Memory & Cognition
1988, 16 (2), 102-109

Mood and memory: Mood-congruity effects in absence of mood

WALTER J. PERRIG and PASQUALINA PERRIG
University of Basel, Basel, Switzerland

The *mood-congruity effect* refers to facilitated processing of information when the affective valence of this information is congruent with the subject's mood. In this paper we argue that mood may be a sufficient but not a necessary condition to produce the mood-congruity effect of selective learning. Two experiments are presented in which subjects learned lists of words with neutral, positive, and negative affective valences. In the learning task the subjects were instructed to behave as if they were depressed or happy. The mood-congruity effect was indeed obtained. The effect was stronger with subjects who "predicted" the relationship between mood and affective word valence than with subjects who were unaware of this relationship. The results are not simply attributed to task demands, but are interpreted in terms of a model of cognitive processes and people's knowledge about mood states.

The influence of emotional states on information processing has become a popular topic in cognitive psychology. In many experimental studies the standard procedure is to start with a mood induction in subjects so that its effects on cognitive processes can be analyzed (Blaney, 1986; Bower, 1981; Bower, Gilligan, & Monteiro, 1981; Bower, Monteiro, & Gilligan, 1978; Clark & Fiske, 1982; den Uyl & Frijda, 1984; Teasdale & Russell, 1983; Teasdale & Taylor, 1981). These studies have reported mood-dependent effects of two kinds: (1) Mood-state-dependent retention. Recall was shown to be highest when the mood state during recall matched the mood state during learning (Bower et al., 1978). However, new findings led Bower and Mayer (1985) to question the reliability of these results. (2) Mood-congruity effect. This effect is evidenced by the facilitation of information processing when the affective valence of the material is congruent with the subject's mood. Mood-congruity effects have been demonstrated in learning tasks as well as in production tasks (Bower & Gilligan, 1979; Clark, Milberg, & Ross, 1983).

In this article, we concentrate on the mood-congruity effect in learning. We restricted our research to effects based on the mood-manipulation approach and ignored the individual-difference approach (in which data is collected from subjects clinically diagnosed as depressed or nondepressed). Different techniques have been used to induce moods, including hypnosis (Bower, 1981; Bower et al., 1978), mood-inducing statements (Velten, 1968) induced feelings of failure or success (Isen, Shalker Clark, & Karp, 1978), memory elicitation or posturin (e.g., a happy or sad facial expression; Laird, Wagener Halal, & Szedga, 1982), and manipulation of self-esteen (Coleman, 1975). The stimulus materials used in these experiments were mainly verbal, such as nouns (Bowe et al., 1978), personality adjectives (Clark & Teasdale 1985; Isen et al., 1978; Teasdale & Russell, 1983) an texts (Bower et al., 1981; Mecklenbräuker & Hager 1984). The experimental material included informatio that was of a neutral, positive, or negative affective tone The dependent variable was usually the recall of positiv or negative items (e.g., words). Although some of th studies reported contradicting results, none of then seemed to question the replicability of the basic mood congruity effect (see Blaney's, 1986, review). The incon sistencies may be due to effects of mood type and se differences (in Clark & Teasdale's, 1985, study, moo congruence appeared demonstrable only in women) or t the fact that stimuli were presented in a narrative forn (Mecklenbräuker & Hager, 1984, found no mood congruity effect, in contrast to Bower et al.'s, 1981, find ings). In any case, we shall not elaborate further on th discrepancies of studies of the mood-congruity effect.

In this paper we concentrate on the interpretation o mood-congruity effects when mood is induced at the tim of learning. These effects can be interpreted in a straight forward way: Mood states become automatically as sociated with mood-congruous material. This may b represented in a network in which a mood node is as sociated with cognitive semantic contents. Reactivatio of a mood state should facilitate access to the cognitiv material associated with the node. All the results men tioned above are consistent with the assumption that mood congruity effects have to be attributed to the subject' mood. In each case, mood was experimentally manipu

Part of this research was supported by Grant 81.983.0.82 from the Schweizerischen Nationalfonds while the authors were visitors at the Institute of Cognitive Science at the University of Colorado, Boulder. The advice and support received there is gratefully acknowledged. We sincerely thank Margaret Jean Intons-Peterson for her helpful comments and suggestions on earlier drafts of this paper. Special thanks go to Denise Meier for her help in conducting Experiment 2 and to Christa Dierks-Ventling for her assistance in editing the manuscript. Send correspondence to Walter J. Perrig, Institut für Psychologie, Bernoullistrasse 14, 4056 Basel, Switzerland.

lated, sometimes strenuously. Hence, the subject's mood appears to be a critical variable, despite some evidence that the extent of mood congruence is unrelated to the intensity of the induced mood (Gilligan & Bower, 1984). After reviewing a large body of studies, Blaney (1986) suggested two alternatives for the interpretation of mood-congruence findings:

> One is that some kind of threshold effect is operating—that mood-congruent memory requires a particular mood strength, beyond which there is no further increment in the effect. The other is that the crucial impact of the induction is not on mood but on some other variable. (p. 237)

What other variable could produce the mood?

