

# Altruistic People Show No Self-Reference Effect in Memory

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**ABSTRACT.** The self-reference effect (SRE), by which encoding of information is done in a self-referential manner (e.g., “Does the word describe you?”), enhances subsequent memory performance. It is thought to reflect that self-reference is a highly practiced task in everyday life. Accordingly, it is expected that the types of tasks that produce memory enhancement vary according to individual differences of past experiences. On the basis of neuroimaging studies, we hypothesized that social desirability reference (“Is this word socially desirable?”) produces memory enhancement as with SRE in people who have chosen altruistic behavior frequently. Participants processed trait adjectives in relation to themselves, social desirability, and meaning. Then they performed a free recall task. The self-report altruism scale was used to assess the frequency of past altruistic behavior. Consistent with our prediction, the social desirability reference yielded the best retention in the high-altruism group. SRE was observed only in the low-altruism group.

**Keywords:** self-reference effect, social desirability, altruistic behavior, memory

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THE SELF-REFERENCE EFFECT (SRE) IS A BROADLY INVESTIGATED MEMORY PHENOMENON by which memory performance is better when information is processed in relation to self (e.g., the knowledge of one's own personal traits, preferences, and abilities) than when information is processed in relation to someone else or when it is processed for general meaning (Kuiper & Rogers, 1979; Rogers, Kuiper, & Kirker, 1977). This phenomenon was first reported by Rogers et al. (Kuiper & Rogers, 1979; Rogers, Rogers, & Kuiper, 1979), who showed that memory performance is more enhanced when information is processed as a self-reference task (e.g., "Does the word describe you?" "kind") than when it is processed as an other-reference task (e.g., "Does the word describe an experimenter?" "strict") or as a semantic task (e.g., "Does the word have the same meaning as creative?" "truthful").

To explain what kind of processing of self-reference causes SRE, several theoretical accounts have been advanced since those early studies (Linville & Carlston, 1994; Rogers, 1981; Symons & Johnson, 1997). Rogers et al. (1977) and Keenan and Baillet (1980) explained SRE in terms of the amount of elaboration received during the encoding of words-to-be-remembered. Klein and Kihlstrom (1986) proposed that the organization process (i.e., presented words are categorized as "words that describe me" or "words that do not describe me" and are associated together within each group) is responsible for SRE. Ferguson, Rule, and Carlson (1983) demonstrated that processing the social desirability of the trait adjective (social desirability reference task: e.g., "Is this word socially desirable?" "kind") enhanced memory to the same degree as self-reference tasks did. Then they suggested that the social desirability of self-reference is a possible cause of SRE. However, this result was not replicated by McCaul and Maki (1984), who did not recognize social desirability as a crucial cause of SRE. The current convergence is that both elaborative and organizational processing underlies SRE (Klein & Loftus, 1988; Symons & Johnson, 1997). Symons and Johnson (1997) reported weaker SRE when comparison-encoding tasks promote both organization and elaboration as a result of meta-analysis of SRE. They also reported that SRE are strongest when stimuli of a certain kind, in this case trait adjectives, are used because trait adjectives are commonly elaborated and organized through self-reference (Maki & McCaul, 1985). Symons and Johnson (1997) concluded that the self-reference process is uniquely efficient (i.e., well organized and well elaborated) solely because it is a highly practiced task in everyday life. Consistent with this explanation, Kesebir and Oishi (2010) and Turk, Cunningham, and Macrae (2008) reported that SRE are observable without an explicit link between self and to-be-processed items, which is a similar situation to those experienced in everyday life. Nakao, Mitsumoto, Nashiwa, Takamura, Tokunaga, Miyatani, and Watanabe (2010) and Nakao, Takezawa, Shiraishi, and Miyatani (2009) reported that self-reference judgment about trait adjectives occurs in everyday life behavior selection (e.g., occupational choice) to bias either choice of behavior.

What remains unconfirmed, however, is whether the difference of past experience affects the memory enhancement phenomenon, as SRE. If the uniqueness of

self-reference is attributable to the highly practiced task, then non-self-reference processes that people use every day would produce the same degree of memory enhancement as that observed for SRE: it is possible that the encoding tasks that produce memory enhancement vary according to individual differences of past experiences.

