MOOD AND MEMORY: 
EVALUATING THE NETWORK 
THEORY OF AFFECT

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ABSTRACT. For nearly 80 years, psychologists have investigated the relationship between affect and memory. During much of this time, researchers were influenced by a variety of theoretical positions that failed to converge on a unified model. However, during the most recent decade, Bower's Network Theory of Affect has led a coherency to this area of investigation. His theory specified four distinct ways in which mood could have an observable effect on memory: (a) memory is facilitated when mood state at learning matches mood state at recall, (b) material with affective tone that is congruent with current mood is most easily retrieved from memory, (c) material with affective tone that is congruent with current mood is most easily learned, and (d) affectively intense material is learned best. The present paper reviews the empirical literature that addresses each of these four predictions by looking at studies that manipulate mood in the laboratory as well as those that utilize naturally occurring mood. Each prediction is supported, although congruency during learning (prediction 3c) yields the most consistent findings. Methodological strengths and weaknesses are noted throughout. Based on this review, we conclude with some suggestions for refinement of a network model of mood and memory.

For most of this decade, psychologists have debated the proper role of affect in contemporary models of information processing. In a series of influential articles in the American Psychologist, Zajonc (1980, 1984), Bower (1981), and Lazarus (1982) have differed on both the independence of affect and cognition and the

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We would like to thank Richard Gerrig, John Mayer, William Nasby, Jerome L. Singer, Jerry Parrott, and Marty Safer for their comments on earlier versions of this manuscript. This project was supported in part by Biomedical Research Support Grant S07 RR07015 to Peter Salovey and by the Yale Social Science Faculty Research Fund.
primacy of one over the other. Zajone has argued that affective reactions are
precognitive, requiring no conscious appraisal. He also adheres to a view that an
affective experience is phenomenologically distinct from cognition, a position
shared by differential emotion theorists (cf. Izard, 1972, 1977; Tomkins, 1962,
1963). Lazarus has challenged Zajone's restricted definition of cognition and
regards affect as the outcome of appraisal processes that are necessarily cognitive.

From a different perspective, Bower has assimilated affect into an associative
He proposes that emotions are central units in an associative network which have
strong linkages to other aspects of the network—behaviors, beliefs, events, and
themes. According to this theory, affect shares some of the properties of proposi-
tional nodes in the associative network. Bower's theory has spawned a large
experimental literature attempting to demonstrate various ways that mood states
influence memorial processes (see Bower, 1981; Bower & Cohen, 1982; and Gilli-
gan & Bower, 1984, for reviews). It has also been linked to theories involving the
impact of affect on social behavior (Clark & Isen, 1982; Isen, 1984; Isen, Shalker,
Clark, & Karp, 1978; Salovey & Rodin, 1985) as well as to cognitive models of
depression (Teasdale, 1983). Yet, research findings in all three of these areas are
inconsistent. More recently, even Bower's laboratory has produced conflicting
findings, prompting them to write that perhaps "our questions about mood-
dependent memory are formulated too simplistically" (Bower & Mayer, 1985, p.
42).

The purpose of this review is to present a comprehensive examination of re-
search directly or indirectly addressing the associative-network model of mood
and memory. Research findings will be organized around four predictions made
by this model concerning the impact of mood on memory (Gilligan & Bower,
1984). The adequacy of this model will be evaluated through empirical confronta-
tion of each prediction with the extant research literature.

HISTORICAL ANTECEDENTS TO THE ASSOCIATIONAL MODEL OF
MOOD AND MEMORY

The fundamental question concerning mood and memory during the first half of
this century was the relative ease of recall of positive memories as compared to
negative ones. This interest was prompted by three concurrent intellectual trends
(Rapaport, 1942). Schopenhauer's pessimistic philosophy concerning the future of
Western society spurred much debate in the infant social sciences about the
essential optimism or pessimism of the human species. Studies of individuals'
differential remembering of positive or negative experiences promised one clue to
this dispute. Freud's (1938) discussion of repression in the Psychopathology of
Everyday Life spawned a great deal of research that sought to "test" his theory by
determining if unpleasant memories were indeed harder to recall than pleasant
memories. These studies were to a large extent misguided in their translation of
Freud's concern with specific unconscious memories into a blanket investigation
of any conscious unpleasant memories the individual might recall. Due to the
influence of Spencer (1875) and Bain (1868), a pleasure-pain theory of learning
was also in ascendancy at the turn of the century. This theory was crystallized in
Thuridike's (1927) "law of effect," which stated that rewarding experiences were
strongly registered in memory, while aversive ones were blocked out. All three of
these theories led to the superficially similar prediction that pleasant experiences should be remembered more effectively and over more time than unpleasant experiences (for a more modern statement of these ideas, see Matlin & Stang, 1978).

**Early Experimental Approaches**

Rapaport (1942) described the two major methodologies used to study the recall of pleasant and unpleasant memories. The first were association experiments, broadly divided into three types: diagnostic, feeling-tone, and experience. In the diagnostic study (summarized in Jung, 1919), the investigator presents a series of words to subjects who then must describe the first idea that comes to mind following each word. The critical measure is the latency of response time to each cue word. While initially these word associations were used to identify a patient's psychopathology, later, in the "feeling-tone" studies (e.g., Smith, 1921; Tolman & Johnson, 1918), researchers compared response times to positively and negatively toned cues. Galton's (1892) "experience" studies (see also Washburn, Giang, Ives, & Pollock, 1925) represent a parallel paradigm that elicited actual experiences rather than words in response to cues. The results, though inconclusive, tended to show some influence of feeling tone on reaction time and ability to produce the required associations. Positive associations were slightly preferred and more quickly accessed than negative ones.

The second major methodology emerged from the learning laboratory. Four primary designs were used. In the first, subjects were asked to associate pleasant and unpleasant sensory experiences (usually odors) with neutral material. The ease of recall for the previously neutral material was then measured (e.g., Gordon, 1925; Ratliff, 1938). Generally, results were mixed, with no clear advantage for positively associated material. In the second experimental design, subjects would simply remember pleasant and unpleasant sensory material. For example, Tait (1915) asked subjects to rate a series of colors for pleasantness or unpleasantness and then measured their reaction time on a color recognition test. Tait found an advantage for pleasantly rated colors, although this effect has been attributed to the sensitivity of an immediate recognition task (Rapaport, 1942). The third type of study, compared the recall of positive and negative life experiences. For example, Fluegel (1917, 1925) asked subjects to keep a diary over a period of a month recording the intensity, duration, and quality of their experiences. He found that subjects listed more pleasant than unpleasant experiences. Wohlgemuth (1923) found no advantage for pleasant over unpleasant events in a study of school children's reports of vacation experiences. Finally, the fourth and most common type of study used experimenter-provided lists varying in positive and negative content and then asked subjects to recall this material. For example, Tolman (1917) found that subjects were better able to recall positive words from a list than negative ones. Subsequent studies found a slight advantage for positive material, though these studies were plagued by methodological and interpretational difficulties as described by several reviewers (Gilbert, 1938; Holmes, 1974; Matlin & Stang, 1978; Meltzer, 1930; Moore, 1935; Zeller, 1950; however, see Strongman & Russell, 1986, and Thompson, 1985, for recent reexaminations of these ideas).

In summary, all of the previously discussed studies required the recall of posi-
tive versus negative material. Affect was not examined as a quality of the subject's consciousness but rather as a property of material stored in memory. Influenced by the growing Gestalt movement in the study of perceptual processes, investigators next turned to considerations of affect as one part of the subject's "mental set." Rapaport (1942) describes this emerging movement and its use of the terms "context," "determining tendencies," "mental set," and "needs." According to Rapaport, these studies represented a desire to investigate "the situation as a whole" (p. 80).

Affect as Context

Researchers in the contextual tradition emphasized that the affective state of a subject during learning and recall would influence the quality of remembered material. For example, Pan (1926) wrote, "the recall of any material is favored by the presence of an environmental factor which has some associative connection with that material. In the absence of such an association, the environmental situation is likely to be unfavorable to recall" (p. 490). In perhaps one of the first mood induction studies, Sullivan (1927) manipulated success and failure in a group of children by providing them false performance feedback on a laboratory memory task. Children receiving failure feedback were slower to learn subsequent material. Barret (1938) observed, quite by accident, that subjects who were anticipating a school examination recalled unpleasant material better than pleasant material. To test this phenomenon further, she asked subjects to recall adjectives associated with pleasant and unpleasant character sketches. Though the results were equivocal, her goal was clearly to test whether the affectively toned sketches would promote recall of congruent adjectives.

These early studies represent the influence of the emerging Gestalt psychology's interest in perceptual phenomena and situational context as typified by the work of Bartlett (1932), Koffka (1935), and Pear (1922). Postman and Brown's (1952) experiment exemplifies the convergence of Gestalt ideas with mood-memory research. Systematic shifts in situational contexts were thought to lead to changes in sensitivity to certain kinds of self-relevant percepts. Postman and Brown hypothesized that recognition thresholds for words connoting success would be lowered in the context of a recent success experience. Parallel results were expected in the context of recent failures. In fact, subjects given false feedback about their high or low achievement on a laboratory visual perception test were later more likely to recognize words congruent with that experience. In a sense, Postman and Brown's work was the first study to manipulate contextual factors within the framework of an associational model of memory, and is thus the precursor to nearly all modern studies of the effects of mood on memory. For example, the following was stated by Postman and Brown in 1952 (but parallels Bower, 1981, if we substitute Bower's "nodes" for their "hypotheses"):

We may speculate that some situational cues directly arouse perceptual hypotheses . . . verbal labels and symbols which become attached to situations mediate the arousal of perceptual hypotheses in this manner . . . [Subjects] labeling of the situation as one of success or failure may well have mediated the differential arousal of hypotheses related to success and failure which then resulted in the observed threshold differences. (p. 219)
Though others also worked in this tradition (e.g., McClelland & Lieberman, 1949), the impact of emotion on memory was not a popular research avenue during most of the 1950s due to three overarching developments. Experimental psychology became increasingly influenced by neurological preparations in the early part of the decade, while the latter part of the 1950s was characterized by the introduction of computer-based information processing paradigms. Third, the Gestalt tradition continued to assert itself by spawning a social psychology interested in needs for completion, symmetry, and balance as its primarily motivating forces, rather than affects and drives. Finally, methodological criticisms of experiments in this tradition began to appear in the literature (e.g., Howes & Solomon, 1951).