Task demands offer one alternative interpretation: a subject may figure out what the intention of the experiment is, and, being suggestible, he/she consciously behaves in the supposed manner. The striking effects of task demands have recently been demonstrated in computer-controlled experiments in cognitive psychology. Intons-Peterson (1983) showed that subjects in amorphous and ill-defined imagery tasks were influenced by subtle cues from hypothesis-sophisticated experimenters, and that subjects responded in ways that were consistent with the experimenters' hypotheses, although observers could not detect this.

Investigators of mood effects are certainly aware of this possibility. Bower (1981) presented two arguments against the assumption that mood congruity could be an artifact: First, observable physiological or body reactions (e.g., heart rate, tears) after mood induction suggest that a subject really is in that specific mood. Second, task demands can be controlled by misleading the subject about the purpose of the experiment. These arguments, however, are not entirely convincing. Even if a subject, after mood induction, is in a certain mood, the possibility still remains that the cause for the observed treatment variation is not the mood per se. Effects of accompanying task demands cannot be excluded. Misleading the subject about the purpose of the experiment is one way to control the task demands. Despite the fact that Bower (1981) himself reported that mood effects of misled subjects were not entirely consistent with effects otherwise found, the critical question here seems to be the degree to which task demands can be excluded, not whether they can be excluded.

Snyder and White (1982) used tasks that should not induce mood but that contain the same task demands assumed to be inherent in mood-induction procedures. In one experiment they compared two groups undergoing mood induction (with the Velten procedure) with two groups that only anticipated elation or depression induction. Participants in the experience-mood conditions had to estimate the amount of time they had engaged in a series of listed positive and negative activities during the past week. The participants learned that the experimenter needed this information both to understand their susceptibility or their lack of susceptibility to the mood-inducing cards. Participants in the anticipation groups completed the same task. In particular, these subjects were asked to report events and experiences of the previous week that they believed could account for their possible subsequent susceptibility to a procedure that they expected would induce depression (or elation). The results showed that the elation group reported more positive than negative activities, whereas the opposite was true for the depression group. No differences were found between the anticipation groups. The same negative results were reported by Snyder and White also in another experiment of the same study in which subjects had been informed that they would receive mood-induction statements, but actually received only neutral statements. This may suggest that the mood-congruent selection effect was actually a mood effect and not the result of task demands.

Rather than belaboring task demands for which subjects deliberately figure out the expectations of the experimenters and then give the expected responses, we introduce a distinction between the mood state of a subject on the one hand and the subject's knowledge about this mood state on the other hand. According to this distinction, mood-inducing techniques imply that the subject is told to bring him/herself into a specific mood (e.g., to be depressed) and that, at the same time, the subject is instructed to adopt the role of being depressed. In this latter situation, the subject does not have to figure out what exactly the hypothesis of the experimenter might be, and the subject does not have to behave consciously that way. Instead, the subject plays the role according to his/her knowledge about mood-controlled behavior. This rationale adds a new and specific interpretation to the behavioral effects in mood-inducing studies: According to this hypothesis, mood-congruity effects are not necessarily the results of either a mood state or task demands, but they are the results of people's knowledge about doing what they think they would do if they were actually in that mood. In other words, our hypothesis is that people process information in the same, or at least in a similar, way in reality as in simulated mood states: By experience, they know how to behave as if they were in a particular mood state, just as people roughly know how particular stereotyped characters would behave in a given situation. Thus, mood may be a sufficient but not a necessary condition to produce the so-called mood-congruence effect.

Relevant research has compared performance of subjects who simulated moods with that of subjects who received mood induction, although these conditions have not been compared in mood-congruent learning situations. To investigate demand characteristics associated with simulation of elation and depression, Velten (1968) asked subjects to "behave the way [they] estimate other subjects behave who have been administered all sixty statements representing this mood of elation (depression)." These subjects were shown five samples for elation or depression statements. Velten's results showed that elation and depression treatments differed significantly from each other on five of seven criterial measures of mood-

relevant behavior, whereas the demand characteristics version of elation and depression did not yield significant differences. It is important to note that part of Velten's simulation instructions asked subjects to "estimate" the behavior of others and to behave accordingly. From what was said above, this instruction may result in effects different from those resulting from an instruction for the subject to behave as if he/she were elated or depressed.