Recent knowledge gained from neuroimaging studies has been useful to construct a specific hypothesis about the relation between SRE and individual differences of past experience. Neuroimaging studies consistently show significant activation within the medial prefrontal cortex (MPFC) during self-reference (Craig et al., 1999; Fossati et al., 2003; Johnson, Baxter, Wilder, Pipe, Heiserman, & Prigatano, 2002; Kelley, Macrae, Wyland, Caglar, Inati, & Heatherton, 2002; Kjaer, Nowak, & Lou, 2002). The MPFC is thought to have an important function for memory enhancement and SRE. Anatomically, MPFC shares a close relation with the hippocampus, which has important memory-related functions (Parent, Wang, Su, Netoff, & Yuan, 2010; Price & Drevets, 2010). Furthermore, the activity in MPFC during self-reference predicts subsequent memory performance (Macrae, Moran, Heatherton, Banfield, & Kelley, 2004). However, MPFC activation has been attributed not only to self-reference but also to inferences about another person's mental state (so-called mentalizing; (Frith & Frith, 2003; Ochsner et al., 2004; Vogeley, et al., 2001) and altruistic behavior selection (Greene & Paxton, 2009; Moll et al., 2006).

Based on this evidence, several reports of the literature (Nakao, Mitsumoto et al., 2010; Nakao, Takezawa, Miyatani, & Ohira, 2009) have described that self-reference shares psychological properties with another person's mental state reference and social desirability reference. They specified the shared psychological properties based on functions of neighboring prefrontal areas (i.e., lateral prefrontal cortex and dorsal anterior cingulate cortex), which have reciprocal connections with the MPFC and which have functions in behavior selection (Botvinick, Braver, Barch, Carter, & Cohen, 2001; Kerns, Cohen, MacDonald, Cho, Stenger, & Carter, 2004). That is, they proposed that self-reference, another person's mental state reference, and social desirability reference have functions as criteria in everyday-life behavior selection. These processes bias either choice of behavior for situations, such as occupational choice and interpersonal communication, in which no objective correct answer exists. Nakao et al. reported evidence that supports this explanation: self-reference biases occupation choice (Nakao, Mitsumoto et al., 2010). In addition, the MPFC has functional relations with the dorsal anterior cingulate cortex during the occupation choice task (Nakao, Osumi, et al., 2010). Regarding the effects of individual differences of past behavior selection to MPFC activities, Moll et al. (2006) reported that an individual who has been engaged more in voluntary activities showed more MPFC activity during costly donation. That is, people who had frequently chosen altruistic behavior in the past showed more MPFC activity when they chose behavior not based on self-interest.

When we apply these notions related to MPFC to SRE based on mutual relations between MPFC activation and SRE (Macrae et al., 2004), it becomes credible

that not only the self-reference but also the non-self-reference process, which biases behavior selection, produces the same degree of memory enhancement as that observed for SRE. It is likely that individual differences of past behavior selection affect the kinds of tasks that produce memory enhancement. Especially, based on Moll et al. (2006), it is expected that the individual differences of past altruistic behavior affect memory enhancement. Furthermore, it has been reported that the social desirability reference biases altruistic behavior selection (Cialdini et al., 1987; Eisenberg et al., 1989; Tracy & Cross, 1973). For example, Cialdini, Schaller, Houlihan, Arps, Fultz, and Beaman (1987) reported that people with a strong concern about social desirability tended to choose helping behavior. This evidence suggests that highly altruistic people (i.e., people who have chosen altruistic behavior frequently) have referred to social desirability as a criterion for everyday-life behavior selection. Consequently, social desirability referencing can be a highly practiced task in highly altruistic people. We hypothesize that social desirability referencing produces the same degree of memory enhancement as that observed for SRE in highly altruistic people.

The experiment described in this article elucidates whether social desirability referencing that functions in altruistic behavior can produce the same degree of memory enhancement as SRE or not in individuals who have chosen altruistic behavior frequently. For the following experiment, we divided participants on the basis of their respective frequencies of altruistic behavior. The frequencies of past altruistic behavior were assessed by using a questionnaire (Rushton et al., 1981). We used a social desirability reference task ("Is this word socially desirable?") as the encoding task because the social desirability task is thought to be a highly practiced task in individuals who have chosen altruistic behavior frequently. Moreover, the social desirability reference task has been used in SRE studies (Ferguson et al., 1983; McCaul & Maki, 1984), as previously described. McCaul and Maki (1984) reported that social desirability reference does not enhance memory as much as self-reference. However, no report has described an examination of individual differences of memory performance in both self-reference and social desirability reference tasks. The hypothesis assessed in this study is that the social desirability reference task produces memory performance that is comparable to SRE in participants who have chosen altruistic behavior frequently.

