### Abstract

The self-reference effect in memory is defined as the memory advantage for materials that have been processed in relation to the self. Existing demonstrations of the self-reference effect rely on laboratory stimuli and use explicit cues to prompt self-relevant encoding. In three studies, we used participants' memories for birthdays to document a naturalistic case of the self-reference effect that did not depend on explicit self-cues. In Study 1, the birthdays that participants free-recalled were closer on average to their own birthday than would be expected by chance. In Study 2, participants were more likely to remember the birthday of a friend if the friend's birthday was close to their own, and they were more likely to forget the friend's birthday if it was distant. In Study 3, we demonstrated experimentally that the self-reference effect occurs for newly introduced individuals. Our findings suggest that the self-reference effect can occur spontaneously in the absence of explicit self-cues if the material to be learned automatically activates self-relevant information.

#### Keywords

self, memory, self-reference effect, social cognition

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The self is a central construct that colors the way people perceive, think, and act (Banaji & Prentice, 1994; Baumeister, 1998). A wide assortment of psychological phenomena, from the fundamental attribution error (Ross, 1977) to self-serving biases (Bernstein, Stephan, & Davis, 1979), are variations on the basic theme that self-relevant information is processed differently than other types of social information. This article examines the boundary conditions and ecological validity of another such phenomenon—the self-reference effect in memory.

The self-reference effect in memory refers to the finding that materials are remembered better if they have been encoded in a self-relevant way than if they have not (Rogers, Kuiper, & Kirker, 1977). In the standard self-reference paradigm, participants are exposed to personality traits (e.g., *honest, shy*). One group is asked to process the traits in self-relevant ways ("Does the word describe you?"). Other groups are asked to process the material in ways relevant to other people, semantically, phonemically, or structurally. Numerous studies have established that self-referent encoding has an advantage over other types of encoding, with an average effect size of 0.50 (Symons & Johnson, 1997). In addition to personality traits, the self-relevance effect has been shown in memory for nouns (e.g., Bellezza, 1984; Klein & Loftus, 1988; Maki & McCaul,

1985) and for passages of prose (Reeder, McCormick, & Esselman, 1987).

### Self-Reference Effect in Everyday Life

Despite the plethora of demonstrations of the self-reference effect with laboratory stimuli, such as trait or noun lists, there is no documented evidence (to our knowledge) of the selfreference effect using everyday stimuli. About 30 years ago, Neisser (1978) expressed discontent about the overreliance on laboratory paradigms in memory research, and his statements started a controversy about the merits of such research (Banaji & Crowder, 1989; Loftus, 1991; Roediger, 1991). Today, realworld and laboratory approaches are both seen as essential, and increasing attention is devoted to everyday aspects of memory, such as autobiographical memory (Conway & Pleydell-Pearce, 2000), prospective memory (Einstein & McDaniel, 2005), and memory in oral traditions (Rubin,

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1995). The self-reference effect, however, has not been part of this shift toward everyday phenomena. The studies reported here go beyond the classic laboratory paradigm and explore the self-reference effect in the everyday context of memory for birthdays.

## Self-Reference Effect in the Absence of Explicit Self-Cues

A basic feature of the standard self-reference task is that it involves explicit instructions to relate information to the self. Studies using this paradigm thus do not reveal how people process materials in the absence of such explicit guidance. Only recently have researchers explored whether the selfreference effect occurs if self-cues are provided without explicit instructions to use them (Cloutier & Macrae, 2008; Cunningham, Turk, MacDonald, & Macrae, 2008; Turk, Cunningham, & Macrae, 2008). In one such study, participants saw a trait name on the same screen with either their own face or with Angelina Jolie's face, and they indicated whether or not the trait name appeared above the face picture. In a subsequent surprise memory task, participants were asked to report whether they had seen each of a list of trait names in the previous task. Even though they were not explicitly required to relate trait names to the faces, participants showed a memory advantage for items that were seen in the context of their own face compared with items seen in the context of Angelina Jolie's face (Turk et al., 2008).

These findings suggest that explicit instructions to relate material to the self are not a prerequisite for enhanced encoding in the self-context. When self-cues (such as a picture of a person's own face) are present, people seem to spontaneously engage in self-relevant processing. This raises another question: Is the presence of self-cues necessary for the occurrence of the self-reference effect, or are there conditions under which the self-reference effect will occur automatically without explicit self-cues?