Polivy and Doyle (1980) tested counterdemand conditions as controls for Velten's (1968) treatment conditions. Counterdemand subjects were informed that people reading the statements tend to feel the emotion opposite that expressed in them. The mood-simulation groups read instructions explaining that the experiment was concerned with how well individuals could portray or imitate cognitive sets that they were not actually feeling. Subjects were asked to act as if they were elated (or depressed) throughout the entire experiment. Polivy and Doyle found significant differences between the two Velten groups and also between the two simulation groups on the depression, anxiety, and hostility scales of the Multiple Affect Adjective Check Lists (Zuckerman & Lubin, 1965). The differences between the simulation groups tended to be larger. Based on the similarities in the self-reports of depression of the mood and the mood-simulation groups, we are inclined to believe that the subjects simulating mood actually changed their moods because the counterdemand groups did not show changes of affect. It is important to note that these groups were not instructed to simulate the counterfeeling or mood. Thus the possibility remains that subjects receiving mood induction, like those receiving mood-simulation instruction, responded to the task solely on the basis of their knowledge about mood states and attendant behavior. Other findings that contradicted the results of the Velten (1968) study are reported by Polivy and Doyle (1980): The two Velten groups did not show significant differences on four tasks, indicating that little true affect was produced.

In Buchwald, Strack, and Coyne's (1981) replication of the Velten study, equivalent information and demands were given to both the experimental and demand characteristics groups. The instruction to simulate mood was stressed, a summary of the induction statements was given to the simulators, and honest responding to the post-experimental questions was emphasized. Again, no differences were reported on task performances between induction and simulation groups.

These data may support our contention that subjects who play a role according to their knowledge about mood-controlled behavior process information in the same or at least in a similar way to that of people who are actually in that mood state. To test the plausibility of our hypothesis, we designed two experiments on mood-congruent learning in which the subjects were instructed to behave as if they were in a certain mood state while learning nouns. In Experiment 1 mood simulation occurred only during learning. The words were presented serially, and a delayed recall was used to replicate the 5- to 15-min retention intervals often imposed in mood-congruity studies. At the end of the experiment, the subjects were asked about the experimenter's hypothesis. They were also asked if they edited their responses by purposely omitting words they actually remembered. Finally, they were asked whether the mood-simulation task had changed their moods.

EXPERIMENT 1

Method

Subjects. Twenty-six psychology students (15 female and 11 male) from the University of Basel, Switzerland, participated in the experiment.

Material. A 75-noun list was constructed using 25 words each with positive, neutral, and negative mood valences. The selection of these words was based on the rating of three experts who categorized 150 words (50 words were preselected for each mood valence) into the three mentioned categories. For each decision a confidence rating was required from the experts (1 = low, 2 = medium, and 3 = high confidence). For the experimental list, only words categorized with high confidence by all three raters were selected. The English translations of the German words are listed in Table 1.

Design and Procedure. The experiment was conducted in a group session. Each subject received an experimental booklet that began with a written instruction. The group was divided into a happy and a sad simulation group. The instruction for the happy simulation group was as follows: "With a tape recorder a number of words will be presented to you. Your task is to study these words. Please behave in this learning task as if you were in a state of extreme happiness." In the sad simulation group "happiness" was replaced by "sadness." After a tape-recorded presentation of the words, the subjects turned over a page in their booklets and worked for 12 min

Table 1
Word Lists Used in Experiments (English Translations)

Experiment 1				
Positive Words				
sunshine	satisfaction	success	diamond	present
smile	love	luck	champagne	peace
strength	fun	honor	award	graduation
beauty	spring	fairy-tale	holiday	relaxation
ecstasy	roses	jewelry	fortune	romance
Neutral Words				
desk	town	shop	letter	book
grass	morning	concert	collection	telephone
lease	order	knob	newspaper	lake
stove	contract	stone	keg	circle
bone	shelf	window	text	iron
Negative Words				
illness	disgust	debts	suicide	abuse
trouble	helplessness	death	cancer	guilt
murder	ruin	cold	depression	war
fog	orphan	pain	failure	funeral
fatigue	drowning	loneliness	dread	misery
Experiment 2				
desk grass illness sunshine relaxation trouble murder smile graduation strength lease fog romance fatigue book stove beauty disgust bone telephone ecstasy lake helplessness ruin circle iron orphan satisfaction town drowning love morning fun debts spring order death contract shelf cold pain roses shop loneliness success concert luck suicide knob honor cancer fairy-tale depression jewelry failure stone diamond window champagne dread letter award collection abuse guilt holiday war newspaper fortune present funeral peace misery keg text				

on two logical reasoning tasks (figure analogies and number strings) from a German intelligence test (P-S-B Test; Horn, 1969). After this, subjects were instructed to write down "all the words they could remember from the learning task." No time limit was set for this task. Finally, the subjects turned to the last page of their experimental booklets to answer the following questions: (1) What do you think was the experimenters' hypothesis about the outcome of the subjects' performance? (2) In recalling the words did you consciously and purposely not write down words you remembered? How many? (3) Did the mood simulation change your mood into the proper direction? Can you say that your deviated mood was different from the one you were in before the experiment started? Thus a 2×3 factorial design was obtained with the between-subjects factor mood simulation (happy or sad), and the within-subjects factor word type (positive, negative, or neutral).

