

# Mood and Recall of Autobiographical Memory: The Effect of Focus of Self-Knowledge

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**ABSTRACT** Mood state facilitates recall of affectively congruent memories (i.e., mood-congruent recall). Mood state may also promote motivation to alleviate a negative affective state, leading to retrieval of affectively incongruent memories (i.e., mood incongruent recall). The present study demonstrates that the focus of self-knowledge influences the occurrence of both mood-congruent recall and mood-incongruent recall. Three experiments found that mood-congruent recall occurred when participants recalled their experiences from a self-aspect that was related to the elicitor of moods, whereas mood-incongruent recall occurred when they recalled their experiences from a self-aspect that was unrelated to the elicitor of moods. These results suggest that the nature of the self-aspect from which persons recall their experiences determines whether mood-congruent or mood-incongruent recall occurs.

The impact of mood on memory is a central concern for researchers who are interested in the relationship between affective and cognitive processes. Most of the research conducted in this area has tested

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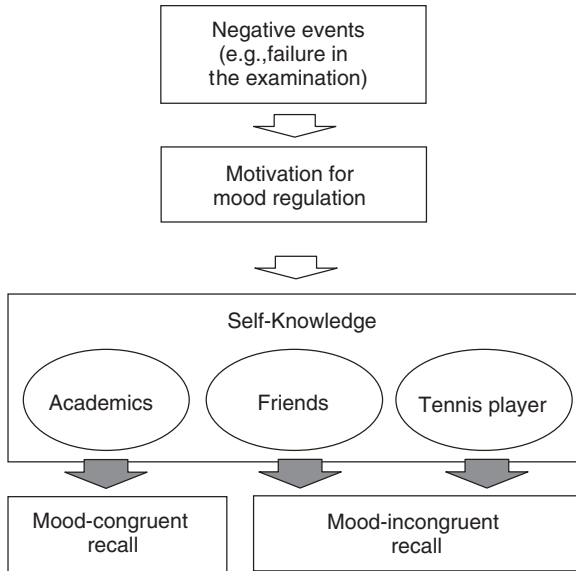
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the associative network model (Bower, 1981), which assumes that mood state influences memory by semantically priming content that is congruent with the mood, which in turn leads to selective retrieval of mood-congruent information. This model of mood-congruent recall has been supported by several studies (e.g., Ellis, Seibert, & Herbert, 1990; Natale & Hantas, 1982; see Singer & Salovey, 1988, for a review) suggesting that persons experiencing negative moods enter into a potentially self-defeating cycle where their negative moods prime unpleasant memories, which in turn may exacerbate their distress (Blaney, 1986; Wenzlaff, Wegner, & Roper, 1988).

On the other hand, several studies have found that mood can enhance the retrieval of mood-incongruent information (e.g., Parrott & Sabini, 1990), which is known as mood-incongruent recall. Mood-incongruent recall may be used as a technique for improving negative mood because it can interrupt the vicious cycle between negative mood and negative memories and thus may mitigate negative moods such as anxiety or depression. In fact, mood-incongruent recall has been found to be helpful for mood regulation (Erber & Erber, 1994; Josephson, Singer, & Salovey, 1996; Rusting & DeHart, 2000).

To date, this contradiction in the literature of the relationship between mood and memory was considered to be attributable to motivation (e.g., Erber & Erber, 1994; Forgas & Ciarrochi, 2002; see Forgas, 1995, Taylor, 1991, for reviews). While mood state has been assumed to prime affectively congruent memories automatically (i.e., mood-congruent recall), mood state also promotes persons' motivation to alleviate their affective state, which leads to retrieval of affectively incongruent memories from the past (i.e., mood-incongruent recall). Consistent with the motivational account, researchers showed that participants tended to recall mood-incongruent experiences when they were motivated to modify their mood (e.g., Erber & Erber, 1994; Parrott & Sabini, 1990) and that personality traits related to the motivation for mood regulation predicted the occurrence of mood-incongruent recall (e.g., Joorman & Siemer, 2004; Josephson et al., 1996; McFarland & Buehler, 1998; Rusting & DeHart, 2002; Smith & Petty, 1995).

However, the motivation for mood regulation is not sufficient in explaining whether mood-congruent or mood-incongruent recall occurs (see also Kunda, 1990). As previous research pointed out (e.g., Conway & Pleydell-Pearce, 2000), recalled autobiographical



**Figure 1**

Effects of focus in self-knowledge on mood-congruent and mood-incongruent recall.

memories are generated from the individual's underlying self-knowledge base, which contains memories for events experienced by that individual. Therefore, the focus of one's self-knowledge base may play a critical role in determining the impact of mood on recall of autobiographical memories. For example, if positive or negative moods are induced in a manner related to a person's self-knowledge about academics (e.g., failure in the academic domain), later recalling autobiographical memories having to do with the concept "academics" might lead to mood-congruent recall, while recalling autobiographical memories unrelated to that concept might lead to mood-incongruent recall (Figure 1). The aim of the present article was to demonstrate that the focus of the self-knowledge is an important factor for discriminating between the occurrence of mood-congruent recall and mood-incongruent recall.

### **EFFECTS OF THE FOCUS OF SELF-KNOWLEDGE**

In the cognitive information-processing approach, which has been the dominant influence in the investigation of the self, the self has been

considered to be the organized set of knowledge that is acquired by each person about himself or herself (e.g., Higgins, Bond, Klein, & Strauman, 1986; Kelly, 1955; Klein & Loftus, 1993). Researchers, then, suggested that self-knowledge is represented in terms of multiple self-aspects, such as social roles (e.g., psychologist, friend, father), kinds of relationships (e.g., colleague, competitor, nurturer), goals (e.g., career success), types of activities (e.g., running, playing tennis, singing), and so on (e.g., Linville, 1985, 1987). It has been assumed that when people experience a specific event, the self-aspect most relevant to the immediate context is activated (e.g., Markus & Wurf, 1987).

From this perspective, whether people recall mood-congruent or mood-incongruent information seems to depend on the nature of the self-aspect from which persons recall experiences, as follows: When people experience negative events, the self-aspect most relevant to the elicitor of negative mood, which is referred to here as the related self-aspect, would be activated. Negative moods evoked by the experience would become associated with the related self-aspect (e.g., Linville, 1985, 1987), which would result in an increased accessibility of mood-congruent memories in the related self-aspect. Therefore, even though people are motivated to alleviate negative moods by recalling positive experiences, this motivation for mood regulation would be unable to function effectively in the related self-aspect. Thus, it would be difficult to recall positive memories from this related self-aspect, and the related self-aspect would tend to produce mood-congruent recall.