The Ascendance of Cognition

Major breakthroughs in anatomical differentiation of neural function led to an emerging picture of the cerebral cortex as the repository of higher cognitive processes (Lashley, 1950; MacLean, 1949; Penfield & Rasmussen, 1950) and the subcortical limbic system as the center for drives and emotions (Bard, 1928; Hess, 1936; Olds, 1958; Papez, 1937). If one thinks of function following structure, emotions were relegated to grosser alerting and activation mechanisms and were no longer conceptualized as distinctive states or cues, as in the Darwinian tradition (Darwin, 1872). This view was reflected in prominent theories of emotion of the 1950s and early 1960s (Arnold, 1960; Duffy, 1962; Lindsley, 1957).

At the same time, models of thought processes were being recast into a more systematic framework of information processing by Broadbent (1958) and Cherry (1953), and conveyed to the social sciences by the writings of Neisser (1967) and Simon (1967). With heavy reliance on computer metaphor, these models included processes that were easily compartmentalized like encoding, storage, and retrieval of information; however, the computer had no obvious analogue for emotion. As with neurological researchers, early cognitive psychologists had little use for the important but less operationalizable affects.

Affect was also left unstudied by the emerging field of experimental social psychology. Influenced by Lewin's (1935) training in the Gestalt paradigm, social psychologists of the 50s and 60s emphasized motives toward cognitive consistency within the individual and balance in group dynamics (Cartwright & Harary, 1956; Festinger, 1957; Heider, 1958; Abelson et al., 1968). Consistency and balance were motivated by diffuse feelings of discomfort or arousal, according to these theorists, but not by differentiated emotional states. In light of this convergent research from three subdisciplines of psychology, a theory of affect that depicted emotion as arousal in the service of cognition offered a reasonable synthesis.

Schachter and his colleagues provided just such a model (Schachter & Singer, 1962; Schachter & Latane, 1964). Schachter tried to demonstrate that emotions are experienced when individuals seek to interpret autonomic arousal. Individuals were hypothesized to search the environment for cues that would enable them to explain these arousal states. In this model, cognitive evaluations steer us to appropriate emotional reactions by enabling us to label diffuse physiological states. Emotions were thought to begin with the activation of the autonomic nervous system and culminate in cognitive evaluations that focus arousal on a
specific target. Although Schachter's model of emotion has been the most influential view of affect during the past two decades, it has generally not withstood empirical challenge (Marshall & Zimbardo, 1979; Maslach, 1979; Reisenzein, 1983), and has been countered by influential differential emotions theorists (Ekman & Freisen, 1975; Izard, 1977, 1982; Schwartz, 1982; Tomkis, 1962, 1963) and Zajonc's (1980) advocacy of the separation of affect and cognition.

Another problem with Schachter's position was its failure to posit the interaction of affect and cognition within the confines of accepted information processing stages. Although Mandler (1975) attempted to provide this integration, his complex analysis did not lend itself to laboratory operationalization. The fact that an adequate understanding of emotion by researchers working within the information processing paradigm was lacking did not go unnoticed by mainstream experimental psychology; Norman (1980) listed it as one of the twelve future areas for cognitive science. From within traditional cognitive psychology, Bower emerged as the leading theorist and researcher of the role of emotion in information processing.

BOWER'S THEORY

The Network Theory of Affect

Bower (1981) and Bower and Cohen (1982) have explained the impact of mood on cognitive processes in terms of a semantic network and spreading activation model of memory (Anderson & Bower, 1973; Collins & Loftus, 1975), calling it the Network Theory of Affect. In the most comprehensive statement of this theory, Gilligan & Bower (1984) enumerated seven postulates. First, emotions are characterized as central units in a semantic network, with many connections to related ideas, autonomic activity, muscular and expressive patterns, and events. These central units are called "nodes," and in most respects are quite similar to cognitive concept nodes (Anderson & Bower, 1973). Second, emotion-laden material is encoded propositionally within the semantic network. Events are represented in terms of subject–response–object units (e.g., John wins lottery; John's family feels happy). Third, thought emerges through the activation of nodes within the semantic network. Once a node is stimulated, material (other nodes) associated with it can also be primed, and, if raised above threshold, activated. This activation can spread among conceptual, emotional, and propositional nodes. Fourth, a node can be activated by internal or external stimuli. Fifth, spreading activation is selective, reaching out primarily to neighboring nodes and related concepts. Sixth, associations among nodes are formed during learning. When new material is learned, it is associated with nodes already active at the time. Seventh, "consciousness" consists of a network of nodes activated above threshold at a given moment.

Four Hypotheses Derived from the Network Theory of Affect

Gilligan and Bower (1984) list four hypotheses deriving from the postulates described above:

1. State-Dependent Recall—superior memory occurs when the recall mood state matches the learning mood state.
2. Thought Congruity — subjects’ thoughts, free associations, fantasies, interpretations, and judgments are thematically congruent with their mood state.

3. Mood Congruity — material agreeing in emotional tone with the subject’s mood is learned best.

4. Mood Intensity — learning is positively correlated with the intensity of a mood.

In light of the literature to be reviewed, we will use the term *recall congruency* to represent Bower and Gilligan’s “thought congruity,” and *encoding congruency* to stand for the “mood congruity” hypothesis.

State-dependent recall is explained by the Network Theory of Affect in the following way. As in general state-dependent phenomena (e.g., Eich, 1980; Eich, Weingartner, Stillman, & Gillin, 1975), contextual factors serve as discriminatory cues, such that when learning and recall contexts match, memory is facilitated and when the two contexts differ, memory is inhibited. An illustration is of a poor soul who hides some money while drunk and cannot remember where it is until intoxicated once more. Similarly, emotion serves as an additional contextual cue in learning and recall. Suppose two word lists are to be learned in each of two different moods and then recalled in one or another of these moods.

When lists are learned in opposite moods, each list would become associated to a different emotion node. At the time of recall, a mood would activate the corresponding emotion node and spread activation to its associates. Reactivating a target list’s learning mood would result in superior recall due to enhanced accessibility only of that list, since the other list would have been associated to a different emotion node. However, recalling while in a different mood — e.g., trying to remember List 1 while in Mood 2 — would cause poor memory since the activated emotion node would (1) provide no retrieval paths to the target list, and (2) make the alternative list more accessible (and thus augment its interference effect) (Gilligan & Bower, 1984, p. 574).

When the need for retrieval cues is minimized (e.g., in recognition tasks or single list learning), the efficacy of emotion as a discriminatory cue will be diminished. Thus, the Network Theory of Affect predicts mood-dependent recall only in situations involving competing contextual cues.

According to the Network Theory of Affect, recall congruency (i.e., the thought congruity hypothesis) occurs when an induced mood activates particular emotion nodes that bias the person to search memory for related material. This biased search, as well as activation spreading from the emotion node, results in increased availability of mood congruent memories. Individuals in particular mood states should be more likely to retrieve newly learned material and autobiographical memories congruent with their moods.

Encoding congruency (i.e., the mood congruity hypothesis) occurs when an affective state facilitates the learning of new information congruent with concepts already associated with that affect. For example, happy individuals are more likely to encode information about a happy character than a sad character in a story that they have read. The Network Theory of Affect uses an ease of elaboration explanation for this phenomenon. Mood congruent information is more richly connected to activated nodes by nature of its shared themes and associations. This connectedness leads to a denser network of representation of the
incoming material. Incongruent material is less elaborated and thus encoded with fewer associations. Hence, it is less well learned and more difficult to retrieve. Network Theory predicts that encoding congruency only occurs where elaboration is necessary and possible. Thus, rapid presentation of very simple or very abstract stimuli does not allow for encoding congruency unless the experimenter specifically encourages elaboration. On the other hand, story material involving concrete incidents and characters would easily promote elaboration under mood congruent conditions during learning, producing the encoding congruency effect.

Finally, the mood intensity hypothesis also follows from Network Theory. As an induced mood increases in strength, there is a corresponding increase in activation of associated nodes in the network. Consciousness is thus increasingly occupied with mood congruent thoughts, restricting attention to mood congruent cues and making it difficult to process mood-irrelevant stimuli (see also Easterbrook, 1959). This effect is not manifested symmetrically in happy versus sad moods. When an individual feels intensely happy, attention is directed away from negative material and toward congruent stimuli and memories. However, sadness probably primes material in memory related to failure, introspection, and fatigue. Thus, intensely sad moods inhibit the processing of all kinds of external stimuli, congruent or incongruent.

**EVALUATING EMPIRICAL SUPPORT FOR THE NETWORK THEORY OF AFFECT**

The next section of this paper will summarize studies that investigated one or more of the four hypotheses suggested by the Network Theory of Affect or whose results have bearing on the theory. We will be concerned primarily with the state-dependency, recall congruency, and encoding congruency effects, and will only summarize briefly work related to mood intensity. This review of literature will be organized primarily by the four hypotheses and secondarily around the origin of the subjects' mood states, either laboratory induced or naturally occurring.

**Studies of State-Dependent Recall**

**Laboratory Induced Moods.** Table 1 summarizes studies investigating mood-dependent recall where moods are laboratory induced. Generally, these experiments used one of three mood induction procedures (MIPs): (a) self-generated imagery, whereby the subject is asked to find vivid and involving images of a past emotional experience and to use these images in order to produce the same emotional reaction, (b) Velmey's (1968) mood-inducing statements, where subjects read a set of ordered sentences designed to induce increasingly intense feelings of elation or depression, or (c) hypnosis, which typically involves self-generated imagery during an hypnotic state. Occasionally, other MIPs were used including threat of shock, evocative audio or videotapes, and physical exertion.