Results and Discussion

Free recall was analyzed by counting the number of correctly recalled words of the three word types. The recall protocols contained some intrusions but no synonyms. The results of this analysis are presented in the upper portion of Table 2. The analysis of variance (ANOVA) revealed a signficant main effect for word type [$F(2,48) = 6.74$, $p < .003$]. Words with an emotional loading were remembered better than neutral words (positive = 6.84, negative = 7.03, and neutral = 5.03). Mood simulation alone had no effect on recall ($F = 0$). The word type × mood simulation interaction, however, was significant [$F(2,48) = 3.73, p < .05$]. We found that the sad simulation group remembered more negative (8.0) than positive (6.53) ($t = 1.75$, $p < .05$) and neutral words. Although the happy simulation group recalled more positive (7.15) than negative (6.07) words, this difference was not statistically significant ($t = 1.28$).

In the item analysis, the mood simulation × word type interaction was significant [$F(2,72) = 5.51, p < .006$]. Mood simulation and word type showed no significant effects ($F < 1$).

To analyze the postexperimental questions, we separated subjects into two groups, those who mentioned a mood-congruity effect in their statements about the experimenters' hypothesis and those who did not mention this effect. The two raters agreed on these classifications in all cases. The results showed that 53% of the subjects expected a mood-congruity effect. The free recall results of these groups are presented in the lower portion of Table 2. We calculated a 2×2×3 factorial ANOVA on these data using mood simulation (happy or sad) and experimenters' hypothesis (congruity effect mentioned or congruity effect not mentioned) as two between-subject factors and word type (positive, negative, or neutral) as the within-subject factor. There was a significant main effect of word type [$F(2,44) = 7.91$], and there were two significant interactions: word type × mood simulation [$F(2,44) = 3.72, p < .05$] and word type × mood simulation × experimenters' hypothesis [$F(2,44) = 3.61$, $p < .05$]. (The error probabilities of these two interactions after the Geisser Greenhouse adjustment were $p < .05$.) Simulation, simulation × hypothesis, and word type × hypothesis had no significant effects on the recall data ($F < 1$).

Table 2
Mean Number of Correctly Recalled Words in Experiment 1

Experimenters' Hypothesis	Mood Simulation	n	Word Type: Positive	Negative	Neutral
	Happy		7.15	6.07	5.61
	Sad		6.53	8.00	4.46
Congruity Effect Mentioned	Happy	7	7.71	5.14	5.57
	Sad	7	5.75	8.28	4.85
Congruity Effect Not Mentioned	Happy	6	6.50	7.16	5.66
	Sad	6	7.66	7.66	4.00

The significant second-order interaction reflects the fact that subjects who mentioned the mood-congruence effect in their statements showed this mood-congruent selective learning in their recall data, whereas subjects who did not mention this effect did not show any evidence of selective learning. Planned comparisons in the former group showed that subjects in the happy simulation group recalled more positive (7.71) than negative (5.14) words ($t = 2.44, p < .01$), and subjects in the sad simulation group reproduced more negative (8.28) than positive (5.57) words ($t = 2.31, p < .02$). Subjects who did not mention this effect showed no such differences.

In the item analysis the three-way interaction (experimenter hypothesis × mood simulation × word type) was significant [$F(2,72) = 3.47, p < .05$]. The other significant interaction was mood simulation × word type [$F(2,72) = 5.51, p < .006$]. No other effect was significant ($F < 1$).

In the second question subjects were asked whether in their simulation task they had used an editing strategy, such as purposely omitting some words they remembered. Only 1 of the 26 subjects indicated that she had omitted one or two remembered words. All other subjects stated that they recorded all the words they remembered.

The third question in the postexperimental inquiry was whether the mood simulation resulted in an experienced change of mood. Six of the 26 subjects wrote that their mood changed into the simulated mood. Two subjects of the 6 mood-changed subjects belonged to the happy simulation group; they did not mention the mood-congruity hypothesis, and their data showed no mood-congruence effect. The remaining 4 subjects were from the sad simulation group; 3 of them mentioned the mood-congruence effect in their statements. However, they showed about the same selective learning effect in their recall as 4 other subjects who had also mentioned the mood-congruity effect but who claimed that their mood had not changed.

The results of this experiment indicate that mood-congruity effects occurred. The subjects who were instructed to behave as if they were in a specific mood (happy or sad) recalled more mood-congruent than neutral and mood-incongruent words. As this experiment demonstrates, it suffices to have subjects simulate or take over the role of being in a specific mood in order for mood-congruity effects in learning to occur. We explain

this result by the fact that everybody has access to a large body of knowledge about events causing certain states of mood and about actions resulting from them. This knowledge offers a thematically related organizing framework in which encoded theme-congruent (mood-congruent) material can be embedded or elaborated in context. For example, if one reads the word "cancer" while simulating depression during learning, one might notice that "cancer" has more to do with depression than do words of neutral or opposite emotional valence. One may remember that a severe illness can lead to depression, or one may remember someone who had cancer and how depressing this was for the family and friends. Needless to say, this kind of reasoning is likely to provide a variety of mood-related retrieval cues.