## **Method**

### **Participants**

From Hiroshima University, 83 healthy volunteer participants were recruited (14 men, 69 women, age range = 18–22 years, mean age = 19.1 years). All participants had normal or corrected-to-normal vision. Each participant voluntarily gave written informed consent before the investigation. The study protocol

was approved by the Ethical Committee of the Graduate School of Education, Hiroshima University.

## Materials and Procedure

The stimuli were 49 Japanese trait adjectives, selected from Aoki (1971), which have been used for psychological studies in Japan (Fujita & Horiuchi, 2004; Itoh, 2004; Nakao, Mitsumoto et al., 2010). In the report by Aoki (1971), the desirability ratings of 455 trait adjectives are presented as with Anderson (1968). Three word lists comprised five positive (e.g., sincere, honest, and loyal), five neutral (e.g., cautious, systematic, and stern), and five negative traits (e.g., jealous, loud-mouthed, and selfish). One word list comprising four trait words was produced. The four-word list was used in filler trials (first two trials and last two trials) to control for primary and recency effects.

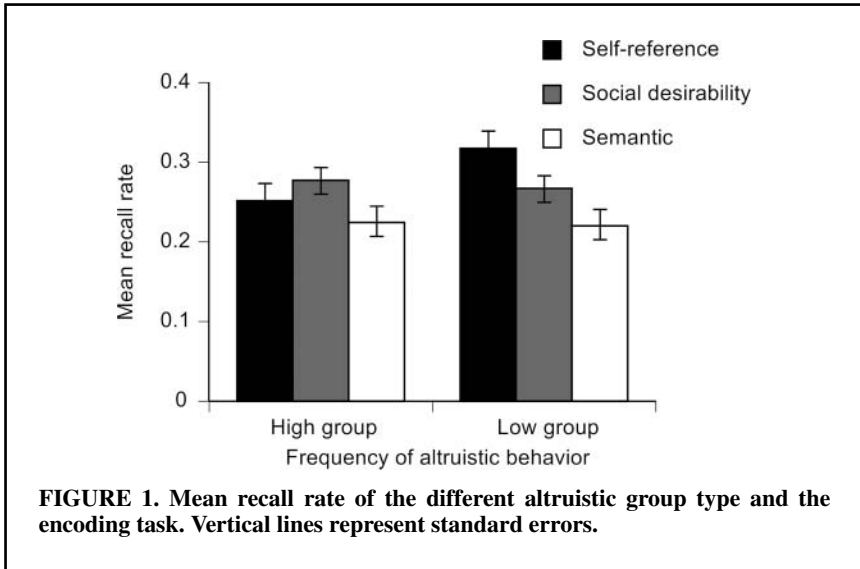
We prepared three booklets (A, B, and C). Booklet A comprised 49 trials of the encoding tasks of three kinds: self-reference (participants decided whether a trait adjective was self-descriptive, as in “Does the word describe you?”), social desirability reference (participants judged whether the trait adjective described a socially desirable characteristic, as in “Is this word socially desirable?”), and semantic tasks (participants judged whether it was easy to generate a definition for the trait adjective, as in “Is it easy to define this word?”). We used a social desirability reference task because the social desirability task is thought to be a highly practiced task in individuals who have chosen altruistic behavior frequently. Moreover, it has been used in SRE studies (Ferguson et al., 1983; McCaul & Maki, 1984). The semantic task has been used in SRE studies as the control condition (Klein, Loftus, & Burton, 1989; McCaul & Maki, 1984; Nakao & Miyatani, 2005; Symons & Johnson, 1997). A question, a trait adjective, and an answer column (Yes or No) were printed on each sheet for the encoding task. The pages of Booklet A, along with the pages used for filler trials, were stapled in random order. The Booklets A of three types differed in their assignments of the word list used for the encoding task. Booklet B consisted of a sheet for distraction tasks and sheets for free-recall tests. Booklet C consisted of a sheet for confirming the presence or absence of intention retention and a sheet for the self-report altruism scale (Rushton et al., 1981). As the self-report altruism scale, we used the Japanese version, which has been validated by Kikuchi (1988). This scale comprises 20 items. Typical items were the following: “I have offered my seat on a bus or train to a stranger who was standing,” “I have allowed someone to go ahead of me in line,” and “I have pointed out a clerk’s error (in a bank, at the supermarket) in undercharging me for an item.” Participants were instructed to rate the frequency with which they had engaged in the altruistic behaviors using the categories 1 = “Never,” 2 = “Once,” 3 = “More Than Once,” 4 = “Often,” and 5 = “Very Often.” The sum total of ratings of all items represents the score of the frequency of past altruistic behavior selection. The total score range is 20–100.