Second, one of two memory tasks was typically employed, either a single list learning paradigm or one involving a two list interference design. In the single list variant (e.g., Bower, Monteiro, & Gilligan, 1978, Exps. 1 & 2), subjects induced to feel happy or sad (in this case via hypnosis) are then given a list of words to learn. Later, after a filler task, they are reinduced into the same or opposite mood and are asked to recall the original list. State-dependent recall is revealed when
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<th>Subjects</th>
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<th>Memory Task</th>
<th>Results</th>
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<td>Bartlett, Burleson &amp; Santrock (1982)</td>
<td>16 preschoolers, 16 3rd graders</td>
<td>Happy, Sad</td>
<td>Self-generated imagery</td>
<td>Learned word list in mood, Recalled in same or different mood (single list)</td>
<td>No evidence for state-dependency</td>
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<td>Exp 1</td>
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<td>Same</td>
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<td>Exp 2</td>
<td>16 preschoolers, 16 3rd graders</td>
<td>Happy, Sad</td>
<td>Self-generated imagery</td>
<td>Recall words from story in free, cued, &amp; recognition tasks.</td>
<td>State-dependency in happy, not sad; State-dependency in free and cued recall</td>
</tr>
<tr>
<td>Bartlett &amp; Santrock (1979)</td>
<td>32 preschoolers</td>
<td>Happy, Sad</td>
<td>Experimenter modeling and story listening</td>
<td>Read story, recall info about happy, sad characters</td>
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<tr>
<td>Bower, Gilligan, &amp; Monteiro (1981)</td>
<td>16 college students, 16 mental health professionals</td>
<td>Happy, Sad</td>
<td>Hypnosis</td>
<td>Learned words from 2 lists. Target is first list.</td>
<td>State-dependency in happy, not sad in free recall but not cued recall</td>
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<tr>
<td>Exp 3</td>
<td>48 college students</td>
<td>Happy, Sad</td>
<td>Hypnosis</td>
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<td>Bower &amp; Mayer (1985)</td>
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<td>Bower, Monteiro, &amp; Gilligan (1978)</td>
<td>10 college students</td>
<td>Happy, Sad</td>
<td>Hypnosis &amp; Self-generated imagery</td>
<td>Learned words from 1 list</td>
<td>No state-dependency</td>
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<tr>
<td>Exp 1</td>
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<tr>
<td>Exp 2</td>
<td>16 college students</td>
<td>Happy, Sad</td>
<td>Hypnosis &amp; Self-generated imagery</td>
<td>Learn words from 1 list with 24 hour wait</td>
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<tr>
<td>Exp 3</td>
<td>10 college students</td>
<td>Happy, Sad</td>
<td>Hypnosis &amp; Self-generated imagery</td>
<td>Learned words from 2 16-word lists. Target is first list.</td>
<td>State-dependency in sad-happy-sad, happy-sad-happy</td>
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<td>14 adults in hypnosis workshops</td>
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<th>MIP</th>
<th>Memory Task</th>
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<tbody>
<tr>
<td>Clark, Milberg, &amp; Ross</td>
<td>37 college students</td>
<td>General Arousal</td>
<td>Exercise</td>
<td>Learned phrases varying in emotionality</td>
<td>No state-dependency</td>
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<tr>
<td>(1983) Exp 1</td>
<td></td>
<td>Arousal</td>
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<td>Happy, Sad,</td>
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<td>Learned phrases varying in emotionality</td>
<td>State-dependency for any kind of words</td>
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<td>Neutral</td>
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<td>No state-dependency in any condition</td>
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<td>Duncan, Todd, Perlmutter, &amp;</td>
<td>16 college students</td>
<td>General Arousal</td>
<td>Sexually</td>
<td>Studied pictures of toys.</td>
<td>No state-dependency in any condition</td>
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<td>Masters (1985)</td>
<td></td>
<td>Arousal</td>
<td>explicit</td>
<td>Recall in free, cued, &amp; recognition conditions</td>
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<td>film</td>
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<td>Self-generated</td>
<td>Presented with nonsense syllables on Day 1, recalled</td>
<td>State-dependency with delayed recognition in depressed mood only under conditions of &quot;constant&quot; input of material</td>
</tr>
<tr>
<td>Leight &amp; Ellis (1981)</td>
<td>80 college students (female)</td>
<td>Neutral</td>
<td>imagery</td>
<td>them on Day 2.</td>
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<tr>
<td>Macht, Spear, &amp; Levis</td>
<td>35 college students</td>
<td>Fear, Neutral</td>
<td>Threat of</td>
<td>Presented with list of words recalled in same session</td>
<td>State-dependent memory: more words recalled when learned state matched recall state</td>
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<tr>
<td>(1977) Exp 1</td>
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<td>shock</td>
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<td></td>
<td>80 college students</td>
<td>Fear, Neutral</td>
<td>Threat of</td>
<td>Presented with list of words, recognition and recall tasks.</td>
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<td></td>
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<td>shock</td>
<td>Followed by recall task.</td>
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<td>48 college students</td>
<td>Fear, Neutral</td>
<td>Threat of</td>
<td>Presented with list of words followed by recall task.</td>
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<td></td>
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<td>shock</td>
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<tr>
<td>Marshall, Garcia &amp; Beck</td>
<td>58 college students</td>
<td>Happy, Sad,</td>
<td>Threat of</td>
<td>Single-list and two-list paradigms both tested</td>
<td>No state-dependency in either paradigm</td>
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<tr>
<td>(1985) Exp 1</td>
<td></td>
<td>Neutral</td>
<td>shock</td>
<td>Presented with list of words, recall task after filler period.</td>
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<tr>
<td>Schare, Lisman, &amp; Spear</td>
<td>40 college students</td>
<td>Sad, Neutral</td>
<td>Velten</td>
<td>Learned list, 24 hour separation, recall task</td>
<td>No state-dependency memory effect</td>
</tr>
<tr>
<td>(1984) Exp 1</td>
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<td>Happy, Sad,</td>
<td>Velten</td>
<td>Two list interference paradigm</td>
<td>No state-dependency</td>
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<td></td>
<td>32 college students</td>
<td>Neutral</td>
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<td></td>
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<tr>
<td>Wetzler (1985)</td>
<td>140 college students</td>
<td>Happy, Sad,</td>
<td>Velten</td>
<td>Associations to stimulus words. Must recall both associations &amp; stimulus</td>
<td>State-dependency in both happy and sad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td></td>
<td>words. Must recall both associations &amp; stimulus words.</td>
<td>Using both interference and noninterference design there was no effect of mood on memory</td>
</tr>
</tbody>
</table>
subjects can remember more words on the list when their mood during recall matches their mood during initial learning of the words. In the two list interference paradigm, (e.g., Bower, Monteiro, & Gilligan, 1978, Exp. 3), subjects made to feel happy or sad are asked to learn a list of words. They then are induced to experience a mood state opposite that of their first mood and are given a second list to learn. Later, they reexperience one of these two moods and are required to recall the list learned in the first mood. Again, state-dependent recall is demonstrated when subjects show better recall for the word list in conditions where mood states are the same during learning and recall than when they differ.

In the Bower et al. (1978) studies, state-dependent recall was not demonstrated in the single list situation, even if there was a long delay between learning and recall. However, in their two list interference experiment, state-dependent learning effects were found. A very similar set of three experiments was conducted by Schare, Lisman, and Spear (1984), except these investigators induced either sad or neutral moods in their first two studies and happy or sad moods in the third, all by using the Velten statements. Their results corresponded to those of Bower et al. (1978). Mood-dependent effects were only obtained in the third experiment, the one using a two list interference procedure.

The results of mood-dependent recall studies using single list designs are relatively inconsistent. Some investigators have failed to find any effects using this method, such as Bartlett, Burleson, and Santrock (1982, Exp. 1) using self-generated imagery to induce moods; Leight and Ellis (1981, Exp. 2) using the Velten statements; Bower, Gilligan, and Monteiro (1981, Exp. 3) using hypnosis (and testing story rather than word list recall); and Macht, Spear, and Levis (1977, Exp. 2 & 3) using threat of shock. Clark, Milberg, and Ross (1983) used physical exertion and sexually explicit films to induce a general arousal state and tested for recall of phrases varying in emotionality. Although no mood state-dependent recall occurred, arousal state-dependent learning was demonstrated.

Occasionally, single list procedures have produced evidence of mood dependent recall. For example, Macht et al. (1977, Exp. 1) found it for fearful moods. Bartlett and Santrock (1979) induced happy and sad moods in children using modeling and story listening and found mood-dependent recall in happy but not sad moods and in free recall but not cued recall tasks. Bartlett, Burleson, and Santrock (1982, Exp. 2) also found mood-dependent recall in happy but not sad moods induced via self-generated imagery and in both free and cued recall tasks.

Initially, it appeared that two list interference experiments would show more consistent evidence in support of mood-dependent recall. Bower et al. (1978, Exp. 3) found this effect using hypnosis to induce happy and sad moods. Later, Schare, Lisman, & Spear (1984, Exp. 3) induced happy and sad moods using the Velten statements and also found mood-dependent recall. Each of these studies showed mood-dependent effects during happy states as well as sad ones. However, Bower and Mayer (1985) failed to replicate mood-dependency even though they used the same two list paradigm and hypnotically induced moods of comparable intensity to Bower et al. (1978). Bower and Mayer believe that the success of the earlier study may have been due to its "special" subject population, mental health workers attending a hypnosis workshop (as opposed to the usual college student sample). Wexler (1985) and Marshall-Garcia and Beck (1985) also were unable to replicate the mood-dependent recall effect using the two-list as well as the single list design.
Naturally Occurring Mood States. Several criticisms have been raised regarding laboratory mood induction procedures. They do not necessarily induce a single mood state, instead, producing blends of several emotions (Polivy, 1981). They are also susceptible to experimenter demand (Buchwald, Strack, & Coyne, 1981; Polivy & Doyle, 1980). Artificial mood states tend to be more intense than those typically experienced in an average day (Hasher, Rose, Zacks, Sanft, & Doren, 1985). Further, laboratory mood inductions generally rely on the marshalling of personal, affectively toned memories, thus prompting charges of circularity when emotional memories are later treated as dependent variables (Mathews & Bradley, 1983). Finally, laboratory MIPs involving hypnosis require subjects who score highly on tests of hypnotic susceptibility, limiting the generalizability of studies using this procedure.

