

Mood congruence in childhood and recent autobiographical memory

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To improve upon previous methodology, participants in musically induced happy, sad, or neutral moods were asked to recall childhood and recent autobiographical memories in response to pleasant, unpleasant, and neutral word cues. Symmetrical mood-congruent memory effects were observed when events were rated from the perspective of when they actually occurred (i.e., *then*), because memories rated as being unpleasant *then* tended to be rated as more pleasant *now*. Finally, pleasant and unpleasant cue words facilitated retrieval of childhood memories more than did neutral cues. These findings suggest that symmetrical mood congruence can be observed when accounting for such factors as the valence of retrieval cues and the perspective from which experiences are rated, given that memories appear to undergo change in affective labelling.

Among the many effects of emotion on memory is the phenomenon of mood-congruent retrieval: Memory is best for events whose emotional connotations match the mood of the person at the time of retrieval (Kihlstrom, Eich, Sandbrand, & Tobias, 2000).¹ Mood congruence in autobiographical memory recall has received much attention because personal events tend to be affectively

¹Mood-congruent memory differs from mood-dependent memory, which refers to the phenomenon that occurs when a person's emotional state serves as the context that becomes associated with an event, such that something learned while in a particular mood is best retrieved when the mood is experienced again (see Eich, 1995).

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charged. In clinical practice, mood congruence has been of interest because it raises the possibility that depressed patients' recollections might be biased by their prevailing moods.

In an early study of mood-congruent memory, Bower (1981) found that when individuals were asked to record experiences from their lives in a diary and later asked to recall those events, the affective valence of the experiences they recalled tended to be congruent with their mood at the time of recall. In addition, individuals who were asked to recall unrelated incidents from childhood recalled more pleasant experiences while in happy moods and, to a lesser degree recalled more unpleasant experiences while in sad moods. Bower suggested that because emotion was a feature of these memories, emotional state might serve as an additional retrieval cue facilitating access to them.

Since Bower's original study, a number of investigations have explored mood-congruent memory, manipulating moods with a variety of techniques including hypnosis (e.g., MacCallum, McConkey, Bryant, & Barnier, 2000; Natale & Hantas, 1982), the Velten (1968) technique (e.g., Teasdale & Fogarty, 1979), videotapes (e.g., Josephson, Singer, & Salovey, 1996), or music (e.g., Parrot & Sabini, 1990; Macaulay & Eich, 1996). Several studies have found that people who experience temporarily induced happy moods recall more positive events and fewer negative events than people in sad moods (e.g., Bullington, 1990; Laird, Cuniff, Sheehan, Shulman, & Strum, 1989; Madigan & Bollenbach, 1982; Natale & Hantas, 1982; Salovey & Singer, 1989). Others have found that when people are in sad moods, they recall fewer pleasant memories than people in happy moods (e.g., Natale & Hantas, 1982). However, only few have found that sad moods actually increase the recall of unpleasant events (see Blaney, 1986; Brewin, Andrews, & Gotlib, 1993; Singer & Salovey, 1988).

The asymmetry in mood congruence effects may be a consequence of spontaneous decreases in affective intensity over time, which are greater for unpleasant than for pleasant memories (Holmes, 1970; Walker, Vogl, & Thompson, 1997). Alternatively, the affective valence of memories for unpleasant memories may be altered through mood regulation (Erber, 1996; Parrot & Sabini, 1990), or mood-repair (Isen, 1985; Singer & Salovey, 1996) strategies (Josephson et al., 1996; McFarland & Buehler, 1998; Rusting & DeHart, 2000). If negative memories lose their affective tone, or people recode negative memories as neutral, or even positive, then negative moods will no longer help to retrieve them.

It has also been suggested that mood congruence only occurs in the recall of recent memories but not in the recall of childhood memories. Using a free recall task of five childhood and five recent memories, Salovey and Singer (1989) found weaker mood congruence for childhood memories than for recent memories, particularly when individuals were in temporarily induced sad moods. The number of happy childhood memories recalled by people in happy moods was greater than the number of sad childhood memories people recalled while in sad

moods. Of course, childhood memories, being associated with longer retention intervals, have had more opportunity to lose their emotional valence over time, or to undergo alteration as a result of the strategic self-regulation of mood. Memories of childhood may also consist of a set of well-rehearsed memories that are less subject to variations in retrieval cues (Brewin et al., 1993).

The present study sought to address the question of mood-congruency for positive and negative childhood memories with a method that provided for more systematic sampling of remote and recent memories. The methodology used improves upon previous work by combining several methodologies to aid in memory retrieval: (1) using music as a primary method of mood induction; (2) using cues (rather than free recall) to aid in memory retrieval; (3) providing anchor points for what constitutes a childhood vs. a recent memory; (4) recording response latency as a measure of memory accessibility; and (5) obtaining ratings of how individuals perceive their memories at the time of recall, vs. when they actually occurred.

In the study, participants underwent a musical mood induction procedure, and then were asked to recall personal experiences in response to cues of differing affective valences—a variation and modification of procedures used in prior work (e.g., Lloyd & Lishman, 1975; Macaulay & Eich, 1996; Salovey & Singer, 1989; Williams, 1992). Music was selected as the form of mood induction in order to reduce the possibility of a nonemotional priming confound, as it contains no obvious visual or semantic content (Niedenthal & Halberstadt, 2000). Autobiographical memory was more systematically sampled by randomly assigning these cues to childhood or recent periods in the participants' lives (Chew, 1979; see also Kihlstrom et al., 1988). In order to track changes in the affective valences of the memories over time (and thus obtain information about how memory retrieval might be affected by affect regulation), participants rated how they perceived the events they recalled *now* and also from the perspective of when the events actually occurred (Holmes, 1970; Yang & Rehm, 1993). As an additional measure of mood-congruency, we recorded response latencies in the cued-recall task (Clark & Teasdale, 1982; Lloyd & Lishman, 1975; MacLeod, Andersen, & Davies, 1994; Teasdale & Fogarty, 1979; Teasdale & Taylor, 1981).