In accordance with this rationale is our finding that only subjects who mentioned the mood-congruity effect in their hypotheses about the outcome of the experiment showed a clear mood-congruity effect. It seems that subjects who did not mention the relationship between the different types of words and their simulated moods might not have used their mood-related knowledge as an organizing framework. Unfortunately, we do not know about a similar experimental procedure in mood-induction studies that would allow a comparison of the results of mood simulation and mood induction.

The results discussed thus far have been replicated in another experiment using a prose-like presentation (Perrig & Perrig-Chiello, 1985). All of the stimulus words were simultaneously presented as a single paragraph. This contrasts to the "one-word-at-a-time serial presentation" method used in this and other mood-congruity studies. The effect of selective learning in Perrig and Perrig-Chiello's experiment was even larger than that in Experiment 1 of this study. One may speculate that the "complete listing" method provided the subject with greater opportunity to notice the contrasting emotional valence of the items; to organize the mood-congruent words into recallable clusters; and to selectively attend to, integrate, or elaborate on the mood-congruent words. By contrast, the one-by-one item presentation may make such strategies harder to carry out.

The results of Experiment 1 also demonstrate that the recall data do not reflect consciously controlled editing strategies. Some studies showed that simulation of the Velten mood-induction procedure (Coleman, 1975) and even role playing of a mood state (Polivy & Doyle, 1980) changed the mood of many simulators. The results of our third question of the inquiry, however, indicate that there is no reason to believe that our mood-simulation task very strongly influenced the mood of the subjects and our results. Although 6 subjects mentioned a mood change, their pattern of results did not differ from that of subjects who did not mention such a change.

In summary, the data of this experiment support the view that mood-congruity effects can be produced by cognitive selection and organization processes during learning. We assume that knowledge representing mood themes controls these processes. According to this hypothesis, the organizing effect of a specific mood theme should affect retrieval in addition to encoding. This follows from the assumption that retrieval is an active search process, what Baddeley (1982) called a "recollection." If we consider recollection as a two-stage process in which the candidates generated during an initial search are subsequently evaluated for recognition, we expect that a specific mood theme at the time of recall would offer retrieval cues and/or generate candidates for retrieval. When subjects learn under the control of a certain mood theme, this theme should act as retrieval cue at the time of recall whether one requests the subjects to use it or not.

We expected that if subjects were asked to shift the mood theme, the new retrieval schema would provide dominant retrieval cues and candidates. Compared with the mood-congruent retrieval situation, this should result in superior recall of previously mood-incongruent items and, because the old mood schema is suppressed in its function as retrieval schema, inferior recall of previously mood-congruent items. Thus, the overall recall of items between mood congruity and mood shift in retrieval should be the same. This hypothesis is consistent with failures to find mood-state-dependent learning (Bower & Mayer, 1985).

In Experiment 2, we examined retention when subjects who simulated a mood state (e.g., behaved as if they were happy) during learning were asked to change their mood simulation during recall.

EXPERIMENT 2

Method

Subjects. Forty psychology students (27 female and 13 male) from the University of Basel, Switzerland, participated in the experiment.

Material. A list consisting of the 75 nouns used in Experiment 1 was administered. To avoid artificial categorization tendencies, the words were presented in the form of a regular written text with a random order of the words. The randomization procedure was governed by the restriction that in a succession of words no more than two from the same category (positive, neutral, or negative) were allowed. This list, presented in the lower half of Table 1, was the same for all subjects.

Design and Procedure. The experiment was conducted in two consecutive group sessions. First, 20 subjects saw the words under instructions to simulate a happy mood. Immediately thereafter, 20 other subjects performed under instructions to simulate a depressed mood. The subjects of the two groups were not in contact during the entire experiment.

The 20 subjects of one group, seated in the same room, received written instructions. The happy simulation group was instructed, "Your task is to study a list of words that will be presented to you. Please behave in this learning task as if you were in a state of extreme happiness." While the subjects read the instructions, the word list was put upside down in front of the subjects. After a start sign, the subjects turned the sheet with the word list right side up and began learning. After 4 min, learning was interrupted and the word lists were collected. Then, 10 subjects were instructed "to continue to behave as if you were extremely happy and to write down all the words you can remember from the learning task." The other 10 subjects were asked to change their behavior and "now to behave as if you were extremely sad and to write down all the words

you can remember from the learning task." No time limitation was set for the recall task.

For the sad simulation group, the procedure and the instructions were the same as for the happy simulation group except "happiness," "happy," and "sad" were replaced by "sadness," "sad," and "happy" at the appropriate places. We also prepared a post-experimental questionnaire for the subjects as in Experiment 1; however, due to a tactical error, the questionnaire was never presented to the subjects.

The design was a 2×2×3 factorial, with two between-subjects factors of mood simulation at the time of learning (happy or sad) and mood congruence at the time of recall (congruent or incongruent with mood at the time of learning) and one within-subjects factor of word type (positive, negative, or neutral).