To avoid these potential confounds, researchers have studied natural mood states in two ways. The first is to study a clinical population with diagnosed affective disorders such as depression or mania. The assumption here is that as patients cycle between normal and depressed moods (or depressed and manic states), they will have better access to material that was learned in a state congruent with their current state. The second methodology is to examine either normal, daily mood fluctuations within nonclinical populations, or to divide these samples on scales measuring depressed mood. These two procedures, however, have not yet been used in studies of mood-dependent recall, but will be seen later in tests of other effects of mood on memory.

Weingartner, Miller, and Murphy (1977) gave a free association task to eight manic-depressive patients over a time period in which they cycled between these two states. Later, they had to recall these associations in the same or different state from which they were originally generated. The patients showed superior recall when in the same state as their learning state. These effects were particularly strong for associations produced and recalled during manic states.

As can be seen in Table 2, we were unable to uncover any other tests of mood-dependent recall using naturally occurring mood fluctuations in clinical or normal populations. Perhaps this is because a successful test requires two learning tasks in two discrete moods and subsequent recall tasks in two moods, one identical and one opposed to the first. It is also difficult in a natural population to control for variability in mood and interference from extraneous variables between learning and recall.

1In these latter studies, subjects split into depressed and nondepressed groups learn new material and later are asked to recall it. Their mood state at recall is presumed to match that at encoding. This methodology does not allow a clear test of competing mood-memory hypotheses. Subjects who recall more material that parallels their mood state might benefit from the fact that the material matched their mood at encoding (encoding congruency), or that their mood at recall matched the effective tone of the material (recall congruency), or even that their learning and recall moods matched each other (mood-dependent recall). Experimenter that use this design cannot claim the superiority of one of these explanations for their results. We will describe these studies under the heading "Confounded Recall" in the section on recall congruency in naturally occurring mood states.
<table>
<thead>
<tr>
<th>Citation</th>
<th>Subjects</th>
<th>Moods</th>
<th>Memory Task</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weingartner, Miller, &amp; Murphy (1977)</td>
<td>8 manic depressive patients</td>
<td>Mania, Depression</td>
<td>Freely associated words to two nouns, repeated after 4 days &amp; repeated several more times as patients cycled between depression &amp; mania.</td>
<td>State-dependency in recall. Best memory when recall state matched learning state, particularly strong in mania.</td>
</tr>
</tbody>
</table>
Recall Congruency

Laboratory Induced Moods. Recall congruency is demonstrated when subjects who are experiencing a particular mood state show preferential recall (in speed or content) for material that is of the same affective tone as their mood. As can be seen in Table 3, many different mood induction procedures have been used to study this phenomenon including the Velten (1968) mood statements, hypnosis, self-generated imagery, success and failure feedback, receipt of a free gift, music, and even the weather.

(1) Velten Mood Induction Procedure. The most common way that recall congruency is investigated involves the induction of happy and sad moods using the Velten statements (occasionally accompanied by other procedures). One design is to present subjects with a list of pleasant and unpleasant words prior to the mood induction and then compare the recall of these words after mood induction. A second procedure asks subjects to generate cued or freely recalled autobiographical memories following mood induction, and then looks at selective recall of these memories or latency of their retrieval.

As Table 3 reveals, several investigators reported the recall congruency effect, for both happy and sad moods, using each of these procedures. Teasdale and Russell (1983) obtained it using the first design. In the second design, selective recall of autobiographical memories was reported by Madigan and Bollenbach (1982), Snyder and White (1982), and Mathews and Bradley (1983), who only induced sad mood. Teasdale and Fogarty (1979) found shorter latency for recall of positive memories in happy moods and longer latency for these memories in sad moods, but there was no difference in retrieval time for negative memories in either mood.

Teasdale and Taylor (1981) and Teasdale, Taylor, and Fogarty (1980) looked at both selective recall and latency of cued autobiographical memories. Teasdale and Taylor reported strong evidence for recall congruency in both happy and sad moods but Teasdale, Taylor, and Fogarty found congruency only for memories rated as extremely positive or negative. The measure of recall latency yielded more equivocal findings. Teasdale and Taylor reported faster retrieval for positive memories in happy mood and faster retrieval for negative memories in sad mood, but these differences were not statistically reliable due to small cell sizes. Teasdale, Taylor, and Fogarty reported only faster retrieval of positive memories in happy moods. Similarly, Riskind, Rhodes, and Eggers (1982) reported faster retrieval of positive memories in happy subjects but found this effect for negative memories only in sadness created with a subset of self-devaluative Velten statements.

Two teams of investigators reported finding weaker support for recall congruency when using the Velten statements to induce happy and sad moods. Sutherland, Newman, and Rachman (1982, Exp. 1) examined the effects of mood on individuals’ ability to dismiss unpleasant thoughts. They found that subjects were slower to remove an unpleasant thought when sad than when happy, but subjects in both of these conditions removed negative thoughts more slowly than neutral thoughts. Sutherland et al. found similar results using a different MIP (Exp. 2 used music), demonstrating asymmetrical support for recall congruency in sad but not happy moods. Siegel, Johnson, and Sarason (1979) measured selective recall using a life
### TABLE 3. Congruency in Recall: Induced Moods