We hypothesised that mood congruence would be obtained in both the happy and sad mood conditions, regardless of the epoch from which the memories were drawn. This effect would be reflected by faster reaction times when the pleasantness of participants' moods matched the pleasantness of the cues used to retrieve the memories, and also in participants' ratings of the pleasantness of their memories. We also predicted separate effects of mood and cue valence on memory pleasantness. That is, we expected that participants in happy moods would recall more pleasant childhood and recent memories, compared to individuals in the neutral condition and to those in the sad condition, and that individuals in sad moods would recall more unpleasant childhood and recent

events, compared to those in the neutral and happy conditions. Furthermore, individuals would recall pleasant events in response to pleasant cue words and unpleasant events in response to unpleasant cue words.

METHOD

Participants

A total of 86 undergraduates and graduate students (58 female, 29 male), ranging in age from 17 to 35 ($M = 19.8$, $SD = 2.6$) from Yale University participated in this experiment for pay or for course credit. Participants were assigned to one of three mood conditions—happy, neutral, or sad.

Materials

Music for the mood inductions included pieces used in previous studies of mood and memory (Macaulay & Eich, 1996), supplemented by additional pieces selected by the authors (see Appendix A). Each selection was repeated once to yield a 90 minute cassette tape for each mood condition.

Two lists of 15 words each (a total of 30 words) were constructed from items selected from standard norms derived from college students' ratings of a large number and variety of words (Toglia & Battig, 1978). For each list, five positive items were chosen from the top third of the pleasantness distribution, five neutral items were chosen from the middle third, and five negative items were chosen from the bottom third (see Appendix B). Cue words were closely matched for concreteness and frequency of use both within and between lists.

Procedure

Participants were randomly assigned to one of three mood conditions (happy, neutral, or sad). After giving informed consent, participants reported their current mood on Macaulay and Eich's (1996) adaptation of Russell's Affect Grid (Russell, Weiss, & Mendelsohn, 1989), which measures pleasure and arousal as orthogonal dimensions. The affect dimension ranged from -4 , "extremely unpleasant," indicative of being in a very sad mood, to $+4$, "extremely pleasant", indicative of being in a very happy mood. There was a similar 9-point scale of arousal, which was not considered further in this study. Participants were asked to mark the "0" box in the middle of the grid if they felt perfectly neutral (i.e., neither happy nor sad).

Next, participants listened to one of three types of musical selections on a tape player—happy, neutral, or sad—and were asked to try to become as happy, neutral, or sad, respectively, as possible. After listening to music for 10 minutes, they reported their moods once again on the affect grid, and again every 5 minutes until they reached the criterion for proceeding with the experiment. The criterion mood for the positive and negative conditions were pleasure ratings of

+2 or above and -2 or below, respectively. Individuals in the neutral condition who reported neutral moods on the first rating did not receive a mood induction (no participant qualified for the happy or sad mood conditions without some exposure to the induction).

Participants in the happy and sad mood conditions were given the option to "doodle" with crayons on a blank sheet of white paper, so that they would not become bored as they listened to the music. Once participants developed the appropriate mood, the experimenter lowered the volume of the music (but allowed it to play until individuals completed the memory task) and asked them to sit at the computer and to read the instructions on the monitor. The experimenter explained the instructions verbally and went through two practice trials with the participants.

Stimuli were randomly presented, and responses collected, on a Macintosh computer running RSVP ("Rapid Serial Visual Presentation") software (Williams & Tarr, n.d.). Participants were asked to recall the first specific event that they remembered was associated with each cue. If the cue was preceded by the word "remote", they were asked to recall an event from their lives that occurred between kindergarten and fifth grade, or the equivalent (this period was chosen to take account of normal infantile and childhood amnesia; see Kihlstrom & Harackiewicz, 1982). If the cue was preceded by the word "recent", they were told to recall an event from the beginning of high school until the present moment, excluding anything that had occurred during the experiment. As soon as he or she recalled the event, each participant was asked to press a key on the keyboard and then to summarise the event in one or two sentences. The experimenter wrote the gist of the memory and told the person when to continue. Reaction times to the recall of the events were recorded by the computer from the time of presentation of the cue words to the time when participants pressed a key on the computer keyboard to indicate that they had recalled an event. The two stimulus lists were counterbalanced so that half of the people received the 15 items from one list as "remote" cues and the 15 items from the second list as "recent" cues, while the other half received remote and recent cues from the opposite lists.

At the conclusion of the memory task, the music was turned off, and participants were asked to complete a *Music Rating* form, which asked them to report to what extent the musical selections helped them to achieve the moods to which they were assigned on a Likert scale that ranged from 1 ("very slightly or not at all") to 5 ("extremely"). They also rated the events that they recalled on a nine-point scale ranging from -4 ("very unpleasant") to 4 ("very pleasant"). Each event was rated twice, according to how the participant experienced it at the time that the event actually occurred ("Then") and how he or she remembered it at the time of rating ("Now"). Participants then completed a post-experimental questionnaire, during which individuals who participated in the sad mood induction listened to happy music to ensure that their moods when they

left the experiment would be no worse than when they arrived. Finally, all participants were debriefed by the experimenter and received a printed copy of the debriefing.

RESULTS

The data for 16 individuals were excluded from the analyses: 11 because they did not develop the mood required for the condition to which they were assigned (2 in the positive condition, 3 in the neutral condition, and 6 in the negative condition), and 5 because of computer errors in recording reaction times (3 positive, 1 neutral, and 1 negative). This left a total of 72 participants—24 assigned to each mood condition.