On the other hand, when people experience negative events, the negative mood evoked by those events would not be associated with self-aspects unrelated to the elicitor of the negative mood (e.g., Linville, 1985, 1987), which are referred to as unrelated self-aspects. Therefore, when persons attempt to recall memories from these irrelevant self-aspects, the motivation for mood regulation would function effectively and individuals would be able to recall more positive memories even in a negative mood state (i.e., mood-incongruent recall). Thus, mood-congruent recall is expected to occur in the related self-aspect better than in the unrelated self-aspect, while mood-incongruent recall is expected to occur in the unrelated self-aspect better than in the related self-aspect.

The aim of the present study was to address the above hypothesis. Three experiments were conducted to explore how the nature of the self-aspects from which persons recall their experiences influences the

relationship between mood and recall of autobiographical memories. In Experiment 1, the prediction was tested under positive mood, while in Experiment 2, the prediction was tested under negative mood. Finally, Experiment 3 attempted to replicate the findings using a different memory task.

### PRETEST

The pretest was designed to determine which of the participants' self-aspects would be used as the related self-aspect and the unrelated self-aspect. Fifty Japanese undergraduates and graduates students (30 males, 20 females) completed a trait-sorting task (Linville, 1985, 1987). This task has been found to be useful for evaluating Japanese students' self-knowledge (e.g., Hayashi & Horiuchi, 1997; Sato, 1999). In this trait-sorting task, participants were provided with 40 personality trait words selected from research on Japanese trait adjectives (Kashiwagi, Wada, & Aoki, 1993; Wada, 1996) so that half of the traits would be positive. The participants were asked to form as many groups of traits as they could that describe aspects of themselves or their lives, and to provide a label for each group.

The self-aspect groups formed by the participants were classified into six categories: (a) academics, (b) friends, (c) family, (d) romantic relationships, (e) hobbies, and (f) work.<sup>1</sup> Independent raters agreed on 92% of these classifications, and discrepancies were resolved through discussion. The largest proportions of the participants reported self-aspects for "friends" (92%) and "academics" (86%). The next most frequently reported categories were "family" (76%), "hobbies" (54%), "work" (40%), and "romantic relationships" (32%). Many other studies have also found that "academics" and "friends" are common self-aspects among undergraduate and graduate students (e.g., Marsh & Shavelson, 1985; Yamamoto, Matsui,

1. Some might think that these self-aspects may correspond to categories of social situations rather than categories of persons' self-knowledge. However, several authors have indicated that social situations determine persons' behaviors and attitudes, and that self-knowledge consists of many situation-behavior profiles (see Mischel, Shoda, & Mendoza-Denton, 2002, for a review). This suggests that self-knowledge is organized in terms of social situations, and that the structures of self-knowledge reflect those of social situations.

Yamashiro, 1982). Therefore, we decided to use these two self-aspects in the following experiments.<sup>2</sup>

### EXPERIMENT 1

The purpose of Experiment 1 was to test our hypothesis for a positive mood. People in positive moods tend to maintain their mood state, rather than to recall mood-incongruent memories. In contrast, people are motivated to improve a negative mood or to achieve a positive mood (e.g., Taylor, 1991). Nevertheless, Parrott and Sabini (1990) found that mood-incongruent recall occurs not only for persons in a negative mood but also for persons in a positive mood. This suggests that situational demands sometimes enhance motivation for recalling negative memories to attenuate a positive mood (e.g., at a funeral; Erber & Erber, 2001; Martin, 2001). Experiment 1 tests our hypothesis for a positive mood by externally enhancing participants' motivation for mood-incongruent recall. For this purpose, we used a forced-recall task (Sakaki, 2004), where participants were explicitly asked to recall mood-incongruent memories during a positive mood state.

To test our hypothesis, we also needed to specify which of participants' self-aspects was activated by the elicitor of moods. In Experiment 1, therefore, participants' moods were manipulated using bogus performance feedback procedure (Forgas, 1995; Parrott & Hertel, 1999), which enabled us to activate participants' self-aspect for "academics." More specifically, after participants took an achievement test,

2. Research on self-complexity suggests that there are individual differences in the degree of differentiation among self-aspects (Linville, 1985, 1987; Rafaeli-Mor & Steinberg, 2002). This raises the possibility that the self-aspect for "friends" is not independent from the self-aspect for "academics." To address this possibility, we computed a differentiation score for each of all the possible pairs of self-aspects made by the participants (e.g., "academics"- "friends", "academics"- "family", "academics"- "romantic relationships" and so on). The differentiation score was the mean proportion of attributes that were exclusively sorted in one self-aspect based on the total number of attributes sorted in that aspect (Mikulincer, 1995). Higher scores reflect higher differentiation among the two self-aspects. The results showed that the differentiation score between "academics" and "friends" ( $M = 0.69$ ,  $SD = 0.22$ ) is significantly higher than those of other pairs ( $t(49) = 5.51$ ,  $p < .0001$ ; the mean differentiation score for all other pairs = 0.44,  $SD = 0.12$ ). This suggests that the self-aspect for "friends" and the self-aspect for "academics" are relatively differentiated from each other.

they were provided with feedback designed to manipulate their mood state (either positive mood or neutral mood). Following this, they were asked to recall as many negative memories as they could from either the related self-aspect or the unrelated self-aspect for four minutes. The self-aspect for “academics” was used as the related self-aspect, while the self-aspect for “friends” was used as the unrelated self-aspect. According to our hypothesis, participants who recalled autobiographical memories from the self-aspect for “friends” were expected to recall a greater number of negative memories in the positive mood than in the neutral mood (i.e., mood-incongruent recall), whereas participants who recalled experiences from the self-aspect for “academics” were expected to recall a smaller number of negative memories in the positive mood than in the neutral mood (i.e., mood-congruent recall).