<table>
<thead>
<tr>
<th>Citation</th>
<th>Subjects</th>
<th>Moods</th>
<th>MIP</th>
<th>Memory Task</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boggiano &amp; Hertel (1983)</td>
<td>92 college students</td>
<td>Positive, Neutral</td>
<td>Reward; Interest</td>
<td>Free recall of adjective list</td>
<td>Reward &amp; high interest increased recall of positive adjectives. Reward &amp; low interest increased recall of negative adjectives.</td>
</tr>
<tr>
<td>Bower, Gilligan, &amp; Monteiro</td>
<td>Exp 2 16 mental health professionals</td>
<td>Happy, Sad</td>
<td>Hypnosis</td>
<td>Read story &amp; recall info about happy &amp; sad characters</td>
<td>No congruency in recall</td>
</tr>
<tr>
<td>(1981)</td>
<td>Exp 4 16 mental health professionals &amp; students</td>
<td>Happy, Sad</td>
<td>Hypnosis</td>
<td>Read story &amp; recall info about pos &amp; neg incidents</td>
<td>No congruency in recall</td>
</tr>
<tr>
<td>Clark &amp; Teasdale (1985) Exp 1</td>
<td>74 college students</td>
<td>Happy, Sad</td>
<td>Music</td>
<td>Free recall of trait list</td>
<td>Congruency in both happy &amp; sad only in women</td>
</tr>
<tr>
<td>Clark, Milberg, &amp; Ross Exp 3</td>
<td>44 college students</td>
<td>Aroused</td>
<td>Exercise &amp; positive or neutral false feedback</td>
<td>Judgments of campus life, etc.</td>
<td>More positive judgments in happy mood</td>
</tr>
<tr>
<td>(1983)</td>
<td></td>
<td>happy, Aroused neutral</td>
<td>Vehem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silis, Thomas, McFarland, &amp;</td>
<td>160 college students</td>
<td>Sad, Neutral</td>
<td>Learn sentences, must later recall missing word from sentence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lane (1985)</td>
<td></td>
<td></td>
<td></td>
<td>Sad mood reduced the ability of subjects to recall the missing word (not really a test of congruency)</td>
<td></td>
</tr>
<tr>
<td>Fiedler, Pampe, &amp; Scherf (1986)</td>
<td>50 college students</td>
<td>Happy, Neutral</td>
<td>Vehem (in German)</td>
<td>Recall behaviors of target person</td>
<td>Generally, no mood congruent recall except for highly deviant behaviors</td>
</tr>
<tr>
<td>Fiedler &amp; Stroehm (1986)</td>
<td>36 college students</td>
<td>Happy, Neutral</td>
<td>Self-generated imagery for happy; guided imagery for neutral</td>
<td>Recall positive and negative pictures</td>
<td>Mood congruent recall for isolated pictures but not for categorized pictures</td>
</tr>
<tr>
<td>Fisher &amp; Marrow (1934)</td>
<td>7 college students</td>
<td>Happy, Sad</td>
<td>Hypnosis</td>
<td>Speed of associations to stimulus words</td>
<td>Faster RT for congruent associations</td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Citation</th>
<th>Subjects</th>
<th>Moods</th>
<th>MIP</th>
<th>Memory Task</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gerrig &amp; Bower (1982) Exp 1</td>
<td>14 college students</td>
<td>Happy, Angry</td>
<td>Hypnosis</td>
<td>Speed of recognition of previously presented words</td>
<td>No differences</td>
</tr>
<tr>
<td>Exp 2</td>
<td>12 college students</td>
<td>Happy, Angry</td>
<td>Hypnosis</td>
<td>Speed of recognition of previously presented affect-laden words</td>
<td>No differences</td>
</tr>
<tr>
<td>Izen et al. (1978) Exp 1</td>
<td>74 adults</td>
<td>Happy, Neutral</td>
<td>Free gift</td>
<td>Ratings of consumer products</td>
<td>Congruency in mood &amp; ratings</td>
</tr>
<tr>
<td>Exp 2</td>
<td>47 college students</td>
<td>Happy, Sad</td>
<td>Success, Failure</td>
<td>Free recall of trait list</td>
<td>Congruency for happy. No congruency in sad.</td>
</tr>
<tr>
<td>Laird, Wagener, Halal, &amp; Slepela (1982) Exp 1</td>
<td>60 college students</td>
<td>Happy, Sad</td>
<td>Posed facial expression: smile vs. frown</td>
<td>Read humorous vs. angry passage. Recall while smiling or frowning.</td>
<td>Recall facilitated by congruent facial expression for both conditions, but only among Ss whose facial expressions affected their mood. Same results as Study 1.</td>
</tr>
<tr>
<td>Exp 2</td>
<td>20 college students</td>
<td>Happy, Sad</td>
<td>Posed smile or frown</td>
<td>Heard and later recalled happy, sad, or angry sentences.</td>
<td>Congruency in all conditions, weak, p ≤ .05.</td>
</tr>
<tr>
<td>Madigan &amp; Bollenbach (1982) Exp 1A</td>
<td>52 adults</td>
<td>Happy, Sad, Neutral</td>
<td>Velten</td>
<td>Autobiographical memories to stimulus words</td>
<td>Congruency in both conditions</td>
</tr>
<tr>
<td>Exp 1B</td>
<td>43 college students</td>
<td>Happy, Sad</td>
<td>Velten</td>
<td>Autobiographical memories to stimulus words</td>
<td>Congruency in both conditions</td>
</tr>
<tr>
<td>Exp 2</td>
<td>43 college students</td>
<td>Happy, Sad</td>
<td>Velten</td>
<td>Associations to stimulus words</td>
<td>Congruency in both conditions</td>
</tr>
<tr>
<td>Mathews &amp; Bradley (1983)</td>
<td>73 medical students</td>
<td>Sad, Neutral (within subjects)</td>
<td>Velten &amp; music</td>
<td>Autobiographical memories to stimulus words</td>
<td>Congruency</td>
</tr>
<tr>
<td>Mischel et al. (1976)</td>
<td>90 college students</td>
<td>Happy, Sad, Neutral</td>
<td>Success, Failure</td>
<td>Recognition of self-descriptive traits</td>
<td>Congruency in positive condition only</td>
</tr>
<tr>
<td>Study</td>
<td>Experiment</td>
<td>Participants</td>
<td>Mood Conditions</td>
<td>Memory Task</td>
<td>Findings</td>
</tr>
<tr>
<td>------------------------</td>
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<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Nasby &amp; Yando (1982)</td>
<td>Exp 1</td>
<td>108 5th-grade children</td>
<td>Happy, Sad, Neutral</td>
<td>Free recall of adjective list</td>
<td>Congruency in positive only</td>
</tr>
<tr>
<td></td>
<td>Exp 2</td>
<td>40 5th-grade children</td>
<td>Happy, Sad, Neutral, Angry, Neutral</td>
<td>Self-generated imagery</td>
<td>No congruency in recall</td>
</tr>
<tr>
<td>Natale &amp; Hantas (1982)</td>
<td></td>
<td>54 female college students</td>
<td>Happy, Sad, Neutral</td>
<td>Free recall of autobiographical memories, accuracy of trait term recognition, and intensity ratings of affect-laden slides</td>
<td>Congruency in positive and negative: Response bias toward congruent traits in positive and negative. No memory strength diff.</td>
</tr>
<tr>
<td>Postman &amp; Brown (1952)</td>
<td></td>
<td>67 male college students</td>
<td>Happy, Sad</td>
<td>Success, Failure</td>
<td>Congruency—more easily recognize congruent words</td>
</tr>
<tr>
<td>Potts, Morse, Felleman, &amp; Masters (1986)</td>
<td></td>
<td>72 2nd-grade children</td>
<td>Happy, Sad, Neutral</td>
<td>Self-generated imagery for happy/sad; series of questions for neutral</td>
<td>Various interactions obtained but no effect for recall congruency for any of the recall or recognition tasks.</td>
</tr>
<tr>
<td>Riskind, Rholes, &amp; Eggers (1982)</td>
<td></td>
<td>52 college students</td>
<td>Happy, Sad-self-devaluative, sad-so-matic, sad-com-plained</td>
<td>Latency of free recall of autobiographical memories</td>
<td>Congruency in happy for positive memories; congruency only in sad, self-devaluative condition</td>
</tr>
<tr>
<td>Salovey &amp; Singer (1985)</td>
<td>Exp 1</td>
<td>60 college students</td>
<td>Happy, Sad, Neutral</td>
<td>Free recall of autobiographical memories from audiotapes</td>
<td>No MIP differences</td>
</tr>
<tr>
<td></td>
<td>Exp 2</td>
<td>30 college students</td>
<td>Happy, Sad, Neutral</td>
<td>Self-generated imagery</td>
<td>No congruency</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Free recall of autobiographical recent memories</td>
<td>Congruency in positive and negative moods</td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Citation</th>
<th>Subjects</th>
<th>Moods</th>
<th>MIP</th>
<th>Memory Task</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exp 2 93 college students</td>
<td>Happy, Sad, Neutral</td>
<td>Weather</td>
<td>Life experience survey</td>
<td>Congruency in both</td>
</tr>
<tr>
<td>Siegel, Johnson, &amp; Sarason (1979)</td>
<td>38 college students</td>
<td>Happy, Sad, Neutral</td>
<td>Velten</td>
<td></td>
<td>No congruency</td>
</tr>
<tr>
<td>Small (1985)</td>
<td>10 college students</td>
<td>Happy, Sad, Neutral</td>
<td>Velten</td>
<td>Recognition thresholds for depressive words were lower for sad subjects than neutral subjects</td>
<td></td>
</tr>
<tr>
<td>Snyder &amp; White (1982)</td>
<td>Exp 1 30 female college students</td>
<td>Happy, Sad</td>
<td>Velten</td>
<td>Free recall of recent autobiographical memories</td>
<td>Congruency in both, stronger for positive</td>
</tr>
<tr>
<td></td>
<td>Exp 2 97 female college students</td>
<td>Happy, Sad</td>
<td>Velten &amp; Expectancy</td>
<td>Frequency of ratings on event list</td>
<td>Congruency in both (interaction with expectancy)</td>
</tr>
<tr>
<td>Sutherland, Newman, &amp; Rachman (1982)</td>
<td>Exp 1 32 adults</td>
<td>Happy, Sad</td>
<td>Music</td>
<td>Removal time of an intrusive thought</td>
<td>Longer time to remove negative intrusive thought in sad mood and in happy mood</td>
</tr>
<tr>
<td></td>
<td>Exp 2 16 adults</td>
<td>Happy, Sad</td>
<td>Music</td>
<td>Removal time of an intrusive thought</td>
<td>Same as above</td>
</tr>
<tr>
<td>Teasdale &amp; Fogarty (1979)</td>
<td>16 college students</td>
<td>Happy, Sad (within subjects)</td>
<td>Velten</td>
<td>Time to retrieve pleasant &amp; unpleasant memories cued by word list</td>
<td>Faster retrieval of positive memories in happy mood, slower in sad mood. No effect on negative memories.</td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Mood Conditions</td>
<td>Method</td>
<td>Findings</td>
<td></td>
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<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Teasdale &amp; Russell (1981)</td>
<td>32 female college students</td>
<td>Happy, Sad (within subjects)</td>
<td>Velten Free recall of word list</td>
<td>More positive words recalled in happy; more negative words recalled in negative congruency in both happy &amp; sad. Congruent memories are more likely to be recalled in both moods. Faster retrieval of positive memories in happy condition, Faster retrieval of negative memories in sad condition (weak effect). Congruent memories are more likely to be recalled in both moods if rated as &quot;extremely&quot; positive or negative. Faster retrieval of positive memories when happy. No difference in latency in sad moods. Positive affect increased expectations, higher evaluations of past successes, higher self-evaluations. Opposite for negative affect (i.e., congruency in both moods).</td>
<td></td>
</tr>
<tr>
<td>Teasdale &amp; Taylor (1981)</td>
<td>37 female college students</td>
<td>Happy, Sad (within subjects)</td>
<td>Velten (modified) Time to retrieve pleasant and unpleasant memories cued by word list &amp; probability of congruent memory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teasdale, Taylor, &amp; Fogarty (1980)</td>
<td>20 college students</td>
<td>Happy, Sad (within subjects)</td>
<td>Velten Time to retrieve pleasant and unpleasant memories cued by word list &amp; probability of congruent memory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wright &amp; Mischel (1982)</td>
<td>72 college students</td>
<td>Happy, Sad, Neutral</td>
<td>Self-generated imagery crossed with success &amp; failure</td>
<td>Expectations for total performances, self-appraisal</td>
<td></td>
</tr>
</tbody>
</table>
events inventory, but mood proved to have no impact on recall of individuals’ experiences.

It could be argued that the failure to find unequivocal support for recall congruency in the latter two studies was due to their unorthodox dependent variables. However, another possibility is that the seemingly strong support for recall congruency seen in the studies reported earlier may be limited by methodological problems that cast doubt upon the stability of their results. Before turning to studies investigating recall congruency using MIPs other than the Velten statements, we will discuss some of these methodological concerns.

The most significant of these is the failure to include a neutral mood, “control” group. Without a neutral group, the experimenter assumes that differences in the expected direction are due to the impact on recall of both the happy and the sad mood. However, the relative difference in recall of positive or negative material in happy versus sad moods may be due to effects in either of the two conditions. With no control group, it is impossible to determine which condition is (or if both conditions are) accounting for the facilitation of congruent memories or the inhibition of incongruent memories.

With two exceptions, all of the studies listed earlier reporting recall congruency do not include neutral control conditions. When Madigan and Bollenbach (1982) included a neutral condition in the first of three reported studies, they failed to find significant recall congruency. The effect was only significant in their second and third studies, which did not include neutral mood groups. Second, Mathews and Bradley (1983) used neutral and sad mood groups but did not induce happiness in any subjects. Hence, it is difficult to determine whether effects found in the sad (as compared to neutral) condition indicate facilitation of congruent or inhibition of incongruent memories. The only study that reported absolutely no support for recall congruency (Siegel et al., 1979) was one of the few to include the neutral condition.