Manipulation checks

Mood check. There was a statistically significant difference among the conditions in ratings of initial mood, $F(2, 69) = 3.58, p < .05$, with participants in the happy condition reporting more positive starting mood ($M = 1.50, SD = 1.50$) than those in the neutral ($M = 0.54, SD = 1.56$) and sad ($M = 0.33, SD = 1.76$) conditions, respectively (Tukey's *LSDs* significant at $p < .05$), although there was no difference between the neutral and sad groups in initial mood. The mean pleasure ratings after mood induction for included participants were 2.63 ($SD = 0.71$) in the happy condition, 0.33 ($SD = 0.87$) in the neutral condition, and -2.21 ($SD = 0.51$) in the negative mood condition, $F(2, 69) = 277.24, p < .001$ (all *LSDs* significant at $p < .001$). On average, participants who reached positive mood states did so in 15 min. Participants in the neutral condition reached their criterion moods, on average, in 11 min, and those in the sad condition took approximately 17 min. There were no significant differences between groups in initial levels of arousal, nor in levels of arousal after mood induction (all *ps* n.s.), although participants who received the happy mood induction reported slightly higher arousal ($M = -0.04, SD = 1.43$) than individuals in the neutral ($M = -0.50, SD = 1.69$) and sad ($M = -0.92, SD = 1.61$) groups. Individuals in all three conditions indicated that the music was moderately effective in helping them to maintain their moods ($M_1 = 2.67, M_2 = 3.08, M_3 = 3.30$, respectively).

Cue word counterbalancing. Because the two lists of cue words were matched for frequency, concreteness, and pleasantness, it was not surprising that there was no difference between them in terms of either response latency or the pleasantness ratings given to the memories they elicited.

Response rate. Of the 2160 memories collected, 19 (0.9%) were considered invalid trials and were excluded from subsequent analyses. In 6 cases, the participants could not think of events associated with the cue words presented to them. The remaining 13 were cases in which participants made other errors, such

as forgetting to press a key before reporting the events or misinterpreting instructions.

Memory pleasantness

Ratings of pleasantness "now". Figures 1a and 1b show the mean pleasantness ratings for memories retrieved in the childhood and recent conditions. A $3 \times 3 \times 2$ mixed-design analysis of variance (ANOVA) with one between-subjects variable (mood: happy, neutral, and sad) and two within-subjects variables (cue valence: positive, neutral, and negative; temporal epoch: childhood and recent) yielded statistically significant main effects of all three factors: mood, $F(2, 69) = 9.28, p < .001$; cue valence, $F(2, 138) = 95.20, p < .001$; and temporal epoch, $F(1, 69) = 5.35, p < .05$. Interestingly, childhood memories were more pleasant than recent memories. Overall, as expected, memories retrieved in a happy mood were rated as more pleasant ($M = 0.82$) than those retrieved in a neutral mood ($M = 0.46$) and in a sad mood: $M = 0.18$; Contrasts: $t_1(69) = 2.45, p < .05$; $t_2(69) = 4.29, p < .01$, respectively. Similarly, memories retrieved in response to positive cues were rated as more pleasant ($M = 1.13$) than those retrieved in response to neutral cues ($M = 0.60$) and as less unpleasant than events recalled in response to negative cues: $M = -0.27$; Contrasts: $t_1(69) = 6.09, p < .001$; $t_2(69) = 12.22, p < .001$, respectively. Note, however, that by and large memories retrieved in negative moods were not actually unpleasant (i.e., their average pleasantness rating was > 0); they were just less pleasant than those retrieved in positive or neutral moods. The emotional valence of the retrieval cue was much more powerful than mood state as a determinant of the emotional valence of the participants' memories. While we had predicted that mood congruence would be greatest when participants' moods matched the valence of the word cues used to retrieve their memories, no reliable interactions were found in these data.

Ratings of pleasantness "then". A similar pattern of results was obtained when participants re-rated their memories according to the affective valence of the events at the time when they actually occurred (see Figures 2a and 2b). However, only two main effects were statistically significant: mood, $F(2, 69) = 8.36, p < .01$; and cue valence: $F(2, 138) = 115.50, p < .001$. The main effect of temporal epoch was not statistically reliable, $F(1, 69) = 0.11, p = .74$. As before, participants who recalled experiences while in a happy mood rated their memories as being more pleasant ($M = 0.30$) than did those in a neutral mood ($M = 0.09$) and sad mood: $M = -0.43$; Contrasts: $t_1(69) = 2.15, p < .05$; $t_2(69) = 4.09, p < .01$, respectively. In addition, memories retrieved in response to pleasant cues were rated more positively ($M = 0.87$) than were memories retrieved in response to neutral cues ($M = 0.11$) and as less unpleasant than experiences recalled in response to unpleasant cues: $M = -1.20$; Contrasts:

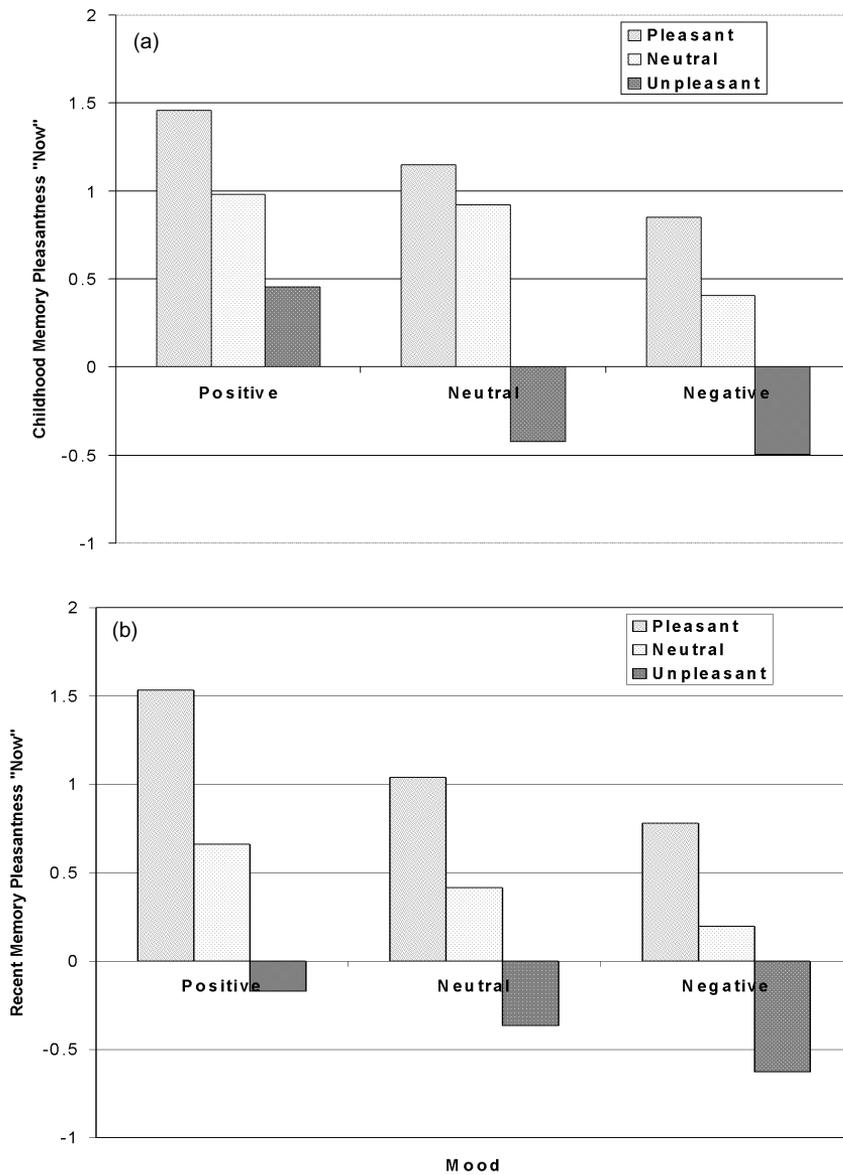


Figure 1. (a) Mean pleasantness ratings for childhood memories from “Now” perspective (i.e., at the time of experiment), by mood and cue valence. (b) Mean pleasantness ratings for recent memories from “Now” perspective (i.e., at the time of experiment), by mood and cue valence.

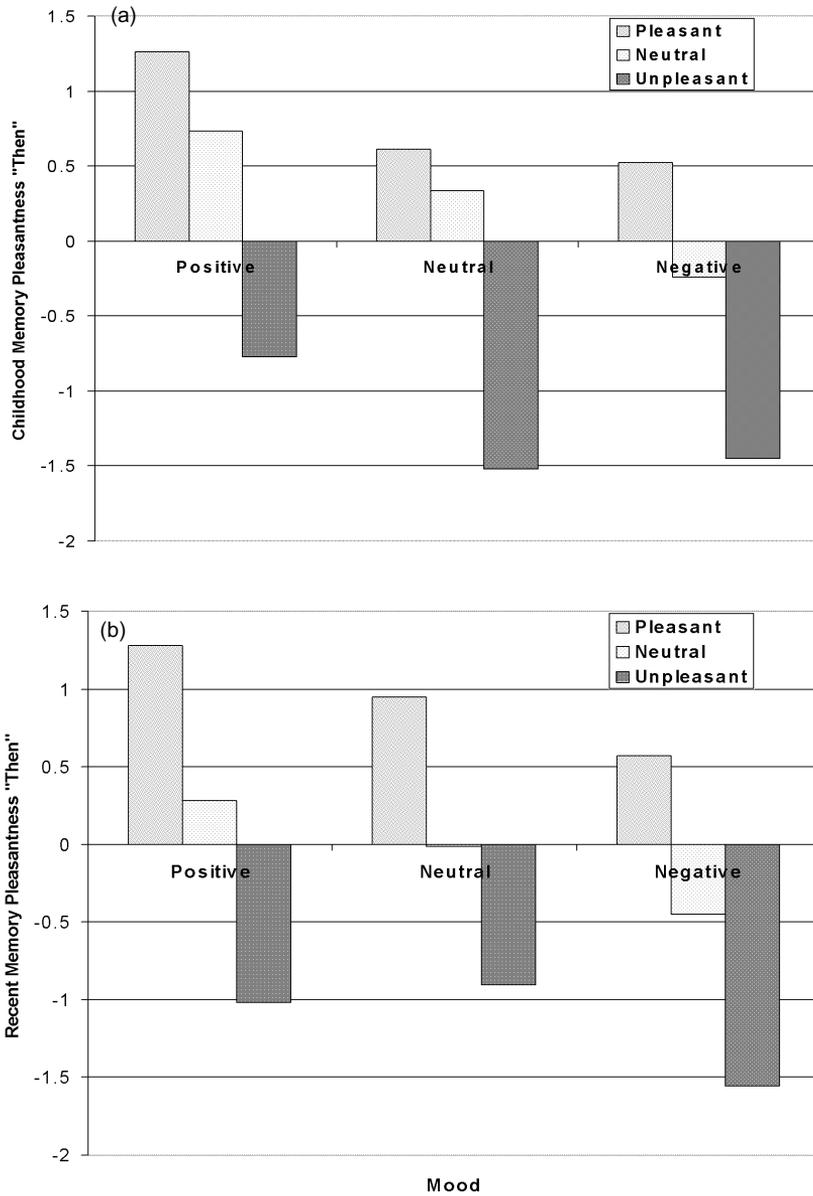


Figure 2. (a) Mean pleasantness ratings for childhood memories from “Then” perspective (i.e., at the time that they occurred), by mood and cue valence. (b) Mean pleasantness ratings for recent memories from “Then” perspective (i.e., at the time that they occurred), by mood and cue valence.