Results and Discussion

The free recall of words was analyzed as in Experiment 1 (see Table 3). The main factors of mood simulation at the time of learning and word type were significant [$F(1,36) = 7.63$, $p < .009$, and $F(2,72) = 5.17$, $p < .007$, respectively]. The subjects who simulated a happy mood at the time of learning remembered more words than the subjects who simulated a depressed mood (7.71 and 5.63, respectively). Recall of neutral words (5.70) was inferior to recall of positive (7.10) and negative (7.22) words. Mood congruence at the time of recall had no influence on the recall of words, with 6.94 and 6.40 words recalled for congruent and incongruent mood, respectively ($F = 0.53$).

The interaction of word type and mood simulation at the time of learning and the triple interaction of word type, mood simulation at the time of learning, and mood congruence at the time of recall were statistically highly significant [$F(2,72) = 8.73$, $p < .001$, and $F(2,72) = 12.60$, $p < .001$, respectively]. The interactions of word type and mood congruence at recall and of mood simulation at learning and mood congruence at recall were not significant.

The results show that congruence or incongruence in mood simulation at the time of recall yielded a completely different pattern of results. The subjects who simulated a mood that was congruent with the mood simulation at the time of learning showed a clear mood-congruity effect. Thus, the subjects in a happy mood simulation recalled many more positive (10.20) than negative (5.70) words ($t = 4.28$, $p < .001$), and the subjects in a depressed mood simulation recalled many more negative (9.50) than positive (4.90) words ($t = 4.28$, $p < .001$).

The subjects who had to change their mood simulations at recall reacted differently. The numbers of different types of words recalled did not differ. Compared with the mood-congruent simulation group, the mood-incongruent simulation group remembered fewer words that were congruent with the mood simulated at the time of learning (incongruent at the time of recall) (6.45 and 9.85, respectively; $t = 3.17$, $p < .01$) but remembered more words that were incongruent with the mood simulated at the time of learning (congruent at the time of recall) (7.05 and 5.3, respectively; $t = 2.12$, $p < .05$).

Table 3
Mean Number of Correctly Recalled Words in Experiment 2

Mood Simulation		Word Type		
At Learning	At Recall	Positive	Negative	Neutral
Happy	Happy	10.20	5.70	6.40
	Sad	7.50	8.30	8.20
Sad	Happy	5.80	5.40	3.20
	Sad	4.90	9.50	5.00

In Experiment 2 the subjects who simulated the same mood during learning and recalling the words showed a strong mood-congruity effect: Mood-congruent words were remembered much better than incongruent or neutral words. Thus, our findings of Experiment 1 were replicated. We failed to find simulated mood-state-dependent learning. Both findings agree with findings of mood-induction studies (Bower & Mayer, 1985).

From these results, we may conclude that a specific mood state or mood simulation effective during learning results in a mood-congruity effect. It is not effective during recall, however, so the recall of the mood-congruent group approximates that of the mood-shift group. The results of our triple interaction for experimenter hypothesis, mood simulation, and word type [$F(2,72) = 7.91$, $p < .001$] led us to another conclusion. Compared with the mood-congruent group, the group that changed its mood simulation at recall (1) remembered fewer words congruent with the mood at the time of learning (incongruent at the time of recall) and (2) remembered more words incongruent at the time of learning (congruent at time of recall). This finding agrees with our hypothesis that the organizing effect of a specific mood theme should be effective not only during encoding but also during recall. This follows from the assumption that retrieval is an active search process in the sense of Baddeley's (1982) recollection model. We expected for Experiment 2 that a new retrieval schema, which represented a mood shift, would provide dominant retrieval cues and candidates. Compared with the mood-congruent retrieval situation, this should result in superior recall of previously mood-incongruent items. Moreover, because the old mood schema is suppressed in its function as a retrieval schema, we expected inferior recall of previously mood-congruent items, thus eliminating the mood-congruity effect. This is exactly what happened in our mood-simulation experiment. Perhaps even more interesting, this is also what probably happened in the mood-induction study of Bower et al. (1981, Experiment 3). The overall recall of items between mood congruity and mood shift in retrieval should be the same. This hypothesis agrees with our results and with the results from mood-induction studies.

GENERAL DISCUSSION

The results of the two experiments supported our hypothesis that mood-congruity effects (Bower, 1981; Bower et al., 1981; Bower et al., 1978; Clark & Fiske, 1982; Teasdale & Russell, 1983; Teasdale & Taylor,

1981) can be produced by activating the subject's knowledge about a mood state and its corresponding behavioral pattern. Subjects who are instructed to behave as if they were happy remembered more positively than negatively or neutrally valenced words. We obtained the opposite effect with subjects instructed to act as if they were depressed: They recalled significantly more words of negative than of neutral or positive emotional valence.