In addition to their lack of neutral mood control groups, the various studies by Teasdale and his colleagues also relied upon a within-subjects manipulation of happy and sad mood. That is, subjects were first given one set of mood statements, performed the recall task, and were later given the opposite set of mood statements in the same session. Contrasting the two mood conditions within the same subject makes the already demand-prone mood induction situation even more susceptible to subject compliance with experimenter hypotheses. Teasdale and his colleagues attempted to reduce this demand by including measures of recall latency in their studies of mood congruent content in memory. In their most recent work, the within-subjects design has been abandoned (Clark & Teasdale, 1985), but, as we will discuss, the results of this study were less supportive of recall congruency.

(2) Hypnotic Mood Induction Procedure. Due partly to the demand characteristics inherent in the Velten Mood Induction Statements, other investigators have examined recall congruency using different laboratory mood induction procedures. Fisher and Marrow (1984) were among the first investigators to induce moods through hypnosis in order to investigate recall congruency. In a study involving only seven subjects hypnotized to feel either happy or sad, Fisher and Marrow found that mood congruent associations were faster than incongruent ones. More recently, Bower, Gilligan, and Monteiro (1981, Exp. 2 & 4) used hypnosis to
induce either happy or sad moods. Subjects then read stories describing characters (Exp. 2) and incidents (Exp. 4) that were positively or negatively toned. Recall congruency would be demonstrated if subjects showed better recall for characters or incidents consistent with their affective state. Both experiments showed no selective recall in either mood state. Gerrig and Bower (1982) performed similar experiments except they looked at the speed of recognition for previously presented words varying in affective quality. Again, no differences were found for happy versus sad subjects.

The one study using hypnosis to induce moods that found evidence for recall congruency was performed by Natale and Hantas (1982), employing happy, sad, and neutral moods. Natale and Hantas found that the free recall of autobiographical memories was selectively influenced by mood state. Their results repeated the earlier finding that happy moods facilitate the recall of positive memories and inhibit the recall of negative memories while sad moods inhibit the recall of positive memories but have no effect on negative memories. Other findings for recognition of self-relevant personality traits and discrimination between old and new items were more ambiguous.

(3) Self-Generated Imagery Mood Induction Procedure. Inducing moods through self-generated imagery attempts to preserve the intensity of the hypnotic procedure while more closely approximating ongoing affect-laden thought. In a recent set of experiments, we (Salovey & Singer, 1985) induced happy, sad, and neutral states using either self-generated imagery or a guided imagery exercise (listening to stories about a friend’s fatal illness or a tropical vacation). In one experiment, we found very weak congruency in autobiographical memories from childhood using either mood induction procedure. However, when the experiment was repeated (using only self-generated imagery), and recent personal memories were requested, mood congruency effects were observed in both happy and sad moods, due primarily to the inhibition or facilitation of positive memories.

Two studies using self-generated imagery found stronger recall congruency effects in happy mood states as compared with sad ones (Nasby & Yando, 1982; Schwarz & Clore, 1983). Nasby and Yando (1982, Exp. 1) induced happy, sad, and neutral moods in children and noted selective recall of adjectives congruent only with happy mood. When anger was contrasted with a neutral state (Exp. 2), subjects showed no recall congruency. Schwarz and Clore (1983, Exp. 1) induced happy, sad, and neutral moods and found congruency in ratings of happiness and life satisfaction for happy states as well as for sad states but only when subjects made internal attributions for the cause of their sadness.

(4) Other Mood Induction Procedures. In a self-generated imagery induction combined with success and failure feedback, Wright and Mischel (1982) found that happy moods increased subjects’ expectation for success and produced higher evaluations of past successes and of themselves. Sad moods produced the opposite effects. The strength of Wright and Mischel’s (1982) study might be due to the particular intensity and realism of their false-feedback mood induction procedure. An early study of recall congruency using this MIP (Postman & Brown, 1952) also found unequivocal results. However, more recent experiments using false-feedback manipulations of mood, once again show strong selective recall in
happy states and more ambiguous results in sad moods (Isen, Shalker, Clark & Karp, 1978, Exp. 2; Mischel, Ebbesen, & Zeiss, 1976).

An even more realistic mood induction procedure than feedback is the actual receipt of a free gift or bonus. Isen et al. (1978, Exp. 1) found that subjects who were made to feel happy by receiving a free gift rated more highly the attributes of various consumer products. Similarly, Boggiano and Hertel (1983) found that subjects who received a reward for an interesting activity (i.e., a bonus) were more likely to recall positive adjectives than subjects who received a reward for an uninteresting task (i.e., a bribe).

Finally, some investigators have used very subtle mood induction procedures (presumably less demand-prone) like music or weather. Recently, Clark and Teasdale (1985, Exp. 1) reported recall congruency using music in both happy and sad moods for women but not men. Sutherland, Newman, and Rachman (1982, Exp. 2) found recall congruency (using music as their MIP) in sad moods but not in happy moods, contrary to other investigators who have tended to find weaker congruency in sad moods compared to happy moods. Lastly, Schwall & Clare (1983, Exp. 2) reported that college students give higher happiness and life satisfaction ratings on warm, sunny days as compared with rainy days, an effect presumably mediated by mood.

(5) Summary. In general, the evidence for recall congruency seems to be mildly supportive. Despite the methodological limitations of the various mood induction procedures, subjects do tend to show selective retrieval of autobiographical and learned material consistent in affective tone with the experimentally induced mood. A relatively large group of studies (particularly those using the Velten statements to induce moods) have found the recall congruency effect in both happy and sad moods. A smaller group of studies did not show this effect at all, while some studies showed asymmetrical evidence of recall congruency. Typically, when asymmetrical results were obtained, happy moods led to the recall of congruent memories but sad moods failed to show a parallel effect. Another related asymmetry is that recall congruency was often due to the facilitation of recall of positive memories in happy moods or the inhibition of these same memories in sad moods. Mood tended to have less of an impact on the recall of negative memories. The asymmetry of recall congruency in happy and sad moods suggests a constraint upon and an alternative to the recall congruency hypothesis. We will propose later in this paper that subjects may be motivated to terminate negative moods by recruiting competing positive associations. In an effort to regain a positive mood state, they may short-circuit the spread of negatively toned material (cf. Isen, 1985).

Another methodological concern that we have yet to mention is the circular nature of experimental paradigms that rely on cognitive strategies to induce mood states and then measure changes in affectively toned cognitions. Particularly troubling in this regard are studies relying on the Velten statements and those using self-generated imagery. More behavioral MIPs like false feedback or the presentation of a free gift are less plagued by this problem, and, in fact, often show stronger support for recall congruency. In an attempt to avoid this circularity, some investigators have chosen to examine populations already experiencing mood states, rather than to induce them. We will turn next to studies of this type that investigated recall congruency.
Naturally Occurring Mood States. As can be seen in Table 4, there are two research strategies used in studying the effects of naturally occurring mood states on recall of material from memory. The first and stronger of these methodologies involves comparing clinically depressed patients with normal populations or clinical populations who do not have affective disorders. The second strategy, and one that has produced mixed results, is to use college student samples split at the median of a depression inventory and then compared. Both of these strategies can result in a confounding of recall effects with mood congruent encoding, a problem alluded to in Footnote 1. We will first describe unconfounded experiments and then move to those with confounded designs.

(1) Unconfounded Recall Studies. Lloyd and Lishman (1975) measured memory retrieval speed in depressed patients. The ratio of retrieval speed of positive or negative memories was inversely correlated with severity of depression. Further, more depressed subjects recalled more intensely negative memories than less depressed subjects. However, Clark and Teasdale (1982) found that depressed patients showed no differences in retrieval latencies of positive and negative memories as the severity of their depressions waxed and waned. But, Clark and Teasdale noted that patients did recall more sad memories as they became more depressed and more positive memories as they became less depressed.

The first study of mood variation in normal subjects and recall congruency was conducted by Johnson (1937) who found no relation between mood and speed of positive and negative free associations but a slight trend toward congruency in content. Mayo (1983) also failed to find a relationship between latency of recall of positive and negative autobiographical memories and current mood state. Further, Mayer and Bremer (1985) failed to find recall congruency in associations or category enumeration (see also Mayer & Volanthy, 1985).

(2) Confounded Recall Congruency. The following set of studies looked for recall congruency effects but failed to control for mood at encoding. Typically these studies rely on differences in recall of material learned in the course of the experiment as opposed to the less confounded experiments which relied on the free recall of pre-existing autobiographical memories. The recall of fewer positive memories by depressed patients (but no differences in negative memories) was noted by several investigators (Breselow, Kocsis, & Belkin, 1981; McDowall, 1984, Exps. 1 & 2). Slife, Miura, Thompson, Shapiro, and Gallagher (1984, Exp. 1) found better recall for “disliked” nonsense syllables among depressed elderly adults compared to normal elderly adults as well as normal college students. In a second experiment in which they examined only depressed patients, Slife et al. (1984, Exp. 2) found that severity of depression correlated with the affective tone of recalled syllables. However, several researchers reported no differences between clinically depressed individuals and normals or non-depressed patients (Roth & Rehm, 1980; Silberman, Weingart, Laraia, Byrnes, & Post, 1983).