All existing demonstrations of the self-reference effect in memory have relied on procedures that activate self-relevant information. These procedures took the form of either explicit instructions (the classic paradigm) or incidental self-cues in the environment, such as a picture of a person's own face (Turk et al., 2008). If the activation of self-relevant information drives the self-reference effect, any means of activating the self-concept should lead to the same effect, even if explicit self-cues are not involved. Thus, we hypothesized that a selfreference effect would occur without the use of explicit selfcues if the memory material automatically activated the self-concept or self-relevant information.

### **The Present Studies**

To test our hypothesis, we identified one everyday domain of memory that is highly associated with the self—birthdays.

Birthdays are a tribute to the individual and a celebration of the self. Like names or initials, they are a staple of a person's individuality, and diverse lines of research converge to show that they are an integral part of the self-concept. For example, people prefer numbers that are in their birthdays to numbers that are not in their birthdays (Kitayama & Karasawa, 1997). Presumably as a result of this fondness, people are disproportionately likely to live in a city with a name containing the numbers in their birth dates. For example, people who were born on February 2 (i.e., 2/2) are more likely to show up in the records of Two Harbors, Minnesota, than would be expected by chance, and people who were born on May 5 (i.e., 5/5) are more likely to show up in the records of Five Points, Alabama, than would be expected by chance (Pelham, Mirenberg, & Jones, 2002). When people learned that Rasputin—a figure of questionable virtue from Russian history-shared their birthday, they rated him more favorably than people who had no knowledge of Rasputin's birthday (Finch & Cialdini, 1989). People are also more cooperative in a prisoner's dilemma game, and more likely to comply with a request, if they learn that the other person shares their birthday than if the other person does not share their birthday (Burger, Messian, Patel, del Prado, & Anderson 2004; Miller, Downs, & Prentice, 1998). All these studies demonstrate that birthdays are a positively valued part of the self-concept.

Because birthdays are closely associated with (and are of importance to) the self, the birthday concept may automatically activate the self-concept and a person's own date of birth. This effect should be particularly strong if the birthday to be remembered is close to the person's own birthday, because a close birthday provides a secondary cue that activates selfrelevant information (i.e., a person's own birthday). We thus hypothesized that birthdays that are close to a person's own will provide a memory advantage.

To test this hypothesis, we conducted three studies. In Study 1, we asked participants to free-recall the birthdays of their friends, and we tested whether the birthdays participants could remember were more concentrated around their own birthday than would be expected by chance. In Study 2, we asked participants to list their close friends and then asked them to recall those friends' birthdays. Participants then searched for and reported the birthdays they could not remember. Using this method, we were able to compare the average distance from participants' birthdays to friends' birthdays they could remember with the average distance from participants' birthdays to friends' birthdays they could not remember. Studies 1 and 2 tested participants' memories of their friends' birthdays. Because the material to be recalled was preexisting in these two studies, its encoding context was not experimentally controlled. We conducted Study 3 to address this issue: Participants read the profiles of four individuals whom they did not know and whose birthdays were manipulated in terms of distance to each participant's own birthday. Participants later tried to remember the birthdays from these

profiles. Together, these studies tested the self-reference effect in memory for other people's birthdays.

# Study I Method

**Participants.** Participants were 125 University of Virginia undergraduate students (101 women, 23 men, and 1 who did not provide gender data) who participated in the study to complete a course requirement.

**Procedure.** In an online study, participants were asked to freerecall up to 10 friends' birthdays. Participants were instructed that they could leave the birth year of their friend blank if they did not know it, and that they should enter a birthday only if they were reasonably sure of the day and month. After entering their friends' birthdays, participants entered their own birthday on a subsequent screen. The presentation of the ownbirthday question on a separate screen ensured that participants were not explicitly primed with their own birthday before recalling their friends' birthdays.

#### **Results and discussion**

**Memory for birthdays.** On average, participants listed 8.74 friends' birthdays. There was a marked difference between the performance of males and females, with males remembering fewer birthdays (M = 7.04, SD = 2.79) than females did (M = 9.18, SD = 1.72), F(1, 122) = 22.36, p < .001, d = 0.92.