The special importance of knowledge about mood states and the corresponding behavioral patterns in producing the mood-congruity effect is shown in Experiment 1. The 46% of the subjects who did not mention the mood-congruity effect in the outcome of the results did not show this effect in their recall. Since we do not know of a study in which actual moods were induced and in which a similar control procedure was used, we have no way to compare our results.

Our results suggest that the mood-congruity effects we obtained reflect conscious purposeful reasoning and not actual mood states. This implication is deduced from the assumption that our subjects who received only written instructions to behave as if they were happy or depressed were not actually in happy or depressed states of mood. Supported by the feedback from our subjects in the post-experimental inquiries, we at least have good reason to assume that the effect of our instruction in terms of mood induction is not the same as the one produced by the energy- and time-consuming procedures of hypnosis or the Velten technique.

What happens when subjects follow our instructions can hypothetically be described as follows: (1) The subjects behave as if they were happy or depressed. (2) During learning they realize that there is some material that fits their "mood" and other material that does not. (3) The mood-congruent material receives more attention and elaboration. A mood-congruent word may represent the value of a condition, a result, or a behavioral possibility of the actual mood to be simulated. For example, the word "death" may induce depression because it was connected with the death of a friend. This connection may lead to superior recall of "death" because it has been embedded in an enlarged episodic context. Another possibility is that the thematic context of the mood itself functions as a categorical cue in both encoding and retrieval. Support for this idea is contained in our second experiment. More words of the new mood state were remembered after a switch of mood at the time of recall than in the no-switch condition. These results replicate those of Anderson and Pichert (1978), whose subjects read a text either from a homebuyer's or a burglar's perspective. In their experiment, the subjects with the perspective shift produced more ideas important to the second perspective but not to the first perspective and fewer ideas unimportant to the second perspective but important to the first. Borrowing from this rationale, we can explain mood-congruity effects by basic memory theoretic principles. "Mood" directly refers to a rich knowledge base that offers context and retrieval cues constructed during learning and used and reconstructed at time of recollection (Baddeley, 1982). Following this description, our instruction functions as a release of a planning mechanism that determines the selection of mood-relevant context and actions. This rationale is, in principle, an elaboration of one of several explanations offered by Bower (1981), but one on which he did not elaborate.

One might argue that our data could be explained by a much simpler interpretation: Possibly, our subjects wanted to be good subjects and thus behaved according to our expectations. This simple task-demand hypothesis does not explain how the subjects arrived at the experimenter's hypothesis and how they knew about the form of the mood-congruity effect. Furthermore, our data argue against this hypothesis. Thirty-three percent of all remembered words in Experiment 1 (27% in the replication study mentioned in the discussion of Experiment 1) and 25% in the mood-congruent recall condition of Experiment 2 were mood-incongruent words. Moreover, in the mood-change conditions of Experiment 2, more words were recalled that related to the mood congruent with recall than that related to the mood congruent with encoding but incongruent with recall. These results seem unlikely if the subjects learned only the mood-congruent words. Moreover, the results of our postexperimental questionnaire in Experiment 1 suggest that the subjects did not consciously and purposely edit their recall.

What do our results and their interpretation mean for the classical studies working with real mood induction? Our results support our hypothesis that the phenomenon of mood-congruent selective learning can be produced by people's knowledge about mood states, their causal conditions, and their behavioral consequences and its use in encoding and recollection of the different types of words. This explanation adds a new perspective to the assumption of Bower et al. (1981) that the effective mood per se produces the phenomenon. Our results suggest that mood states are sufficient but not necessary to produce the mood-congruity effect. We must entertain the possibilty that mood-induction procedures invite subjects to imitate the role of a certain mood state.

Mood-congruity effects may result from organizing processes during encoding. Results presented recently by Fiedler and Stroehm (1986) lend support to this hypothesis. They found mood-congruity effects only with non-structured isolated material and not with categorical material. This could mean that, if thematic or categorical organization already existed in the material to be learned, additional organization (by a mood schema) would confer no further benefit. In this sense, the results of Fiedler and Stroehm are consistent with our theory about the origin of mood-congruity effects.

If one assumes that mood adds additional characteristic features to the process of learning, it seems that other experimental paradigms are necessary to make them transparent. We assume that the mood-congruity effect in mood induction studies—and here we limit our arguments only to this phenomenon—is caused by the same mechanisms

we discussed. Still, there remains the possibility of a confounded effect of mood state and the use of knowledge about mood states. Our experiments do not resolve this confusion. Nevertheless, we believe that our research demonstrates the need for better control if we are to unequivocally study the influence of mood per se. One control is to introduce simulation groups into the designs. Another is to compare clinical groups with mood-induction groups and simulators. The goal is to identify the effects attributable to mood per se and those mediated by cognitive reasoning processes.

REFERENCES

Anderson, R. C., & Pichert, J. W. (1978). Recall of previously unrecallable information following a shift in perspective. *Journal of Verbal Learning & Verbal Behavior*, **17**, 1-12.