Let us now turn to studies that divided normal samples at the median of some depression inventory. Although Pietromonaco and Markus (1985) found no relation between mood (as measured by the Beck Depression Inventory) and recall of positive and negative memory content, Mathews and Bradley (1983, Exp. 1) did find that students scoring higher on the Depression Adjective Checklist (DACL; Lubin, 1965) were less likely to recall positive traits and more likely to recall
<table>
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<th>Results</th>
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<tr>
<td>Breslow, Kocsis, &amp; Belkin (1981)</td>
<td>21 depressed patients, 21 controls</td>
<td>Depression vs. control</td>
<td>Recall of previously learned story</td>
<td>No differences for negative and neutral content. Depressed subjects recalled less positive content.</td>
</tr>
<tr>
<td>Johnson (1937)</td>
<td>30 female college students</td>
<td>Daily mood variation happy vs. sad</td>
<td>speed of free associations to stimulus words</td>
<td>No differences in speed. Trend toward mood congruency in content of associations.</td>
</tr>
<tr>
<td>Kuiper &amp; Derry (1982)</td>
<td>46 college students</td>
<td>Split at BDI = 9; mild depressed vs. normal</td>
<td>Recall of self-referent adjective list</td>
<td>Enhanced self-referent recall only for positive words in normals but for positive &amp; negative words when depressed.</td>
</tr>
<tr>
<td></td>
<td>Exp 2 52 college students</td>
<td>Split at BDI = 9; mild depressed vs. normal</td>
<td>Recall of adjective list but no longer all self-relevant</td>
<td>Nondepressed subject show enhanced self-referent recall for nondepressed content. Depressed show enhanced self-referent recall for depressed content. No self-reference enhancement among depressed in nondepressed content.</td>
</tr>
<tr>
<td>Lloyd &amp; Lishman (1975)</td>
<td>40 inpatients for depression</td>
<td>Degree of depression on BDI</td>
<td>Speed of recall of free associations to stimulus words</td>
<td>Speed of pleasant vs. unpleasant memory ratio is negatively correlated with BDI. More depressed subjects recalled more intensely negative memories.</td>
</tr>
<tr>
<td>Mathews &amp; Bradley (1983)</td>
<td>Exp 1 73 medical students</td>
<td>Degree of depression on DACIL</td>
<td>Recall of positive and negative traits from list</td>
<td>More depressed recalled fewer positive traits and more negative traits.</td>
</tr>
<tr>
<td>Exp 2, 21 medical students</td>
<td>Depression on DACL followed by induction with music</td>
<td>Recall of positive and negative traits from list and autobiographical memories to stimulus words</td>
<td>No congruency until after MIP. More negative moods recalled following negative MIP.</td>
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<tr>
<td>Mayo (1983) 59 students and secretaries</td>
<td>Self-report of current mood state</td>
<td>Depressed vs. not</td>
<td>No correlation between current mood state and any memory measure</td>
<td></td>
</tr>
<tr>
<td>McDowall (1984) Exp 1, 60 clinically depressed, not depressed psychiatric, normal hospital staff</td>
<td></td>
<td></td>
<td>Depressed subjects free recall, fewer pleasant words, but no differences in categorized recall.</td>
<td></td>
</tr>
<tr>
<td>Exp 2, 30 depressed patients</td>
<td>All depressed</td>
<td>3 groups: shown pleasant list; shown unpleasant list; shown mixed list</td>
<td>Differences in mixed list condition only. Subjects remember fewer positive than negative words. Depression unrelated to recall of sentences. Nondepressed show enhanced recall of &quot;social&quot; sentences. No significant differences in recall of positive vs. negative adjectives.</td>
<td></td>
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<tr>
<td>Pietromonaco &amp; Markus (1985) 75 female college students (45 in final analysis)</td>
<td>Split at BDI = 9</td>
<td>Focus on self or other while recalling sentences describing an event.</td>
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<tr>
<td>Roth &amp; Rehm (1980) 20 depressed patients 20 nondepressed psychiatric patients</td>
<td>BDI split = 20</td>
<td>Recall of personally relevant adjectives from list</td>
<td></td>
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<tr>
<td>Slife, Miura, Thompson, Shapiro, &amp; Gallagher (1984) 23 diagnosed depressed elderly adults; 23 normal elderly adults; 23 normal college students</td>
<td>BDI split = 17</td>
<td>Rated &quot;liking&quot; of nonsense syllables. Recall of same.</td>
<td>Depressed recalled more &quot;disliked&quot; nonsense syllables than non-depressed groups.</td>
<td></td>
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<tr>
<td>Citation</td>
<td>Subjects</td>
<td>Moods</td>
<td>Memory Task</td>
<td>Results</td>
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| Exp 2    | 20 depressed elderly adults assigned to 3 therapies:  
 -Behavioral 
 -Cognitive 
 -Psychodynamic | Depressed following therapy | Rated "liking" of nonsense syllables.  
 Recall of same. | No differences between therapy types.  
 Change from recall bias toward negative items at beginning of therapy  
 to bias toward positive items at end.  
 BDI scores correlated with recall of negative items. |
| Silberman, Weingartner, Laraia, Byrnes, & Post (1983) | 31 depressed patients; 31 normal college students & hospital employees | Depressed, Normal | Recall of 40 words, half are high emotionality & half are low; half highly concrete & half low. | No recall differences between depressed and "normal." No differences in recognition. |
negative traits than college students with lower DAACL scores. However, a attempted replication failed until mood states were bolstered using an induction technique (Mathews & Bradley, 1983, Exp. 2). Finally, a methodologically more sophisticated study by Kuiper and Derry (1982) revealed that normal subjects showed superior recall for positive self-relevant adjectives while mildly depressed subjects showed the enhanced self-referent recall bias for both positive and negative moods. In a second study, the normals showed enhanced self-referent recall for nondepressed adjectives while the mildly depressed group showed this recall bias for negative but not for positive adjectives.

One reason for the weak support of recall congruency seen in studies that compare mildly depressed to normal college students (based upon a median split on a depression inventory like the BDI; Beck, 1976) is that the depressed group typically contains many individuals whose BDI scores would not be considered to indicate depression when the scale is used clinically. Often, these researchers divide subjects into a group scoring below eight or nine on the BDI and one above eight or nine. Yet, the designers of this instrument consider clinical depression to be indicated by scores above 17. It is unlikely that a student scoring a ten on the BDI would show noticeably greater negative affect than one scoring a six. And, even if slight mood differences were noted, the effect of these subtle differences in mood would be unlikely to affect cognitive processing.

More supportive are studies using clinically depressed patients. Although results of these studies were mixed, they tended to replicate the findings of the induction studies. When recall congruency is noted, the effect appears to be due primarily to changes in the availability of positive material.

**Encoding Congruency**

A promising line of research has been concerned with the encoding congruency effect, the tendency for material that is congruent with a mood state to be better elaborated in the associative network and consequently better learned than incongruent material. In these experiments, moods are induced followed by a task involving the reading of a story or the learning of a list. Then, after the induced mood has worn off, subjects are tested for recognition or recall of this previously learned material.

**Laboratory Induced Moods.** In an initial test of the encoding congruency hypothesis, Bower, Gilligan, and Monteiro (1981, Exp. 1 & 5) asked subjects who had been hypnotized to feel happy or sad to read a story describing positive and negative incidents and characters (see Table 5). Later, after their moods had dissipated, subjects tended to recall information about story characters whose affect was congruent with their mood at time of first reading the story. In Experiment 1, this effect was particularly strong for sad moods, and in Experiment 5, the effect was more pronounced for congruent incidents than for congruent characters. In a later study, Gilligan and Bower (1983) elicited autobiographical associations to phrases following mood induction. Later, subjects who were originally happy were able to recall more happy phrases than sad phrases, while subjects in the sad induction condition were more likely to recall sad phrases than happy ones. However, in a related test, studies showed no evidence of encoding congruence for cued material that was originally learned during a mood state.
<table>
<thead>
<tr>
<th>Citation</th>
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<th>MIP</th>
<th>Memory Task</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bower, Gilligan, &amp; Monteiro (1981)</td>
<td>Exp 1 16 college students</td>
<td>Happy, Sad</td>
<td>Hypnosis</td>
<td>Read story, recall info about happy or sad character &amp; incidents (mood-induced prior to story reading, happy/sad story is between subjects)</td>
<td>Tend to show better recall when story character feels the same as subjects when they read the story. Stronger in sad condition.</td>
</tr>
<tr>
<td></td>
<td>Exp 5 16 mental health professionals &amp; college students</td>
<td>Happy, Sad</td>
<td>Hypnosis</td>
<td>Read story, recall info about happy &amp; sad characters &amp; incidents</td>
<td>Congruency between mood when reading and recall of positive and negative incidents but not for happy &amp; sad characters. Neutral subjects recall more &quot;elaborated&quot; sentences, no differences on &quot;base&quot; sentences</td>
</tr>
<tr>
<td>Ellis, Thomas, &amp; Rodriguez (1984)</td>
<td>Exp 1 88 college students</td>
<td>Sad, Neutral</td>
<td>Velten</td>
<td>Recall of sentences that are &quot;base&quot; or &quot;elaborated&quot;</td>
<td>Depressed subjects recall fewer words in both instruction sets. Neutral subjects recalled more high effort than low effort words. No difference between the two among sad subjects</td>
</tr>
<tr>
<td></td>
<td>Exp 2 40 college students</td>
<td>Sad, Neutral</td>
<td>Velten</td>
<td>Recall of word list following semantic vs. nonsemantic orienting instructions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exp 3 32 college students</td>
<td>Sad, Neutral</td>
<td>Velten</td>
<td>Recall of missing words from &quot;high effort&quot; &amp; &quot;low effort&quot; sentences.</td>
<td></td>
</tr>
<tr>
<td>Gilligan &amp; Bower (1983)</td>
<td>16 mental health professionals</td>
<td>Happy, Sad</td>
<td>Hypnosis</td>
<td>Autobiographical associations to phrases while under MIP. In same session, must recall phrases while in neutral mood. Also in neutral mood</td>
<td>Happy readers recall more happy phrases than sad phrases; sad readers recall slightly more sad phrases than happy ones; sad</td>
</tr>
<tr>
<td>Study</td>
<td>Age/Condition</td>
<td>Procedure Details</td>
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<tr>
<td>Nasby &amp; Yando (1982) Exp 1</td>
<td>108 5th-graders</td>
<td>Happy, Neutral, Sad: Self-generated imagery (induced both before encoding and before retrieval) Presented with list of 24 adjectives &amp; then must recall later in same session.</td>
<td></td>
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<tr>
<td>Exp 2</td>
<td>48 5th-graders</td>
<td>Happy, Angry: Self-generated as above Presented with list of 24 adjectives to be recalled in same session.</td>
<td></td>
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<tr>
<td>Potts, Morse, Felleman, &amp; Masters (1986)</td>
<td>72 2nd grade children</td>
<td>Happy, Sad, Neutral: Self-generated imagery for happy/sad; series of questions for natural Listen to story with positive or negative content. Free and cued recall and recognition of content.</td>
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</table>

Subjects tend to have sadder associations but the effect is weak; No evidence for mood congruity in cued recall. For mood at encoding: happy subjects recall more positive words, sad subjects recall fewer positive words, only when words were high or medium frequency. No differences for any negative words. For mood at retrieval: happy mood subjects recall more positive words. No effects for sad subjects on positive or negative words. For state dependency: no state-dependency effects. At encoding: fewer positive words recalled by angry subjects, greater number of negatives recalled by angry subjects. At retrieval: no differences. For state dependence: no differences. Various interactions obtained but no effect for encoding congruency for any of the recall or recognition tasks.
Nasby and Yando (1982) conducted a similar study on children, but used self-generated imagery to induce moods. They found that a happy mood during encoding enhanced recall of positive material while a sad mood during encoding inhibited the recall of positive information. In a second study, induced anger also interfered with the encoding of positive adjectives, but also facilitated the learning of negative information. Using the Velten statements to induce just sad and neutral moods, Ellis, Thomas, and Rodriguez (1984) then asked subjects to learn sentences and words differing in cognitive effort required to master them. Across three experiments, the subjects induced to be sad showed decreased recall for high effort words and sentences.