Participants were tested in one group in five steps (encoding task, distraction task, incidental free-recall test, confirmation of a participant's intention to remember, and the self-report altruism scale). As the encoding task, participants circled either "Yes" or "No" to respond to the question on each page of Booklet A. The duration of a trial of the encoding task was 10 s, as indicated by a signal from the experimenter. As the distraction task, participants were asked to write down the consecutive numerical sequence following 1,000, 999, 997, 994, 990 ... on a sheet of Booklet B for 3 min. After the distraction task, participants were asked to write down the trait adjectives that were presented in the encoding task. They were asked to write as many as possible as they were able to remember for 5 min. Subsequently, participants checked whether they had the intention of memorizing contents or responses during the encoding task. This question was used to exclude participants who had engaged in some memorization strategy, which might have influenced the results. Finally, participants responded to the self-report altruism scale using Booklet C. All aspects of the procedure were performed as similarly as possible to those described in an earlier report (Horiuchi, 1998a, 1998b).

## Results

Four participants' data were excluded from analyses because they had responded incompletely to the encoding task. No participant reported any intention of memorizing materials presented during the encoding task. The participants were divided into two groups: a high-altruism group ( $n = 39$ ) comprising participants who were rated above the median value (53) on the self-report altruism scale and a low-altruism group ( $n = 37$ ) comprising participants who were rated below the median value on that scale. The values on the scale of three participants were equal to the median value (53). For that reason, they were included in neither the high-altruism group nor the low-altruism group.

Figure 1 portrays the mean recall rate for each encoding condition in each group. For each participant, the recall rate for each condition was computed as the number of recalled words divided by the number of presented words in each encoding task (15). A 2 (altruism group)  $\times$  3 (encoding condition) analysis of variance showed a significant main effect of the encoding condition ( $F(2, 148) = 7.65, p < .001, \eta^2 = .05$ ) and significant interaction ( $F(2, 148) = 3.14, p < .05, \eta^2 = .02$ ). Regarding interaction of the altruism group and the encoding condition, simple main effects analysis revealed a significant effect of the encoding condition on the low-altruism group ( $F(2, 72) = 6.70, p < .001, \eta^2 = .10$ ) and a significant effect of the encoding condition on the high-altruism group ( $F(2, 76) = 3.17, p < .05, \eta^2 = .04$ ). Regarding the effect of the encoding condition on the low-altruism group, results of post hoc Bonferroni tests ( $p < .05$ ) showed that the self-reference encoding condition (mean = .32,  $SD = .13$ ) produced a higher recall rate than the social desirability encoding condition (mean = .27,  $SD = .10$ ) and the semantic encoding condition (mean = .22,  $SD = .13$ ). No significant difference was found



between the social desirability encoding condition and the semantic encoding condition. Regarding the effect of the encoding condition on the high-altruism group, post hoc Bonferroni tests ( $p < .05$ ) showed that the social desirability encoding condition (mean = .28,  $SD = .11$ ) produced a higher recall rate than the semantic encoding condition did (mean = .22,  $SD = .11$ ). No significant difference was found between the self-reference and the semantic encoding condition.

In addition to the analysis related to group altruism differences of SRE in altruism, we conducted correlation analysis to ascertain individual differences in altruism and SRE. Because SRE appears to be defined as the added benefit of the self-reference task over the semantic task, we calculated the added recall rates of the self-reference encoding condition over the semantic encoding condition for each participant (i.e., SRE for each participant) and assessed the correlation with the altruism score. The Pearson product-moment correlation coefficient revealed a significant weak negative correlation ( $r = -.22, p < .05$ ). No significant correlation was found between the altruism scores and the added recall rates of the evaluation encoding condition over the semantic encoding condition.