## METHOD

### Participants

Seventy-four Japanese undergraduate and graduate students (56 males and 18 females, mean age = 21.35,  $SD = 2.31$ ) took part in the experiment. They received a book coupon in the amount of 500 yen as compensation for their time. Data from two participants had to be discarded because they were aware of the purpose of the experiment. Furthermore, one participant who was assigned to the positive mood condition experienced strong anxiety during the achievement test, and therefore data from this participant were also excluded.

### Design

The experiment was a  $2 \times 2$  design with mood (positive and neutral) and self-aspect (related and unrelated) as the independent variables. Participants were randomly assigned to each of four conditions.

### Mood Induction

To manipulate participants' mood, two kinds of tests were constructed. One was an extremely easy test and the other was moderately difficult. In the positive mood condition, participants were asked to take the moderately difficult test, which consisted of four anagrams and six questions similar to the Raven Progressive Matrices test, within a 10-minute limit. This moderately difficult test was challenging, but all participants could solve the problems almost perfectly. After this difficult test, the experimenter entered the participants' responses into a computer by a keyboard, and bogus success feedback appeared on the screen (“You achieved

top-class performance and your  $T$ -score was 74.33"). Participants were also informed that the mean  $T$ -score of other students, who were at the same university as the participant, was 63.2, and that the mean  $T$ -score of other students from all universities of the area around Tokyo was 46.5.

In the neutral mood condition, the extremely easy test was administered without giving feedback (Sakaki, 2004). This extremely easy test consisted of five questions similar to the Raven Progressive Matrices and 44 numerical calculations. The time limit for this test was 5 minutes. All questions of this test were very easy in an effort to prevent participants from feeling a sense of failure. This test was also expected to prevent participants from feeling happy because it involved so many questions that participants could not answer all questions within the 5-minute time limit. Prior to the test, participants were told that the test had a very strict time limit such that no one would be able to solve all of the problems.<sup>3</sup>

3. In the usual bogus performance feedback procedure, the feedback was manipulated rather than the task (e.g., Forgas & Ciarrochi, 2001; McFarland & Buehler, 1997, 1998). However, in the present study, the difficulty of the tasks was also manipulated to enhance the credibility of the success feedback (e.g., Dodgson & Wood, 1998; Sakaki, 2004). The difficulty of the tasks was established based on Gilhooly and Johnson (1978); Raven, Court, and Raven (1995); and the Japanese arithmetic textbooks for elementary school (Tokyo-Shoseki, 2004).

A preliminary test was conducted to establish feedback. In this preliminary test, 20 Japanese undergraduate students were asked to take either the moderately difficult test or the extremely easy test. Then participants answered the following two questions: (1) If you were to receive a  $T$ -score, what score would make you feel happy? (2) What score would make you feel unhappy? When participants took the moderately difficult test, we found that a  $T$ -score above 70 would make most participants feel happy. In contrast, a  $T$ -score below 60 was found to make them unhappy. Based on these findings, we established the success feedback. However, when the participants took the extremely easy test, a  $T$ -score between 45 and 70 was found to make them feel happy. In contrast, participants reported that a  $T$ -score between 25 and 65 made them feel unhappy. These findings suggest that it is difficult to determine a  $T$ -score for the neutral mood condition. Therefore, similar to Sakaki (2004), the experimenter did not provide feedback to participants in the neutral mood condition.

An additional preliminary test was conducted to check on the difficulty of the tests. In this preliminary test, 10 Japanese undergraduate students were asked to take either the test for the positive mood condition or the test for the neutral mood condition with no time restriction. All participants could solve the problems almost perfectly. However, the participants took significantly longer to solve the problems for the positive mood condition ( $M = 50.07$  sec per problem) than for the neutral mood condition ( $M = 17.01$  sec per problem;  $t(8) = 4.83$ ,  $p < .01$ ).



### Main Memory Task

Participants were provided with a retrieval cue and memory inventory sheets, which consisted of numbered lines. They were told to recall as many negative memories related to the cue as they could, and were asked to briefly list one memory on each line for 4 minutes (cf. Rusting & DeHart, 2000). In the related self-aspect condition, the retrieval cue was “academics,” while in the unrelated self-aspect condition, the retrieval cue was “friends.” The total number of negative memories listed on the memory inventory sheets served as the main dependent measure in the experiment.

### Baseline Memory Task

The baseline memory task was conducted at the beginning of the experiment to control for differences in the ability to recall autobiographical memories. The procedure of the baseline memory task was modified in the following ways from the main memory task to avoid any influence on the main memory task. First, the retrieval cues used in the baseline memory task differed from those used in the main memory task. Participants were given “friends” as the retrieval cue in the related self-aspect condition, and were given the cue “academics” in the unrelated self-aspect condition. Second, participants were allowed to recall any experiences related to the retrieval cue for 2 minutes in the baseline memory task, while they were asked to recall only negative memories for 4 minutes in the main memory task. The total number of memories listed in this baseline memory task was used as a covariate.

### Procedure

Participants were run on an individual basis by one of six experimenters. First, participants were informed that the purpose of the experiment was to explore the nature of autobiographical memories recalled by university students and that the experiment consisted of recalling their experiences associated with academics and with friends. Next, the baseline memory task was conducted. After recall, the experimenter told participants that the experimenter wanted them to take an academic ability test before the second memory task to prevent any influence of the memories recalled in the first memory task on performance on the second memory task. Participants were handed an “Academic Ability Test for University Students” and told that this test assessed the scholastic ability of university students. In the positive mood condition, participants took the moderately difficult test and received feedback of their successful performance. On the other hand, in the neutral

Thus, the test for the positive mood condition was more difficult than the test for the neutral mood condition.