Distance to remembered birthdays. In order to test whether the birthdays our participants recalled were closer to their own birthday than would be expected if remembered birthdays were distributed randomly, we created a simulation using an Excel plug-in. We first had the plug-in randomly generate 10,000 birthdays between 1980 and 1988 (an interval roughly spanning the birth years of our participants' friends). We used these simulated dates to calculate the average expected difference between a participant's birthday and a random distribution of birthdays. Distance was defined as the number of months before or after a participants' birthday: For example, if a participant was born in December, both November and January birthdays were counted as a 1-month difference. According to our simulation, the average expected difference in months between our participants' birthdays and their friends' birthdays was 2.9989.<sup>1</sup>

This simulation assumed that friends' birthdays were evenly distributed throughout the year. If friends' birthdays were instead clustered at certain times of the year, expected differences between a person's birthday and his or her friends' birthdays could differ from the simulated value. A related possibility is that the University of Virginia students we surveyed had birthdays that clustered around certain months. This possibility is suggested by research on maturation differences within age cohorts. Compared with their older classmates, younger students in each age cohort perform worse academically (Davis, Trimble, & Vincent, 1980) and are more likely to be diagnosed with a learning disability (Diamond, 1983; Maddux, 1980). It is possible, then, that the number of senior students within an age cohort who find their way into a relatively high-ranking state university, such as the University of Virginia, is greater than expected by chance. If this is the case, this could also cause the expected distance between participants' birthdays and their friends' birthdays to diverge from the simulated value. To check for these potential problems, we calculated the average distance between the birthday of each participant and the birthdays of all other participants (7,750 pairs). We found that this averaged birthday difference among 125 participants (M = 2.9871 months) was nearly identical to the simulated value (M = 2.9989 months), t(7749) = 0.59, n.s. This finding suggests that the potential problem of birthday clusters did not noticeably affect our analyses.

We proceeded to test whether observed distances deviated from the simulated distance. We calculated the average distance between participants' own birthday to friends' birthdays they remembered. The average of these averaged distances was 2.68 months (SD = 0.76). This was significantly shorter than the expected distance of 2.9989 months, t(124) = 4.66, p < .001, d = 0.42. We also computed the average distance in days instead of months and compared this number with the simulated distance in days. The result was identical to the result of the month analysis (M = 81.8 days, SD = 22.0), t(124) =4.68, p < .001, d = 0.42. In other words, the birthdays our participants recalled were significantly closer to their own birthday than expected.

There was also a significant gender difference in the distance to remembered birthdays: Male participants on average recalled birthdays that were closer to their own birthday (M =2.34, SD = 0.98) than female participants did (M = 2.77, SD =0.68), F(1, 122) = 6.40, p = .013. Although, for both men and women, remembered birthdays were significantly closer to participants' own birthday than expected, this self-reference effect was larger for men (d = 0.67) than for women (d = 0.34).

In short, we found that people tend to free-recall birthdays that are closer to their own birthday than would be expected by chance. We also found that men on average showed a stronger self-reference effect in recall for other people's birthdays than females did. Possibly women's memories for birthdays are affected less by the distance factor than men's memories are because women are on average more concerned with interpersonal relationships than men are (Cross & Madson, 1997). In addition, remembering friends' birthdays seems to be more critical to relationship maintenance for women than for men (as suggested by the number of birthdays remembered by women compared with the number of birthdays remembered by men). Consistent with this reasoning, our results showed a marginal correlation between the number of remembered birthdays and the average distance between participants' own birthday and remembered birthdays (r = .16, p = .08).<sup>2</sup> In other words, participants who remembered more birthdays also remembered birthdays that were slightly more distant from their own birthday.

One limitation of Study 1 is its reliance on the free-recall method. Free-recall instructions may have led participants to anchor on their own birthday, and this may be the reason they recalled birthdays that were close to their own birthday (even though they were not explicitly asked about their own birthday until after they entered their friends' birthdays). The results, therefore, may be due to differential recall rather than to differential encoding. To put the encoding hypothesis to a more stringent test, we employed a different method of memory retrieval in Study 2. In addition, Study 2 compared the distribution of remembered birthdays with the distribution of not-remembered birthdays, rather than with a theoretical distribution.

## Study 2 Method

**Participants.** Participants were 225 University of Virginia students (161 women and 64 men) who completed the study to fulfill a psychology course requirement.

**Procedure.** In this laboratory study, participants were first asked to write down 10 of their friends' names. After they listed their friends' names, participants were given a second sheet of paper and were asked to write down the birthdays of the friends they listed, but only if they were reasonably sure their memories were accurate. In the final stage of the study, we asked participants to access their Facebook or MySpace accounts, or check their personal calendars, to find the birthdays that they could not remember. On the third sheet of paper, where participants recorded not-remembered birthdays, participants also wrote their own birthday. As in Study 1, we took care not to evoke participants' own birthday before the memory-retrieval task.