## Discussion

We observed a significant interaction between the altruism groups and the encoding condition. In the high-altruism group, the recall rate in the social desirability encoding condition was better than that in the semantic encoding condition. This result is consistent with our hypothesis that the social desirability task produces

memory performance that is comparable to SRE in participants who frequently have chosen altruistic behavior. It is more surprising that although SRE was observed in the low-altruism group, no SRE was observed in the high-altruism group. These results indicate that people who have frequently chosen altruistic behavior produce memory enhancement not when the information is processed in self-reference, but when the information is processed in relation to social desirability. Our results suggest that the kind of task producing memory enhancement varies according to individual differences of past experiences of behavior selection. This finding partially supports the conclusion reached by Symons and Johnson (1997): self-reference is a uniquely efficient process solely because it is a highly practiced task in everyday life. That is, our results suggest that the past experience in everyday life, specifically past behavior selection, is a possible factor of SRE. At the same time, however, our results imply that self-reference is not a unique cognitive process that produces memory enhancement. In the high altruistic group, no SRE was observed. Instead, the social desirability task yielded enhanced memory performance. It is possible that the crucial factor determining which kind of task enhances memory performance is not the self-reference, but the kinds of past behavior that are chosen frequently.

The correlation analysis revealed that the added recall rates of the self-reference encoding condition over the semantic encoding condition were lower in participants who chose altruistic behavior frequently. Based on the explanation of SRE presented by Symons and Johnson (1997), this result might reflect that self-reference is not a highly practiced task to facilitate elaborative (Keenan & Baillet, 1980; Rogers et al., 1977) and organizational (Klein & Kihlstrom, 1986) processing for highly altruistic individuals. Furthermore, for this reason, SRE was not observed in the high-altruism group.

In contrast, no correlation was found between the added recall rates of the evaluation encoding condition over the semantic encoding condition and the altruism score. We used the social desirability task, which had been used in prior SRE studies (Ferguson et al., 1983; McCaul & Maki, 1984), to compare the results of this study with those of previous studies. However, it is possible that social desirability is not sensitive to the frequency of past altruistic behavior. Not only social desirability but also *other* representation (e.g., empathy for other people) is expected to affect the choice of altruistic behavior. In fact, one report of the relevant literature (Fultz, Batson, Fortenbach, McCarthy, & Varney, 1986) has described that empathy for other people engenders increased helping.

Similarly, although the correlation between SRE and past experiences in altruistic behavior was significant, it was weak ( $r = -.22$ ) correlation, which indicates that the variance of SRE is not fully explained by this relation. Previous sociopsychological reports have described that self-reference guides social behavior selection, which is not restricted to altruistic behavior (Markus & Wurf, 1987; Steele, 1988; Swann Jr, 1983; Thibodeau & Aronson, 1992). Not only the frequency of altruistic behavior but also the frequency of other kinds of social



behavior selection (e.g., interpersonal communication, for which self-reference biases decision making) might also vary the amount of SRE.

Despite these weak relations between altruistic behavior selection and SRE or social desirability, significant interaction was found between the altruism groups and the encoding condition. Moreover, SRE was found in the low-altruism group but not in the high-altruism group, and significant memory enhancement in the social desirability task was observed only in the high-altruism group. For that reason, we can at least conclude that the encoding tasks that produce memory enhancement vary according to individual differences of past behavior selection.

As described in the Introduction of this article, Ferguson et al. (1983) reported that the social desirability task enhanced memory to the same degree that self-reference tasks did. In contrast, McCaul and Maki (1984) reported that the social desirability does not enhance memory as much as the self-reference. A possible explanation for the contradiction is provided by our finding: the kind of task producing memory enhancement varies according to individual differences of past experiences of behavior selection. It is possible that McCaul and Maki (1984) found no memory enhancement in the social desirability encoding condition because they incidentally had numerous low-altruism participants. Actually, the pattern of the memory performance in low-altruism participants presented in this study resembles that reported by McCaul and Maki (1984).

One limitation must be explained. For this experiment, we used only one scale (i.e., self-report altruism scale) to divide participants into groups. For that reason, a question always remains of whether the altruism factor is a true cause of the observed results. We cannot deny the possibility that other factors are causes of the reduction of SRE. Although we can show that the encoding tasks that produce memory enhancement vary according to individual differences of past experiences, using questionnaires of several kinds would be a better way to detect a potential cause of the variance of memory enhancement.

In conclusion, results of this study show that individual differences of past experiences in altruistic behavior influence memory enhancement phenomena such as SRE. These results suggest that the kind of task producing memory enhancement varies according to the kind of behavior that had been chosen frequently. However, the cause of individual differences of memory remains unclear.

## AUTHOR NOTES

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