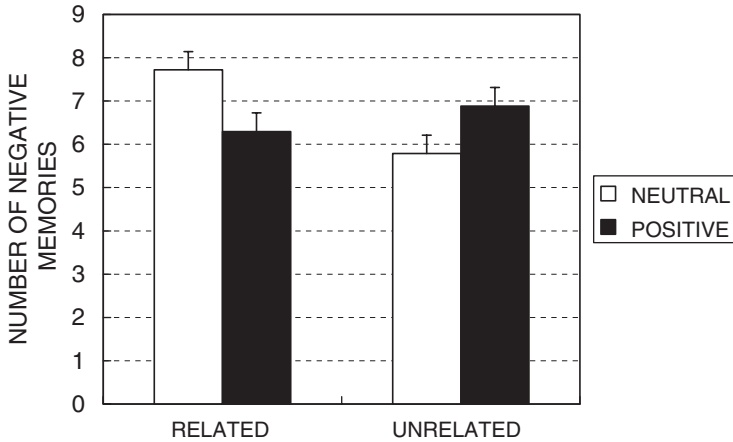
mood condition, participants took the extremely easy test and received no feedback. After this mood induction, the experimenter gave them a questionnaire, which included six mood items obtained from Russell and Carroll (1999) as well as several dummy items. In this questionnaire, participants rated their mood on six items (pleasant, happy, satisfied, depressed, sad, and cheerless) on a scale of 1 (*not at all*) to 7 (*extremely*). Scoring was reversed for the last three items. This questionnaire was followed by the main memory task, in which participants were asked to recall as many negative memories related to the retrieval cue as they could for 4 minutes.

Participants were debriefed after completion of the experiment. The experimenter ascertained that there were no lingering effects of recalling negative memories, and the participants were thanked for their participation and dismissed.

## RESULTS AND DISCUSSION

### Manipulation Check

Because the six mood items had high internal consistency (Cronbach's  $\alpha = .86$ ), the scores for the six items were averaged to create a single mood index. A 2 (self-aspect: related vs. unrelated)  $\times$  2 (mood induction: neutral vs. positive)  $\times$  6 (experimenters) analysis of variance (ANOVA) on this mood index revealed a significant main effect for mood induction,  $F(1, 62) = 30.47$ ,  $MSE = 0.91$ ,  $p < .0001$ . Participants in the positive mood condition reported significantly happier moods than participants in the neutral mood condition ( $M = 5.86$ ,  $SD = 0.90$  vs.  $M = 4.55$ ,  $SD = 1.03$ , respectively). This ANOVA also yielded a significant main effect for self-aspect, indicating that participants assigned to the unrelated self-aspect condition reported more positive mood than those assigned to the related self-aspect condition ( $M = 5.40$ ,  $SD = 1.03$  vs.  $M = 4.95$ ,  $SD = 1.27$ , respectively),  $F(1, 62) = 4.41$ ,  $p < .05$ . One might think that this difference in mood score between two self-aspect conditions would distort the results of following analyses. However, the main hypothesis of the present study concerned the interaction between mood induction and self-aspect on the number of recalled negative memories. In contrast, the ANOVA on the mood score did not yield a significant interaction between them,  $F(1, 62) = 0.11$ . Thus, mood manipulation was not judged to distort the test of the hypothesis. The main effect for experimenters was not significant ( $p > .40$ ).



**Figure 2**

Number of recalled negative memories as a function of mood condition and self-aspect condition (Experiment 1).

#### Effects of Self-Aspect on Recalled Memory

Using the number of memories recalled in the baseline memory task as a covariate, a 2 (self-aspect)  $\times$  2 (mood induction)  $\times$  6 (experimenters) analysis of covariance (ANCOVA) was conducted on the number of negative memories recalled in the main memory task. This ANCOVA yielded a significant interaction between mood induction and self-aspect,  $F(1, 61) = 10.64$ ,  $MSE = 3.17$ ,  $p < .01$ . An examination of the means relevant to this interaction reveals support for the predictions (see Figure 2). As expected, when participants recalled memories from the related self-aspect, they recalled a smaller number of negative memories in the positive mood condition than in the neutral mood condition,  $F(1, 61) = 7.22$ ,  $p < .01$ , whereas when they recalled memories from the unrelated self-aspect, they recalled more negative memories in the positive mood condition than in the neutral mood condition,  $F(1, 61) = 4.05$ ,  $p < .05$ . Additionally, in the positive mood condition, participants recalled negative memories from the unrelated self-aspect more than from the related self-aspect,  $F(1, 61) = 4.03$ ,  $p < .05$ . In the neutral mood condition, they recalled a smaller number of negative memories from the unrelated self-aspect than from the related self-aspect,  $F(1, 61) = 6.94$ ,  $p < .05$ . The main effect for the covariate was also significant,  $F(1, 61) = 12.91$ ,  $p < .01$ .

None of the other effects was significant (all  $ps > .25$ ). These results suggest that mood-congruent recall occurs in the related self-aspect, while mood-incongruent recall occurs in the unrelated self-aspect.<sup>4</sup>

## EXPERIMENT 2

The results of Experiment 1 supported the hypothesis that the occurrence of mood-congruent recall or mood-incongruent recall is determined by the nature of the self-aspect from which people recall the autobiographical memories. The aim of Experiment 2 was to test this hypothesis under a negative mood state by using a similar procedure to that of Experiment 1. It was expected that participants would recall a smaller number of positive memories in the negative mood than in the neutral mood when they were asked to recall memories from the related self-aspect, whereas they would recall a larger number of positive memories in the negative mood than the neutral mood when they were asked to recall memories from the unrelated self-aspect.

In addition, Experiment 2 aimed to address several problems inherent in Experiment 1. First, ratings of positivity of the recalled memories were not obtained in Experiment 1. As such, participants may have recalled several neutral or positive memories in the main memory task in which they were asked to recall only negative memories. To address this problem, positivity ratings of the recalled memories were obtained in Experiment 2.

Second, we did not examine whether recall of autobiographical memories influenced participants' mood in the first experiment. However, retrieval of positive memories to counteract negative mood has been identified as an effective strategy for negative mood-regulation (e.g., Erber & Erber, 1994; Josephson et al., 1996), suggesting that recall of pleasant memories can alter mood and emotional state. Thus, it was expected that the more positive memories participants

4. Although the results of Experiment 1 seem to be consistent with our hypothesis, participants recalled more negative memories from the related self-aspect than from the unrelated self-aspect in the neutral mood state. These differences in the neutral-mood-state means might be responsible for the pattern of results, rather than the differences between the positive means and the neutral means. In Experiments 2 and 3, however, the results for the neutral group in the related self-aspect condition did not differ from the results for the neutral group in the unrelated self-aspect condition (see Experiments 2 and 3).

recalled, the more positive the reported mood after recalling such memories. Experiment 2 addressed this possibility.