#### **Results and discussion**

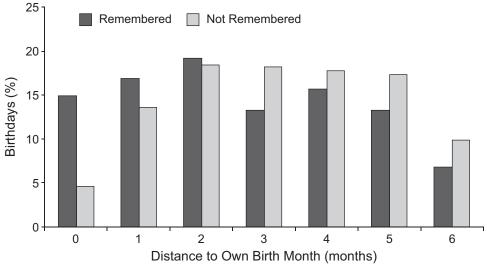
**Number of birthdays remembered.** On average, participants could remember the birthdays of 4.72 friends out of the 10 friends they listed (SD = 2.28). As in Study 1, women remembered significantly more birthdays (M = 5.26, SD = 2.07) than men did (M = 3.38, SD = 2.25), F(1, 223) = 36.10, p < .001, d = 0.87. Eleven participants, 15.6% of males (n = 10) and 0.6% of females (n = 1), could not remember any of their listed friends' birthdays. One female participant remembered all 10 birthdays of her listed friends. Data for these 12 participants were dropped from the following analyses because they did not allow for a comparison between remembered birthdays.

Distance to remembered birthdays and not-remembered birthdays. The average distance between a participant's birthday and the birthdays the participant could remember was 2.59 months (SD = 0.94), and the average distance between a participants' birthday and birthdays the participant could not remember was 3.27 months (SD = 0.92). This difference was significant, t(212) = 7.29, p < .001, d = 0.73. As in Study 1, computing the distance between birthdays in days produced nearly identical results for remembered birthdays (M = 78.9days, SD = 27.2) and for not-remembered birthdays (M = 98.4days, SD = 26.7), t(212)= 7.21, p < .001, d = 0.72. As predicted, then, participants were better able to remember the birthdays closer to their own birthday than the birthdays farther away from their own birthday. Further analyses showed that the effect was mainly due to better memory for birthdays in the same month as the participant's,  $\chi^2(1, N = 200) = 32.49$ , p < .001, and birthdays that were 1 month away,  $\chi^2(1, N = 306) =$ 4.08, p = .04, than for birthdays at a greater distance. In fact, birthdays that were 2 months away were almost equally likely to be remembered as to be forgotten, and beyond 2 months, birthdays were more likely to be forgotten than remembered (see Fig. 1). Unlike in Study 1, the results in Study 2 showed no gender difference in the average distance between participants' own birthday and the birthdays they could remember, F(1, 211) = 0.20, n.s. Nor was there a gender difference in the average distance between participants' own birthday and notremembered birthdays, F(1, 211) = 2.44, n.s.

In short, Study 2 replicated the main findings of Study 1 using a different method. Participants were more likely to recall birthdays close to their own than they were to recall distant birthdays. By asking participants to list the names of friends before asking them to recall birthdays, we addressed some of the limitations of Study 1. We showed that the self-reference effect in memory for birthdays is not limited to the specific recall instructions used in Study 1. In addition, we eliminated the alternative explanation for Study 1 that participants tend to have friends whose birthdays are close to their own by showing that they had friends whose birthdays were far away from their own birthdays. Participants simply did not remember these birthdays as well as the ones close to their own.

Although Study 2 addressed some limitations of Study 1, both studies still had a major limitation: their uncontrolled nature. It is possible that when people learn about other people's birthdays, the two parties mutually reveal their birthdays at the same time. Alternatively, people might remember close birthdays of friends because they might celebrate their own birthday and their friends' birthdays together. In other words, the self may be explicit in the learning environment when a person is encoding another person's birthday. We thus conducted Study 3 to control these potentially confounding factors and to more stringently test the idea that the self-reference effect in memory occurs without explicit self-cues. In Study 3, participants learned about birthdays of people they did not know and were later asked to recall these birthdays.

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**Fig. 1.** Mean percentage of remembered birthdays and not-remembered birthdays in Study 2 as a function of the number of months between the participant's own birthday and the friend's birthday that the participant attempted to remember.

# Study 3 Method

**Participants.** Participants were 54 University of Virginia students (26 women and 28 men) who participated in the study for course credit.

**Procedure.** Participants came to a computer laboratory and were told that they would be participating in a study of impression formation. The experimenter explained that participants would see information about four people and that they should try to learn as much about these people as they could because they would later answer questions about them. Participants were then presented with pictures of four target individuals, along with information about these individuals, at a pace of 30 s per individual. The information included the target individual's first name, occupation, birthplace, current location, hobbies, favorite holiday, birth day, and birth month.