$t_1(69) = 5.47, p < .01$; $t_2(69) = 13.53, p < .01$, respectively. Mood congruence was more symmetrical in this case, as autobiographical memories recalled in a sad mood were rated, on average, as being unpleasant at the time that they actually occurred (i.e., the average rating was below 0).²

For the record, a $3 \times 3 \times 2 \times 2$ mixed-design ANOVA, with rating perspective (now vs. then) added as a within-subjects factor, revealed a statistically significant main effect for perspective, $F(1, 69) = 79.43, p < .001$. In general, the affect associated with all memories was rated as more pleasant *now* than *then*. There was also a significant interaction between cue valence and rating perspective, $F(2, 138) = 22.97, p < .01$. Participants who recalled events in response to unpleasant cues rated their memories as less unpleasant (or as more pleasant) *now* ($M = -0.27$) than *then* ($M = -1.20$), compared to participants who recalled memories that were cued by pleasant or neutral words: Contrasts: $t_1(69) = 6.22, p < .001$; $t_2(69) = 5.00, p < .001$, respectively.

Response latency

A $3 \times 3 \times 2$ (mood: positive, neutral, and negative \times cue valence: positive, neutral, and negative \times temporal epoch: childhood and recent) mixed-design ANOVA was conducted to test the hypothesis that reactions times would be faster when participants' moods matched the valence of the cues used to retrieve memories. The only reliable main effect to emerge was that of temporal epoch, $F(1, 69) = 12.18, p < .01$, with the mean reaction time to the retrieval of childhood memories being slower than the reaction time to the retrieval of recent events (see Figures 3a and 3b).

This main effect was qualified by a cue valence \times temporal epoch interaction, $F(2, 138) = 5.85, p < .01$. Reaction time to the retrieval of experiences associated with neutral cue words accounted for the majority of the difference in response latency to childhood and recent memories, since childhood memories in response to neutral cues were retrieved more slowly, overall than were recent memories, $t(71) = 4.43, p < .001$. Childhood memories were also retrieved more slowly than recent memories in response to unpleasant cues, $t(71) = 2.63, p < .05$. There was no difference, however, in the retrieval of childhood and recent memories in response to positive cues, $t(71) = 0.61, p = ns$. Interestingly, childhood memories were recalled more quickly in response to pleasant and unpleasant cues than to neutral cues: Contrasts: $t_1(71) = 3.67, p < .001$; $t_2(71) = 1.93, p < .06$, respectively, suggesting that the emotional valence of the word cues provided more information for aid in memory retrieval than did the neutral cues.

² That the mean pleasantness rating for memories recalled in a sad mood was -0.43 on a scale of -4 to $+4$ suggests that these memories were, in fact, neutral in tone, rather than unpleasant. However, this should be viewed in the light of the fact that the mood states to which participants were assigned were quite temporary in nature and likely difficult to sustain.

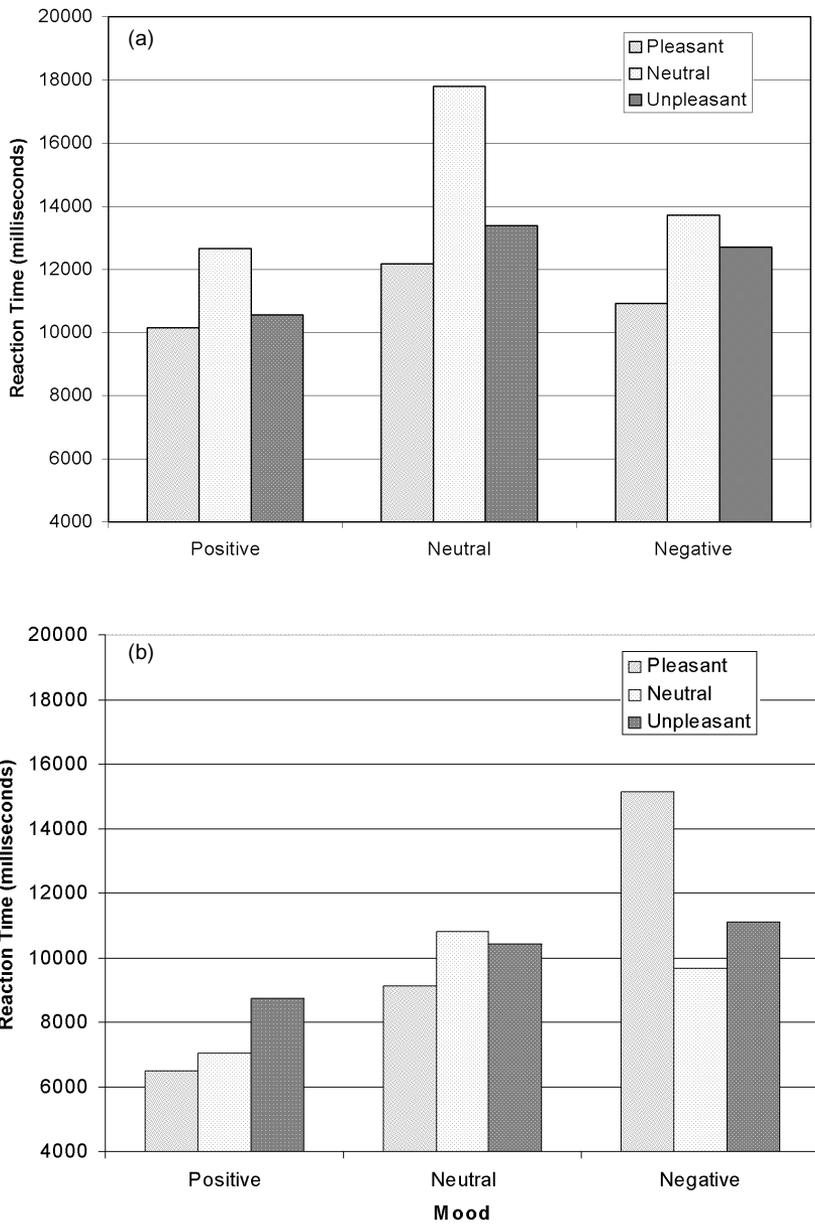


Figure 3. (a) Mean reaction time (ms) for childhood memories, by mood and cue valence. (b) Mean reaction time (ms) for recent memories, by mood and cue valence.