## METHOD

### Participants

Participants were 61 Japanese undergraduate and graduate students (43 males and 18 females, mean age = 22.15,  $SD = 1.96$ ). They received a book coupon in the amount of 500 yen as compensation for their time. Data from four participants had to be discarded as one participant was aware of the purpose of the experiment and three participants did not comply with instructions. Furthermore, after the mood induction, two participants in the negative mood condition reported positive moods (see below; mood score for Time 1 > 5) and six participants in the neutral mood condition reported extremely positive moods (mood score for Time 1 > 6). Previous research pointed out that the inclusion of participants whose mood states were not successfully induced distorts the results of research on mood and memory (e.g., Taniguchi, 1991). Therefore, data from these eight participants were also discarded.

### Design

The experiment was a  $2 \times 2$  design with mood (negative and neutral) and self-aspect (related and unrelated) as the independent variables. Participants were randomly assigned to each of the four conditions.

### Mood Induction

To manipulate participants' mood, two kinds of tests were constructed. One was an extremely easy test and the other was a very difficult one. Both consisted of four anagrams and eight numerical calculations to be completed within a 5-minute limit. In the negative mood condition, participants were requested to solve the highly difficult test that they could not solve perfectly. After this difficult test, the experimenter entered the participants' responses into a computer via a keyboard, and then bogus negative feedback appeared on the screen ("the raw score = 43 and the  $T$ -score = 37.2").

The procedure for the neutral mood condition was similar to Experiment 1. The extremely easy test was administered without any feedback regarding how well participants answered the test questions.

### Memory Task

The procedure for the memory task was similar to that of the main memory task of Experiment 1, except for the opposite valence of recalled

memories and the inclusion of positivity ratings of the recalled memories. Participants were asked to recall as many positive memories related to the retrieval cue as they could for 4 minutes, and to rate each memory in terms of positivity on a scale of 1 (*extremely negative*) to 7 (*extremely positive*) after recall.

Using participants' positivity ratings of each memory, memories that were rated negative or neutral were excluded. The number of positive memories recalled by the participant served as a dependent variable.

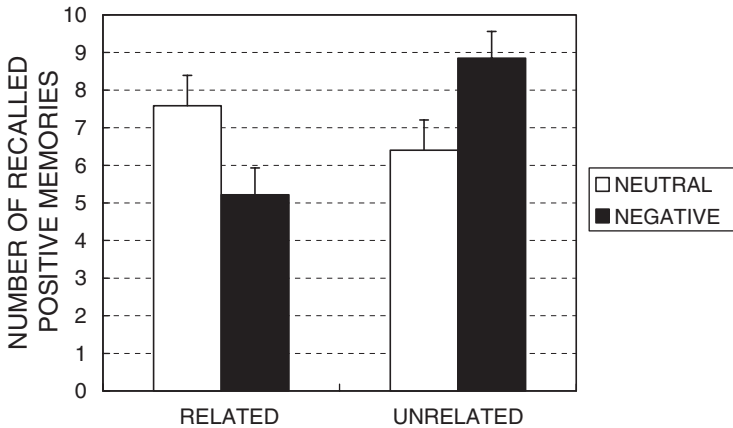
### Procedure

Participants were run on an individual basis by one experimenter. They were informed that the experiment concerned the nature of autobiographical memories recalled by university students, but that since the study was very brief they would be asked to participate in an unrelated pretest experiment prior to the study of autobiographical memory. The pretest was ostensibly designed to obtain pilot data of a newly developed academic ability test for university students. The experimenter then handed them an "Academic Ability Test for University Students." In the negative mood condition, participants took the highly difficult test and then received negative feedback. In the neutral mood condition, they took the extremely easy test and received no feedback. After participants' mood was manipulated, they received the questionnaire that included the first mood ratings. They were asked to rate their mood on six 7-point scales, which were the same items as those used in Experiment 1. This first mood check was followed by the memory task, in which participants were asked to recall as many positive memories as they could for 4 minutes and to rate each memory with respect to its positivity. Finally, participants were given the second mood rating. They were asked to rate their mood on the same six scales employed during the first mood rating. Due to time constraints, Experiment 2 did not include a baseline memory task. A careful debriefing concluded the procedure. Care was taken to eliminate residual mood effects.

## RESULTS AND DISCUSSION

### Manipulation Check

On the basis of their appropriate internal consistency (Cronbach's  $\alpha$ : the first mood ratings = .84; the second mood ratings = .77), the scores for the six items of the first mood ratings were averaged into a single mood score for Time 1. Similarly, the scores for the six items of the second mood ratings were averaged to create a single mood



**Figure 3**

Number of recalled positive memories as a function of mood condition and self-aspect condition (Experiment 2).

score for Time 2. To assess the effectiveness of the mood manipulation, the mood score for Time 1 was subjected to a 2 (self-aspect: related vs. unrelated)  $\times$  2 (mood induction: neutral vs. negative) ANOVA. This ANOVA yielded a significant main effect for mood induction,  $F(1, 44) = 77.39$ ,  $MSE = 0.54$ ,  $p < .0001$ . Participants in the negative mood condition reported less positive mood than participants in the neutral mood condition ( $M = 3.22$ ,  $SD = 0.83$  vs.  $M = 5.13$ ,  $SD = 0.61$ , respectively). Neither the main effect for self-aspect nor the interaction between mood induction and self-aspect were significant (all  $ps > .13$ ).

#### Effects of Self-Aspects on Memory

A 2 (self-aspect)  $\times$  2 (mood induction) ANOVA was conducted on the number of positive memories recalled in the memory task. This analysis yielded a significant interaction between mood induction and self-aspect,  $F(1, 45) = 9.38$ ,  $MSE = 7.45$ ,  $p < .01$ . An examination of the simple main effects revealed the following differences (Figure 3): When participants recalled autobiographical memories from the related self-aspect, they recalled significantly fewer positive memories in the negative mood condition than in the neutral mood condition,  $F(1, 45) = 4.87$ ,  $p < .05$ . In contrast, when they recalled autobiographical memories from the unrelated self-aspect, they

**Table 1**  
Multiple Regression Analyses for Recall of Pleasant Memories on the  
Following Affective States (Studies 2 and 3)

Predictor	B	SE	$\beta$	Model $R^2$
Experiment 2				
Number of positive memories	0.14	0.05	0.47**	0.22
Mood induction	0.01	0.12	0.01	
Self-aspect	0.04	0.13	0.04	
Mood induction $\times$ Self-aspect	-0.01	0.13	-0.01	
Experiment 3				
Number of positive memories	0.07	0.04	0.27*	0.09
Mood induction	0.10	0.09	0.12	
Self-aspect	0.12	0.10	0.15	
Mood induction $\times$ Self-aspect	0.02	0.10	0.02	

Note:

\*\* $p < .01$ . \* $p < .05$ .

recalled a greater number of positive memories in the negative mood condition than in the neutral mood condition,  $F(1, 45) = 4.54$ ,  $p < .05$ . In addition, in the negative mood state, participants recalled a greater number of positive memories from the unrelated self-aspect than from the related self-aspect,  $F(1, 45) = 11.93$ ,  $p < .01$ . In the neutral mood state, there was no difference in the number of positive memories between the related and the unrelated self-aspect conditions ( $p > .30$ ). Neither the main effect for self-aspect nor the main effect for mood induction was significant ( $ps > .12$ ). These results again confirm the hypothesis.