The birthdays of the target individuals were programmed to vary for each participant. The birth month of one target individual was the same as the participant's. The other birth months were 3 months before, 3 months after, and 6 months after the participant's own birthday. For example, if the participant was born in May, one target individual was also born in May. The three other target individuals were born in February, August, and November. Unlike the month, the days of these birthdays were each fixed, and could theoretically be the same day as the participant's own birth day.

After the presentation of all information about target individuals, participants were given just the name and picture of each target individual separately. They were then asked to write down everything they remembered about these people. Participants' own birthdays had been obtained in a pretest approximately 2 months prior to our study.

### **Results and discussion**

**Number of birth months remembered correctly.** On average, participants correctly remembered 1.72 of the target individuals' 4 birth months (SD = 1.28). There was no gender difference in the number of correctly remembered birth months, with women getting 1.77 birth months correct on average (SD = 1.28) and men getting 1.68 birth months correct on average (SD = 1.30), F(1, 52) = 0.07, n.s.

Average distance between participants' own birth month and correctly remembered birth months. The average distance between participants' birth month and the birth months they could remember was 2.41 (SD = 1.42). The average distance between participants' own birth month and the birth months they could not remember was 3.35 (SD = 0.98), t(1, 36) = 2.95, p < .01, d = 0.77.<sup>3</sup> Fifty-eight percent of the participants remembered the birth month of the target individual who was born in the same month as they were. In contrast, and consistent with the results of Study 2, 40% of the participants remembered the target individual's birth month when it was 3 months away from their own birthday, and 38% of participants remembered the target individual's birth month when it was 6 months away.

In this study, we showed the self-reference effect in memory for birthdays experimentally with newly introduced individuals. Unlike Study 1 and Study 2, Study 3 showed no gender difference in the number of remembered birthdays. This suggests that the gender difference we found in naturalistic studies is due more to motivational and normative factors than to a male inability to learn birthdays. This experimental demonstration appears to preclude the possibility that the selfreference effect is due to mutual birthday revelation or joint celebrations with friends. Rather, own birthdays seem to be automatically evoked during encoding, even when they are not contextually explicit.

#### **General Discussion**

In our studies, we explored the hypothesis that one reason some birthdays are easier to remember than other birthdays is that the former afford self-related encoding. We hypothesized that a spontaneous self-reference effect in memory for birthdays would occur even when the self-concept was not activated by an experimenter, that is, when it was not explicit in the learning environment.

In three studies, we established that people have a better memory for birthdays that are closer to their own birthdays. The effect is robust and sizable. Recently, research on the selfreference effect in memory has diverged from the classic paradigm and explored the manifestations of this effect in the absence of instructions to process the material in self-relevant ways (Cloutier & Macrae, 2008; Cunningham et al., 2008; Turk et al., 2008). Our work adds one more piece to the accumulating evidence for the automaticity of the self-reference effect. We documented an occurrence of the self-reference effect that does not rely on explicit processing guidelines and, moreover, does not require explicit self-cues in the environment.

One possible extension of our findings is that a memory advantage may also apply to birthdays that are close to other important dates in people's lives, such as important anniversaries or birthdays of close relatives and friends. The selfreference effect has been shown to occur when materials are processed in relation to close relatives and friends (Bower & Gilligan, 1979; Kuiper, 1982). Consequently, people who remember their partner's birthday may find it easier to keep in mind a birthday that is closer to the partner's birthday.

In addition to personally important dates, other highly salient dates, such as holidays, may serve a similar mnemonic function by being automatically activated during encoding of a birthday. These effects however, would probably be restricted to the close vicinity of the specific day of the holiday, and it is unlikely that holidays would affect memory for birthdays in the same way that we found people's own birthdays do. Our data support this supposition, as there was no indication that participants in Study 2 had better recall for birthdays in July or December—2 months that feature important American holidays—than for birthdays in other months.

We used an everyday domain of memory to show the selfreference effect. To our knowledge, this is the first demonstration of a naturalistic case of the self-reference effect in memory. What are other instances of the self-reference effect in everyday life? We hope future research will uncover more everyday contexts in which self-relevant information affects what people remember and what they forget.

#### **Declaration of Conflicting Interests**

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

#### Notes

- 1. A very close approximation can be calculated using probability.
- 2. This correlation was significant in Study 2 (r = .15, p = .03).

3. For the paired-sample *t* test, data from 17 participants were excluded because they remembered either all birth months (n = 7) or no birth months (n = 10), thereby precluding a comparison between remembered and not-remembered birth months.

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