DISCUSSION

The main question addressed in this study was whether individuals would show symmetrical mood-congruent memory retrieval, regardless of whether the events remembered occurred recently or in childhood. The answer is a qualified “yes”. Throughout the experiment, mood moderated the effects of retrieval cues, such that memories retrieved by happy participants in response to negative cues were less unpleasant than those retrieved by sad participants; and memories retrieved by sad participants in response to positive cues were less pleasant than those retrieved by happy participants. The most pleasant memories were retrieved by participants in a happy mood responding to positive retrieval cues, while the most unpleasant memories were retrieved by participants in a sad mood responding to negative cues. Furthermore, the memories in the latter category were genuinely unpleasant, not merely less pleasant. In these respects, the present study confirms previous findings that, in general, people in happy moods favor the recall of pleasant events more than do people in sad moods (Bower, 1981; Bullington, 1990). In contrast to the findings of Salovey and Singer (1989), a similar pattern of effects was found for childhood memories as for recent memories.

However, the effects of mood on memory were not entirely symmetrical. In the first place, the memories retrieved in the sad-negative condition were not as *unpleasant* as those retrieved in the happy-positive condition were *pleasant*. Of course, on the assumption that the unpleasant things that happened to our participants were not, on average, all that unpleasant, this pattern of results may simply be a reflection of the pool of memories available for recall. Another element of asymmetry emerged in the comparison of temporal epochs. Whereas recent events retrieved in the happy-negative condition were at least slightly unpleasant, childhood events retrieved from this same condition were actually rated as somewhat pleasant. Otherwise, mood appeared to influence the retrieval of childhood and recent events to a similar degree. On the other hand, there may be other explanations for this asymmetry—such as the possibility that the processes involved in the retrieval of positive versus negative memories may not, in fact, be equivalent.

Although mood may influence the pleasantness of the events a person remembers, the reaction-time data gathered in this study only partially support the hypothesis of mood-congruency. Memory retrieval was somewhat facilitated when individuals in happy moods recalled memories in response to positive cues, but individuals in sad moods did not recall memories more quickly in response to negative cues. The most salient finding was that the retrieval of childhood memories takes longer than the retrieval of recent events, confirming earlier results reported by Chew in an experiment that varied the imagery values, but not the emotional valences, of the retrieval (1979; Kihlstrom et al., 1988). Taken together, these results are consistent with the notion that the search for

autobiographical memory begins with recent events and proceeds backwards, although other explanations are, of course, possible. For present purposes, however, this result reassures us that our participants did not favour childhood memories that were highly accessible by virtue of frequent, stereotyped rehearsal (Brewin et al., 1993; Salovey & Singer, 1989).

Comparing the two ratings of memory pleasantness, we found that positive events were rated as less pleasant and negative events as more unpleasant, ‘‘then’’ as opposed to ‘‘now’’. Thus, the changes in rated pleasantness are not merely an artifact of regression to the mean. Perhaps memories naturally become more pleasant, and less unpleasant, over time.³ Alternatively, this re-evaluation of personal experiences may be a way in which individuals attempt to regulate their moods in order to enhance the experience of positive affect, and minimise the experience of negative affect (Erber, 1996; Parrot & Sabini, 1990; Rusting & DeHart, 2000; Singer & Salovey, 1996; Walker et al., 1997).

It is important to consider how the method of obtaining memory reports may have influenced memory retrieval. In this study, memories were recounted to an experimenter who had not previously remained in the room during the mood induction (and who was not in the room when participants later rated their memories). Participants may have been reluctant to recall memories that were too negative in the presence of an unknown person, perhaps due to self-presentation concerns and a motivation to maintain a positive self-view (see Baumeister & Twenge, 2003). The nature of the events participants recalled might have been different had they been asked to retrieve their memories in a more private way. At the same time, there is evidence that awareness of the presence of another person may actually interfere with the self-regulatory strategies people use to maintain positive self-views (e.g., Baumeister & Cairns, 1992). Thus, it is unclear to what degree the presence of the experimenter during memory recall may have altered the nature of memories retrieved.

Some limitations should be noted in this study. First, it was found that participants assigned to the happy mood condition showed more positive initial moods than participants in the neutral or sad mood conditions. This finding leaves open the possibility that the mood congruence effects found in this study might be due to an unmeasured variable (such as an individual difference) that distinguished participants in the happy mood condition from participants in the other groups. However, such a variable would not account for the cue valence effects. Second, despite the fact that individuals were asked to rate their memories both *then* and *now*, it is unknown whether given memories that participants generated were truly positive or negative at the time that they actually occurred. One might argue that both ratings were influenced by

³ It is worth noting that because this study was not longitudinal, we cannot conclude definitively that memories change in the intensity of emotional valence over *time*.

participants' current moods (i.e., the mood inductions) enough to obtain mood-congruence effects. Future research might address this question in the following ways: 1) by obtaining objective ratings of participants' memories (i.e., through independent raters), in addition to participants' own ratings; and (2) by having individuals return a second time to rate the valence of their memories while in a neutral or opposite mood state.