#### Effects of Recall of Positive Memories on Moods

To investigate whether recall of pleasant memories alters participants' affective state, a multiple regression analysis was conducted on the mood score for Time 2. This analysis included the independent variables of number of recalled positive memories, mood induction (1 = negative, -1 = neutral), self-aspect (1 = related, -1 = unrelated), and the interaction between mood induction and self-aspect. The mood score for Time 1 was used as a covariate. As can be seen in Table 1, the number of recalled positive memories emerged as a



significant predictor, indicating that the more positive memories participants recalled, the more positive they felt after recall.

### EXPERIMENT 3

The results of Experiments 1 and 2 are consistent with the view that mood-congruent recall occurs in the related self-aspect better than in the unrelated self-aspect, while mood-incongruent recall occurs in the unrelated self-aspect better than in the related self-aspect. However, the procedures used in these experiments may make it difficult to draw a conclusion about how moods and self-aspects influence the retrieval of autobiographical memories. In the memory task of Experiments 1 and 2, participants were asked to recall only negative memories (Experiment 1) or positive memories (Experiment 2). These explicit instructions are effective in externally enhancing participants' motivation for recalling mood-incongruent memories. Still, the tasks used in Experiments 1 and 2 are somewhat unusual in everyday life (especially during negative moods), where persons voluntarily recall mood-incongruent memories based on their motivation for mood-regulation (Parrott & Sabini, 1990; Taylor, 1991). To address this issue, Experiment 3 tested our hypothesis for negative moods by using a memory task in which recalled memories were not limited to either negative memories or positive memories.

### METHOD

#### Participants

Seventy-nine undergraduates and graduate students (38 males and 41 females, mean age = 21.15,  $SD = 1.82$ ) individually took part in the experiment in return for either course credit or a book coupon worth 500 yen. Data from two participants had to be discarded because they were aware of the purpose of the experiment. Furthermore, after the mood induction, one participant in the negative mood condition reported positive mood (mood score for Time 1 > 5), and five participants in the neutral mood condition felt extremely positive (mood score for Time 1 > 6). Data from these six participants were also discarded.

#### Design

As in Experiment 2, the experiment used a  $2 \times 2$  design, in which mood (negative vs. neutral) and self-aspect (related vs. unrelated) were

manipulated across participants. Participants were randomly assigned to one of the four conditions.

### Procedure

The instructions and procedure were similar to those described in Experiment 2, except for the memory task. In the memory task, participants were told to recall any experiences related to the retrieval cue (either “friends” or “academics”).

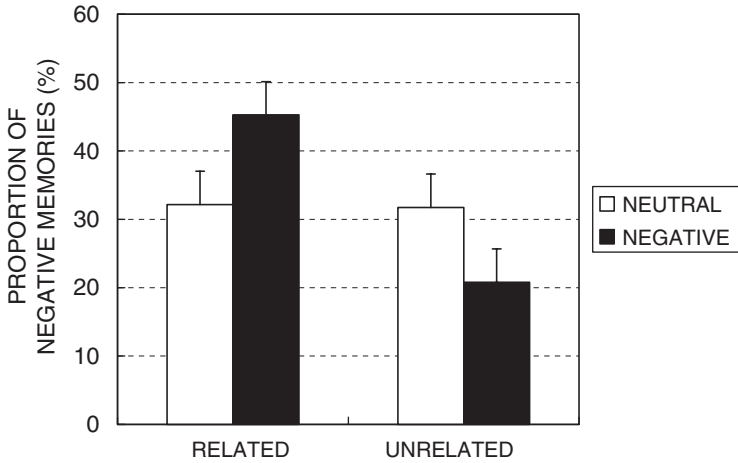
## RESULTS AND DISCUSSION

### Manipulation Check

The six mood items achieved an acceptable level of reliability (Cronbach's  $\alpha$ : the first mood ratings = .81, the second mood ratings = .64). The scores for the six items of the first mood ratings were averaged into a single mood index for Time 1. Similarly, the scores for the six items of the second mood ratings were averaged to create a single mood score for Time 2. A 2 (self-aspect: related vs. unrelated)  $\times$  2 (mood induction: neutral vs. negative) ANOVA on the mood score for Time 1 revealed a significant main effect for mood induction,  $F(1, 67) = 77.51$ ,  $MSE = 0.59$ ,  $p < .001$ . Participants in the negative mood condition were less happy than participants in the neutral mood condition ( $M = 3.37$ ,  $SD = 0.86$  vs.  $M = 4.98$ ,  $SD = 0.64$ , respectively). Neither the main effect for self-aspect, nor the interaction between mood induction and self-aspect were significant ( $ps > .20$ ).