Baddeley, A. D. (1982). Domains of recollection. *Psychological Review*, **89**, 708-729.

Blaney, P. H. (1986). Affect and memory: A review. *Psychological Bulletin*, **99**, 229-246.

Bower, G. H. (1981). Mood and memory. *American Psychologist*, **36**, 129-148.

Bower, G. H., & Gilligan, S. G. (1979). Remembering information related to one's self. *Journal of Research in Personality*, **13**, 420-432.

Bower, G. H., Gilligan, S. G., & Monteiro, K. P. (1981). Selectivity of learning caused by affective states. *Journal of Experimental Psychology: General*, **110**, 451-473.

Bower, G. H., & Mayer, J. D. (1985). Failure to replicate mood-dependent retrieval. *Bulletin of the Psychonomic Society*, **23**, 39-42.

Bower, G. H., Monteiro, K. P., & Gilligan, S. G. (1978). Emotional mood as a context for learning and recall. *Journal of Verbal Learning & Verbal Behavior*, **17**, 573-585.

Buchwald, A. M., Strack, S., & Coyne, J. C. (1981). Demand characteristics and the Velten mood induction procedure. *Journal of Consulting Clinical Psychology*, **49**, 478-479.

Clark, M.S., & Fiske, S. T. (Eds.). (1982). *Affect and cognition*. Hillsdale, NJ: Erlbaum.

Clark, M. S., Milberg, S., & Ross, J. (1983). Arousal cues arousal-related material in memory: Implications for understanding effects of mood on memory. *Journal of Verbal Learning & Verbal Behavior*, **22**, 633-649.

Clark, D. M., & Teasdale, J. D. (1985). Constraints on the effects of mood on memory. *Journal of Personality & Social Psychology*, **48**, 1595-1608.

Coleman, R. E. (1975). Manipulation of self-esteem as a determinant of mood of elated and depressed women. *Journal of Abnormal Psychology*, **84**, 693-700.

den Uyl, M. J., & Frijda, N. H. (1984, June). *Mood, emotion and action: A concern-realization model*. Paper presented at the Cognitive Science Conference, Boulder, CO.

Fiedler, K., & Stroehm, W. (1986). What kind of mood influences what kind of memory: The role of arousal and information structure. *Memory & Cognition*, **14**, 181-188.

Gilligan, S. G., & Bower, G. H. (1984). Cognitive consequences of emotional arousal. In C. E. Izard, J. Kagan, & R. Zajonc (Eds.), *Emotion, cognition and behavior* (pp. 547-588). New York: Cambridge University Press.

Horn, W. (1969). *Prüfsystem für Schul- und Bildungsberatung P-S-B*. Goettingen: Hogrefe.

Intons-Peterson, M. J. (1983). Imagery paradigms: How vulnerable are they to experimenters' expectations? *Journal of Experimental Psychology: Human Perception & Performance*, **9**, 394-412.

Isen, A. M., Shalker, T. D., Clark, M., & Karp, L. (1978). Affect, accessibility of material in memory and behavior: A cognitive loop? *Journal of Personality & Social Psychology*, **36**, 1-12.

Laird, J. D., Wagener, J. J., Halal, M., & Szegda, M. (1982). Remembering what you feel: Effects of emotion on memory. *Journal of Personality & Social Psychology*, **42**, 646-657.

Mecklenbräuker, S., & Hager, W. (1984). Effects of mood on memory: Experimental tests of mood-state-dependent retrieval hypothesis and of a mood-congruity hypothesis. *Psychological Research*, **46**, 355-376.

Perrig, W. J., & Perrig-Chiello, P. (1985). Selektives Lernen bei induzierten Stimmungszuständen: Resultat des Stimmungszustandes oder bloss der Aufgabenstellung? *Schweizerische Zeitschrift für Psychologie*, **44**, 17-30.

Polivy, J., & Doyle, C. (1980). Laboratory induction of mood states through the reading of self-referent mood statements: Affective changes or demand characteristics? *Journal of Abnormal Psychology*, **89**, 286-290.

Snyder, M., & White, P. (1982). Moods and memories: Elation, depression and the remembering of the events of one's life. *Journal of Personality*, **50**, 149-167.

Teasdale, J. D., & Russell, M. L. (1983). Differential effects of induced mood on the recall of positive, negative and neutral words. *British Journal of Clinical Psychology*, **22**, 163-171.

Teasdale, J. D., & Taylor, R. (1981). Induced mood and accessibility of memories: An effect of mood state or of induction procedure? *British Journal of Clinical Psychology*, **20**, 39-48.

Velten, E., Jr. (1968). A laboratory task for induction of mood states. *Behaviour Research & Therapy*, **6**, 473-482.

Zuckerman, M., & Lubin, B. (1965). *Manual for the Multiple Affect Adjective Check List*. San Diego, CA: Educational and Industrial Testing Service.

(Manuscript received September 3, 1986;
revision accepted for publication August 19, 1987.)