It remains to be seen whether these findings will generalise to clinical populations. For example, clinically depressed individuals have been found to recall more sad memories and fewer happy memories than people who are not depressed or who are less depressed (Clark & Teasdale, 1982; Fogarty & Hemsley, 1983; Lloyd & Lishman, 1975), even though their memories tend to be overly general (Brewin, Reynolds, & Tata, 1999; Williams, 1996; Williams & Scott, 1988). Fitzgerald (1989) suggested that the recall of positive and negative events is a reciprocal relationship between *self-schema*, or representations of self, and memory availability, such that people with positive self-schemas have positive information available for retrieval, and people with negative self-schemas have negative information available. Clinically depressed individuals, whose self-schemas are negative and maladaptive (Beck, 1967; Beck, Rush, Shaw, & Emery, 1979), are thus likely to have more negative autobiographical memories available for retrieval than positive memories. Furthermore, depressed individuals' bias toward attending to negative cues in the environment (Ingram, Miranda, & Segal, 1998) may further trigger the recall of negative events. However, they would likely fail to show the same affective relabelling of memories that was observed in this study, as they may be less able to employ effective mood-repair strategies than nondepressed individuals (see Singer & Salovey, 1996). Although the present study did not address such factors as the specificity and degree of self-relevance in autobiographical memories, the methods used in this experiment might prove to be useful for comparing the effects of mood on autobiographical memory retrieval in both clinical and nonclinical samples.

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REFERENCES

- Baumeister, R. F., & Cairns, K. J. (1992). Repression and self-presentation: When audiences interfere with self-deceptive strategies. *Journal of Personality and Social Psychology*, *62*, 851–862.
- Baumeister, R. F., & Twenge, J. M. (2003). The social self. In T. Millon & M. J. Lerner (Eds.), *Handbook of psychology: Personality and social psychology* (Vol. 5, pp. 327–352). New York: Wiley.
- Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. New York: Harper & Row.

- Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. New York: Guilford Press.
- Blaney, P. (1986). Affect and memory: A review. *Psychological Bulletin*, *99*, 229–246.
- Bower, G. H. (1981). Mood and memory. *American Psychologist*, *36*, 129–148.
- Brewin, C. R., Andrews, B., & Gotlib, I. H. (1993). Psychopathology and early experience: A reappraisal of retrospective reports. *Psychological Bulletin*, *113*, 82–98.
- Brewin, C. R., Reynolds, M., & Tata, P. (1999). Autobiographical memory processes and the course of depression. *Journal of Abnormal Psychology*, *108*, 511–517.
- Bullington, J. C. (1990). Mood congruent memory: A replication of symmetrical effects for both positive and negative moods. *Journal of Social Behavior and Personality*, *5*, 123–134.
- Chew, B. R. (1979). *Probing for remote and recent autobiographical memories*. Paper presented at the 87th annual meeting of the American Psychological Association, New York.
- Clark, D. M., & Teasdale, J. D. (1982). Diurnal variation in clinical depression and accessibility of memories of positive and negative experiences. *Journal of Abnormal Psychology*, *59*, 87–95.
- Eich, E. (1995). Searching for mood dependent memory. *Psychological Science*, *6*, 67–75.
- Erber, R. (1996). The self-regulation of moods. In L. L. Martin & A. Tesser (Eds.), *Striving and feeling: Interactions among goals, affect, and self-regulation* (pp. 251–275). Mahwah, NJ: Erlbaum.
- Fitzgerald, J. M. (1989). Autobiographical recall and mood: A schema theory account. *Journal of Social Behavior and Personality*, *4*, 45–51.
- Fogarty, S. J., & Hemsley, D. R. (1983). Depression and the accessibility of memories: A longitudinal study. *British Journal of Psychiatry*, *142*, 232–237.
- Holmes, D. (1970). Differential change in affective intensity and the forgetting of unpleasant personal experiences. *Journal of Personality and Social Psychology*, *15*, 234–239.
- Ingram, R. E., Miranda, J., & Segal, Z. V. (1998). *Cognitive vulnerability to depression*. New York: Guilford Press.
- Isen, A. M. (1985). Asymmetry of happiness and sadness in effects on memory in normal college students: Comment on Hasher, Rose, Zacks, Sanft, and Doren. *Journal of Experimental Psychology. General*, *114*, 388–391.
- Josephson, B. R., Singer, J. A., & Salovey, P. (1996). Mood regulation and memory: Repairing sad moods with happy memories. *Cognition and Emotion*, *10*, 437–444.
- Kihlstrom, J. F., Cantor, N., Albright, J. S., Chew, B. R., Klein, S. B., & Niedenthal, P. M. (1988). Information processing and the study of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 145–178). San Diego, CA: Academic Press.
- Kihlstrom, J. F., Eich, E., Sandbrand, D., & Tobias, B. A. (2000). Emotion and memory: Implications for self-report. In A. A. Stone, J. S. Turkkan, C. A. Bachrach, J. B. Jobe, H. S. Kurtzman, & V. S. Cain (Eds.), *The science of self-report: Implications for research and practice* (pp. 81–99). Mahwah, NJ: Erlbaum.
- Kihlstrom, J. F., & Harackiewicz, J. M. (1982). The earliest recollection: A new survey. *Journal of Personality*, *50*, 134–148.
- Laird, J. D., Cuniff, M., Sheehan, K., Shulman, D., & Strum, G. (1989). Emotion specific effects of facial expressions on memory for life events. *Journal of Social Behavior and Personality*, *4*, 87–98.
- Lloyd, G. G., & Lishman, W. R. (1975). Effect of depression on the speed of recall of pleasant and unpleasant experiences. *Psychological Medicine*, *5*, 173–180.
- Macaulay, D., & Eich, E. (1996). *The LIRIC method of mood modification*. Unpublished manuscript.
- MacCallum, F., McConkey, K. M., Bryant, R. A., & Barner, A. J. (2000). Specific autobiographical memory following hypnotically induced mood state. *International Journal of Clinical and Experimental Hypnosis*, *48*, 361–373.