### Effects of Self-Aspect on Memory

For each participant, the number of negative memories (which was obtained using the participant's positivity ratings of each memory) was divided by the total number of memories recalled by that participant. After the proportion scores were subjected to an inverse sine transformation, a 2 (self-aspect)  $\times$  2 (mood induction) ANOVA was conducted on this transformed score. The main effect for self-aspect was significant,  $F(1, 67) = 8.15$ ,  $MSE = 0.04$ ,  $p < .01$ . The main effect for mood induction was not significant ( $p > .95$ ). In addition, this ANOVA yielded a significant interaction between mood induction and self-concept,  $F(1, 67) = 8.45$ ,  $p < .01$ . As illustrated in Figure 4, when participants recalled memories from the related self-



**Figure 4**

Mean proportion of negative memories as a function of mood condition and self-aspect condition (Experiment 3).

aspect, they recalled a higher proportion of unpleasant memories in the negative mood condition than in the neutral mood condition,  $F(1, 67) = 4.43, p < .05$ , whereas when participants recalled memories from the unrelated self-aspect, they recalled a lower proportion of unpleasant memories in the negative mood condition than in the neutral mood condition,  $F(1, 67) = 4.03, p < .05$ . In addition, during the negative mood state, participants recalled a higher proportion of unpleasant memories from the related self-aspect than from the unrelated self-aspect,  $F(1, 67) = 17.32, p < .001$ . In contrast, during the neutral mood state, the proportion of unpleasant memories did not significantly differ between the related self-aspect condition and the unrelated self-aspect condition,  $F(1, 67) = 0.00$ . These results mirror the findings of Experiments 1 and 2 and once again confirm that mood-congruent recall tends to occur in the related self-aspect to a greater extent than in the unrelated self-aspect, while mood-incongruent recall tends to occur in the unrelated self-aspect to a greater extent than in the related self-aspect.

#### Effects of Recall of Positive Memories on Moods

To investigate whether the retrieval of positive memories influences participants' emotional states, a multiple regression analysis was

conducted on the mood score for Time 2, using as predictors the number of recalled positive memories, mood induction (1 = negative, -1 = neutral), self-aspect (1 = related, -1 = unrelated), and the interaction between mood induction and self-aspect. The mood score for Time 1 was used as a covariate. As can be seen in Table 1, the number of recalled positive memories emerged as a significant predictor. Consistent with the results of Experiment 2, this result indicates that the greater number of positive memories participants recalled, the happier they felt following recall.

### GENERAL DISCUSSION

In three experiments, the present study revealed that the self-aspects relevant to the elicitors of mood tended to produce mood-congruent recall, while the self-aspects irrelevant to the elicitors of mood tended to produce mood-incongruent recall. Thus, the occurrence of mood-congruent or mood-incongruent recall depends on the nature of the self-aspects from which persons recall their experiences. Furthermore, Experiments 2 and 3 found that the more positive memories persons recalled, the more positive moods they reported after recalling. These results support the view that retrieval of positive memories is one effective strategy for negative mood regulation (e.g., Josephson et al., 1996).

However, some questions remain. One question concerns the self-aspects used in the present study. The present study examined the effects of self-aspects on mood-congruent and mood-incongruent recall using the self-aspect for “academics” as the related self-aspect and the self-aspect for “friends” as the unrelated self-aspect. It is possible that the self-aspect for “academics” might produce mood-congruent recall more strongly than the self-aspect for “friends,” which therefore might be responsible for the pattern of results.

However, there are several reasons why we think this is not the case. First, previous research showed that mood-congruent recall and mood-incongruent recall occur regardless of whether persons recall memories associated with “academics” or with “friends” (e.g., Smith & Petty, 1995). For example, Sakaki (2006) found that participants recalled mood-incongruent memories associated with “academics” (39%) as frequently as those associated with “friends” (38%), after a negative mood was induced using a sad movie that depicted the death of a young boy’s mother.

Second, McFarland and Buehler (1998) showed a symmetric pattern for recall associated with “friends” and “academics.” The authors examined the effects of self-focused attention on mood-congruent and mood-incongruent recall. When participants’ negative moods were induced by recalling sad events that were socially oriented (e.g., conflicts with friends), negative mood and self-focused attention influenced recall of events concerning “friends,” whereas neither negative mood nor self-focused attention influenced recall of events concerning “academics” (Experiment 3). However, when participants’ negative moods were induced using a performance-feedback procedure, the opposite pattern was observed (Experiment 4). Negative mood and self-focused attention influenced autobiographical memories concerning “academics,” whereas neither negative mood nor self-focused attention influenced autobiographical memories concerning “friends.” Thus, the effects of moods on recall of autobiographical memories seem to be determined by whether persons recall memories from a related self-aspect or from an unrelated self-aspect, rather than whether they recall memories from the self-aspect for “friends” or for “academics.”

Some might feel that the present study is limited with regard to the mood induction procedure. In the present study, the experiment was conducted using one mood induction procedure, the manipulated performance feedback procedure. Although this procedure enables us to induce strongly self-relevant moods (e.g., McFarland & Buehler, 1997) and to specify which of participants’ self-aspects is the related self-aspect, this method might influence not only participants’ affective states but also their thoughts or motivations (e.g., Forgas & Ciarrochi, 2002). However, previous research in which participants’ moods were manipulated by exposure to either a sad or a happy video revealed that individual differences in the number of the unrelated self-aspects have an effect on mood-incongruent recall (Sakaki, 2006). This suggests that the results of the present study can be replicated using different mood induction procedures, and therefore utilization of the present mood induction procedure does not make our results less generalizable. In conclusion, we believe that the present study provides reasonable evidence that the nature of the self-aspects from which persons recall autobiographical memories determines whether mood-congruent or mood-incongruent recall is more likely to occur.

### IMPLICATIONS FOR MOOD AND MEMORY LITERATURE

Mood-congruent recall has been considered to cause negative impact on persons' everyday lives. For example, it has been suggested that mood-congruent recall in negative mood contributes not only to severe negative mood or depression (Blaney, 1986), but also to negative spirals in negotiations, which impairs the ability of negotiators to reach integrative solutions (George, Jones, & Gonzalez, 1998). On the other hand, mood-incongruent recall has been considered to be effective in mitigating serious negative moods (e.g., Erber & Erber, 1994; Joormann & Siemer, 2004; Josephson et al., 1996) and destructive negative spirals in negotiations (e.g., George et al., 1998) because it can interrupt the vicious cycle between negative mood and negative memories. Thus, the factor for discriminating between the occurrence of mood-congruent recall and mood-incongruent recall is an important issue in the literature of mood and memory.