- MacLeod, A. K., Andersen, A., & Davies, A. (1994). Self-ratings of positive and negative affect and retrieval of positive and negative affect memories. *Cognition and Emotion*, *8*, 483–488.
- Madigan, R. J., & Bollenbach, A. K. (1982). Effects of induced mood on retrieval of personal episodic and semantic memories. *Psychological Reports*, *50*, 147–157.
- McFarland, C., & Buehler, R. (1998). The impact of negative affect on autobiographical memory: The role of self-focused attention to moods. *Journal of Personality and Social Psychology*, *75*, 1424–1440.
- Natale, M., & Hantas, M. (1982). Effect of temporary mood states on selective memory about the self. *Journal of Personality and Social Psychology*, *42*, 927–934.
- Niedenthal, P. S., & Halberstadt, J. B. (2000). Emotional response as conceptual coherence. In E. Eich, J. F. Kihlstrom, G. H. Bower, J. P. Forgas, & P. M. Niedenthal (Eds.), *Cognition and emotion* (pp. 169–203). Oxford, UK: Oxford University Press.
- Parrot, W. G., & Sabini, J. (1990). Mood and memory under natural conditions: Evidence for mood incongruent recall. *Journal of Personality and Social Psychology*, *59*, 321–336.
- Russell, J. A., Weiss, A., & Mendelsohn, G. A. (1989). Affect Grid: A single item scale of pleasure and arousal. *Journal of Personality and Social Psychology*, *57*, 493–502.
- Rusting, C. L., & DeHart, T. (2000). Retrieving positive memories to regulate negative mood. *Journal of Personality and Social Psychology*, *78*, 737–752.
- Salovey, P., & Singer, J. A. (1989). Mood congruency effects in recall of childhood versus recent memories. *Journal of Social Behavior and Personality*, *4*, 99–120.
- Singer, J. A., & Salovey, P. (1988). Mood and memory: Evaluating the network theory of affect. *Clinical Psychology Review*, *8*, 211–251.
- Singer, J. A., & Salovey, P. (1996). Motivated memory: Self-defining memories, goals, and affect regulation. In L. L. Martin & A. Tesser (Eds.), *Striving and feeling: Interactions among goals, affect, and self-regulation* (pp. 229–250). Mahwah, NJ: Erlbaum.
- Teasdale, J. D., & Fogarty, S. J. (1979). Differential effects of induced mood on retrieval of pleasant and unpleasant events from episodic memory. *Journal of Abnormal Psychology*, *88*, 248–257.
- Teasdale, J. D., & Taylor, R. T. (1981). Induced mood and accessibility of memories: An effect of mood state or of induction procedure. *British Journal of Clinical Psychology*, *20*, 39–48.
- Toglia, M. P., & Battig, W. F. (1978). *Handbook of semantic word norms*. Hillsdale, NJ: Erlbaum.
- Velten, E. (1968). A laboratory task for induction of mood states. *Behavior Research and Therapy*, *6*, 473–482.
- Walker, W. R., Vogl, R. J., & Thomson, C. P. (1997). Autobiographical memory: Unpleasantness fades faster than pleasantness over time. *Applied Cognitive Psychology*, *11*, 399–413.
- Williams, J. M. G. (1992). Autobiographical memory and emotional disorders. In S. A. Christianson (Ed.), *Handbook of emotion and memory* (pp. 451–477). Hillsdale, NJ: Erlbaum.
- Williams, J. M. G. (1996). Depression and the specificity of autobiographical memory. In D. C. Rubin (Ed.), *Remembering our past* (pp. 244–267). New York: Cambridge University Press.
- Williams, J. M. G., & Scott, J. (1988). Autobiographical memory in depression. *Psychological Medicine*, *18*, 689–695.
- Williams, P., & Tarr, M. J. (n.d.). *RSVP: Experimental control software for MacOS* [Online]. Available at: <http://www.tarrlab.org/rsvp/> [25 March 1998].
- Yang, J. A., & Rehm, L. P. (1993). A study of autobiographical memories in depressed and non-depressed elderly individuals. *International Journal of Aging and Human Development*, *36*, 39–55.

APPENDIX A
Musical selections used for inducing happy, neutral, and sad moods

| <i>Happy mood music</i> | <i>Neutral mood music</i> | <i>Sad mood music</i> |
|--|--|--|
| <i>The Entertainer</i> , Joplin | Shostakovich <i>Fugue No. 4 in E minor</i> | <i>Adagio in G minor</i> , Albinoni |
| <i>Eine Kleine Nachtmusik</i> , Mozart | <i>Fugue No. 8 in F sharp minor</i> <i>Fugue No. 13 in F sharp major</i> <i>Fugue No. 16 in B Flat minor</i> | From <i>Schindler's List</i> soundtrack <i>Auschwitz–Birkenau</i> <i>Making the List</i> <i>Remembrances</i> <i>Theme from Schindler's List</i> |
| <i>Magic Flute Overture</i> , Mozart | <i>Prelude No. 13 in F sharp major</i> | <i>Violin Concerto: Adagio di Molto</i> , Sibelius |
| <i>Appalachian Spring</i> : sections 3, 5, 6, and 8; Copland | <i>Sonatas and Interludes for the Prepared Piano</i> , Cage | <i>Peer Gynt: The death of Ase</i> , Grieg |
| <i>La donna è mobile</i> from <i>La Rigoletto</i> , Verdi | First Interlude Sonata V | <i>Prelude No. 4 in E minor</i> , Chopin |
| <i>Sempre libera</i> from <i>La Traviata</i> , Verdi | | |
| <i>The Nutcracker</i> , Tchaikovsky <i>Waltz of the Flowers</i> <i>Dance of the Flutes</i> | | |
| <i>Symphony No. 9: Presto</i> , Beethoven | | |
| <i>Four Seasons: Spring 1</i> <i>Allegro</i> , Vivaldi | | |

APPENDIX B
Cues used in experiment

| <i>List A</i> | <i>List B</i> |
|------------------------------|---------------|
| <i>Positive (Pleasant)</i> | |
| movie | rabbit |
| bouquet | blanket |
| dream | gift |
| butterfly | friend |
| cake | smile |
| <i>Neutral</i> | |
| trouser | office |
| table | closet |
| telephone | rope |
| station | toaster |
| bush | puddle |
| <i>Negative (Unpleasant)</i> | |
| trash | offend |
| frown | scar |
| spider | rat |
| dentist | blood |
| vinegar | needle |

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