Previous research has considered that the motivation for mood regulation determines the occurrence of mood-congruent recall and mood-incongruent recall (e.g. Parrott & Sabini, 1990; see Forgas, 1995, for a review). Much research where participants' motivation for mood regulation was manipulated by situational demands (e.g., cognitively taxing tasks; Erber & Erber, 1994), the passage of time (e.g., Forgas & Ciarrochi, 2002), and affect acknowledgment (e.g., McFarland & Buehler, 1997) showed that persons tended to recall mood-incongruent experiences when they were motivated to modify their mood, but they tended to recall mood-congruent experiences when they were not motivated to alleviate their mood. It was also found that personality traits related to the motivation for mood regulation predicted the occurrence of mood-incongruent recall (e.g., Joorman & Siemer, 2004; Josephson et al., 1996; McFarland & Buehler, 1998; Rusting & DeHart, 2002; Smith & Petty, 1995).

Motivation for mood regulation alone cannot explain the results of the present study, however. The related self-aspect condition did not differ from the unrelated self-aspect condition in situational demands or the passage of time. Also, it is unlikely that there are differences between the related self-aspect condition and the unrelated self-aspect condition in participants' ability to acknowledge their mood or motivation for mood regulation, because they were randomly assigned to the conditions. The only difference between the

conditions that produced mood-congruent recall and those that produced mood-incongruent recall was whether participants recalled memories from the related self-aspect or from the unrelated self-aspect. This suggests that whether mood-congruent or mood-incongruent recall is more likely to occur depends not only on motivational factors but also on cognitive factors such as the focus of self-knowledge (see also Kunda, 1990). Future research is needed to distinguish between the contributions of motivation for mood-regulation and the focus of self-knowledge.

### **IMPLICATIONS FOR SELF-KNOWLEDGE LITERATURE**

The present results are relevant to research on self-knowledge. First, our findings hold important implications for research on self-complexity (Koch & Shepperd, 2004). Self-complexity refers to the individual differences in the degree of differentiation of self-knowledge (Linville, 1985, 1987). More specifically, persons with high self-complexity are considered to have many self-aspects with a high level of differentiation, and persons with low self-complexity are considered to have few self-aspects with large overlap. Previous research showed that high self-complexity serves as a buffer against the impact of negative events, while low self-complexity is related to affective extremity and depression (e.g., Campbell, Chew, & Scratchley, 1991; Dixon & Baumeister, 1991; Linville, 1985, 1987, but see Campbell, Assanand, & Di Paula, 2003; Rafaeli-Mor & Steinberg, 2002).

The results of the present study offer possible mechanisms that underlie the stress-buffering effects of self-complexity. When a stressful event occurs, it would affect the self-aspect most pertinent to the stressor (i.e., the related self-aspect). For persons with high self-complexity, this affected self-aspect would be one of many aspects, and a large number of their self-aspects would be unaffected by the stressor (i.e., unrelated self-aspects), which would enable them to recall mood-incongruent memories. Thus, persons with high self-complexity would be expected to recall positive memories during negative moods, resulting in improved mood. On the other hand, the self-aspect affected by negative emotions would account for a greater proportion of the total self-knowledge in persons with low self-complexity, which poses difficulty in recalling mood-incongruent materials during negative moods. Thus, persons with low self-complexity would be expected to recall many mood-congruent memories in

negative moods, which could result in serious negative mood or depression. Consistent with this account, recent research demonstrated that persons with high self-complexity tend to recall mood-incongruent memories, while persons with low self-complexity tend to recall mood-congruent memories (Sakaki, 2004).

Second, the results of the present study are consistent with the findings of research on self-affirmation theory. Self-affirmation theory posits that a threat to a specific self-aspect can be overcome by affirmation of different aspects of the self-concept from the threatened aspect (e.g., Steele, 1988; Steele & Liu, 1983). Researchers, then, found that positive self-attributes relevant to a threat increase one's discomfort because it brings to mind the elicitor of the threat, while positive self-attributes irrelevant to the threat can effectively reduce their discomfort (e.g., Aronson, Blanton, & Cooper, 1995; Blanton, Cooper, Skurnik, & Aronson, 1997; see Stone & Cooper, 2001, for a review). The results of the present study, which indicate that persons can access positive attributes irrelevant to the threat more easily than positive attributes relevant to the threat, seem to provide new evidence supporting the view that a threat to a specific self-aspect can be more effectively overcome by positive attributes irrelevant to the threat than those relevant to the threat.

### **IMPLICATIONS FOR THE EMOTION REGULATION LITERATURE**

Our results also contribute to a growing literature of emotion regulation (Larsen & Vohs, 2004). Previous research showed that persons can reduce their unpleasant emotional states by shifting their attention from the source of distress to positive materials (e.g., Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Nolen-Hoeksema & Morrow, 1991; Wenzlaff et al., 1988). However, it was revealed that it is difficult to access positive materials during negative mood (Joormann & Siemer, 2004; Wenzlaff et al., 1988) because negative mood automatically produces a heightened accessibility of negative materials (e.g., Bower, 1981). This raises the following question: How can we access positive materials to alleviate negative moods? The present study provides an answer to this question. That is, the results of the present study suggest that recall of autobiographical memories from unrelated self-aspects is one effective strategy for accessing positive information during negative moods.



### ASSIMILATION AND CONTRAST EFFECT

Mood-congruent recall and mood-incongruent recall are relevant to the social psychological literature on assimilation and contrast effects (DeCoster & Claypool, 2004; Mussweiler, 2003). In this literature, many researchers have found a pattern that is similar to mood-congruent recall: Persons' reactions to targets are sometimes biased toward the preceding contexts, which is the assimilation effect. However, the opposite pattern has also been found. Similar to mood-incongruent recall, persons' reactions to targets are biased away from the preceding contexts. This has been referred to as the contrast effect.

Researchers have found that the occurrence of assimilation and contrast effects are determined by the similarity between the target and the preceding context (see DeCoster & Claypool, 2004; Mussweiler, 2003, for reviews). The assimilation effect is stronger when the target and the context share a similarity than when they are dissimilar (e.g., McFarland, Buehler, & MacKay, 2001). However, the contrast effect occurs more strongly when the target and the context are dissimilar than when they are similar (e.g., Brown, Novick, Lord, & Richards, 1992). These results are compatible with our findings that the occurrence of mood-congruent recall and mood-incongruent recall is determined by the similarity between the prior mood-eliciting situation and the self-aspect from which person recalls autobiographical memories. This raises the possibility that the generation of mood-congruent or mood-incongruent memories shares an underlying mechanism with the occurrence of the assimilation and contrast effects (cf. Petty, Desteno, & Rucker, 2001).

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