Using three different mood manipulations as well as three different types of learning tasks, three different laboratories have produced support for the encoding congruency hypothesis. Although stronger effects in sadness were produced by Bower et al. (1981), Nasby and Yando (1982) and Gilligan and Bower (1983) showed better recall for positive information learned in happy moods. All published laboratory studies of encoding congruency have yielded positive results. However, the one study using naturally occurring moods to test encoding congruency, failed to obtain the desired result.

Naturally Occurring Moods. As indicated in Table 6, Hasher et al. (1985) reported three studies of encoding congruency using college students split into two groups based on a median BDI score of six (Exp. 1 and 2) or seven (Exp. 3). Using story recall tasks similar to Bower et al. (1981), these researchers report no differences in encoding congruency in any of their studies. Mayer and Bower (1985) have criticized this set of studies on grounds that naturally occurring mood shifts in nondepressed subjects are not as intense as laboratory induced mood states and that the investigators failed to use procedures that would allow for an optimal test of the encoding congruency hypothesis.

Mood Intensity

The mood intensity hypothesis states that extreme increases in positive mood cause increases in the firing of associated nodes in memory whereas while extremely intense sad moods inhibit the firing of both congruent and incongruent nodes in memory. Historically, that hypothesis has been framed somewhat differently, simply that affectively intense memories, regardless of affective quality, are remembered more accurately and over longer periods of time (Dutta & Kanungo, 1967; Dutta & Kanungo, 1975; Holmes, 1970; Kanungo, 1968; Kanungo & Dutta, 1966; Menzies, 1935; Robinson, 1980; Turner & Barlow, 1951; Waters & Leeper, 1936). For example, Dutta and Kanungo (1975) reported a series of five experiments in which the perceived affective intensity of a memory was the best predictor of which memories were more effectively recalled. These researchers concluded that affective memory is organized around the current intensity the event holds for the individual, regardless of its affective quality. More recent investigators have found, however, that intense sad moods tend to inhibit the learning and recall of any material (Ellis, Thomas, McFarland, & Lane, 1985; Ellis, Thomas, & Rodriguez, 1984). Ellis et al. (1985) argued that intense depressed mood impairs encoding and retrieval in episodic memory by preemtting
<table>
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<tr>
<td>Hasher, Rose, Zacks, Sanft, &amp; Doren (1995)</td>
<td>Exp 1</td>
<td>Depressed, Normal BDI split at 6</td>
<td>Recall of positive neutral and negative items from positive, neutral, and negative stories.</td>
<td>No significant differences</td>
</tr>
<tr>
<td>Exp 2 109 college students</td>
<td></td>
<td>Depressed, Normal Split at BDI = 6</td>
<td>Recall of positive vs. negative information from story (same as Bower, et al., 1981, Exp 3)</td>
<td>No significant differences</td>
</tr>
<tr>
<td>Exp 3 113 college students</td>
<td></td>
<td>Depressed, Normal Split at BDI = 7 (but also tested extreme groups)</td>
<td>Same as Exp 2, with self-referent instructions</td>
<td>No significant differences</td>
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</table>
attentional capacity that would normally be allotted to these tasks. Further, they suggested that depressive cognitions might directly interfere with retrieval.

EVALUATING THE EVIDENCE

What is the evidence for each of the predictions of the network theory of affect? Evidence for state-dependent recall in laboratory studies is mixed. Studies employing the two-list, interference design fared better than single-list experiments. Additionally, there appears to be an advantage for mood-dependent effects in happy as compared with sad mood, however, this difference is not consistent. Mood-dependent recall is investigated in naturally occurring mood states only with great difficulty as it requires natural fluctuation between two moods at two points in time. The one attempt to conduct such an investigation produced positive results.

The evidence for congruency in recall is also mixed. In the laboratory, the strongest support for recall congruency can be seen in those studies weakened by their use of within subjects designs and their lack of neutral mood control groups. These and other studies show that the recall congruency effect is stronger for recall of congruent content as compared with the speed of retrieval of material congruent with subjects' mood. Further, recall congruency in sad moods seems due to inhibition of positive memories rather than the promotion of negative memories. Finally, studies utilizing more behavioral mood manipulations produce superior results and incur fewer problems with demand than manipulations requiring cognitive tasks such as the reading of sentences or self-generated and guided imagery. Of course, ethical induction of sad moods using behavioral techniques may be difficult to design. Results for naturally occurring mood states tend also to be supportive when investigated in truly depressed clinical populations but not with normal college students divided at the median of a depression scale. The number of naturally occurring mood-recall congruency studies is small because so many involve the confounding of learning and recall mood states. In the unconfounded studies, the pattern of reduced positive memories in sad moods with no change in negative memories was once again observed, as was the strength of recall effects over speed of recognition measures.

The strongest evidence for the network theory of affect can be seen in studies investigating congruency in encoding. These studies tend to show that material congruent with mood at time of encoding is learned best. Again this was particularly true for recall tasks as compared with speed of retrieval or cued recognition tasks. Sad moods interfered with the learning of positive material but had little impact on the encoding of negative material. The one study that examined encoding congruency in naturally occurring mood states was not successful but has been criticized in the literature.

The mood intensity hypothesis has not received as systematic attention in the recent mood and memory literature. However, studies that have been reported generally support the notion that events and thoughts that are affectively intense are better learned and easier to recall.

Overall, the network theory of affect received some empirical support, particularly its encoding congruency hypothesis. One repeated finding throughout the mood-memory literature is that while happy moods tend to promote the encoding and recall of positive memories and inhibit the processing of negative material,
parallel effects are not seen in sad moods. That is, sad mood inhibits learning and recall of positive material without promoting the learning or retrieval of negative content. This asymmetry suggests that the effects of mood on learning and memory are more complicated than a network theory of affect would predict. We will now speculate briefly about some alternative cognitive processes that might be incorporated into a network theory of affect.

ALTERNATIVE PROCESSES

Although it successfully found a place for affect in ongoing cognitive processing, the network theory of affect is silent on the role of motivation in influencing the effects of mood on memory. That is, network theory assumes that positive and negative moods promote the learning and recall of positive and negative material, respectively. Yet, why should we assume that nondepressed but sad individuals would be motivated to maintain their lowly states by continuing to recall congruent cognitions? Even the most simple theory of motivation, one requiring the postulating of few nonobservable variables, assumes that individuals attempt to maximize pleasurable experiences and minimize aversive ones. If this is the case, individuals should attempt to summon thoughts incongruent with sad moods in order to remove the unpleasant state. It is precisely this lack of positive thoughts that is found in subjects made temporarily sad in many mood induction studies. Presumably, subjects placed in sad moods would initially show decrements in the learning and recall of positive memories, but, with time, would begin to harness competing positive material.

We are neither unique nor original in suggesting that the network theory of affect might benefit from the incorporation of motivational elements (cf. Isen 1985; Showers & Cantor, 1985). In much more lofty terms, Rapaport (1942) believed that associationist models of memory would ultimately be "destined for failure, as [they] lacked a concept of 'psychic force' on the basis of which a theory of psychic dynamics could be developed" (p. 113). The psychic force that Rapaport ultimately proposed was based on psychodynamic theories, which have yet to lead to many operationalizable constructs. At a similarly abstract level of analysis, Rychlak (1981) has contrasted the associative network theory of memory and the consequences of mood for it with a "dialectic" theory of memory. Rychlak proposed that individuals possess a dialectic awareness of mood. Both negative and positive mood representations must each be active in consciousness. Further, the awareness of a happier state, even when events have underscored a negative mood, creates a purificate concern in individuals to reach the more pleasing state. Even though feeling negative, the individual retains in mind the possibility of an alternative mood state. This theory leads to an opposite prediction than mood congruence for negative mood states. Individuals, by dint of their awareness of a positive possibility should attempt to remove the negative mood by promoting incongruent associations. In this manner, the individual can counteract the activation of further negative associations, and regain the desired positive mood.

Current researchers in social cognition have termed these processes "mood repair," noting that individuals will use controlled mechanisms to counteract automatic associations produced by negative moods (Clark & Isen, 1982; Fiske & Taylor, 1984; Isen, 1984). As Fiske and Taylor (1984) note, "People in bad moods may be more likely to switch from automatic to controlled processes . . . in order
to escape the bad mood. Consequently, people often take charge of their minds' propensity to jump from gloomy thought to gloomy thought. Controlled processes for short-circuiting negative associations include such old devices as counting your blessings, looking for the silver lining, and trying to remember your favorite things" (p. 328).

A behavioral parallel to mood repair is the "negative state relief" theory of the effects of mood on helping behavior. Cialdini and his associates (Cialdini, Darby, & Vincent, 1973; Cialdini & Kenrick, 1976; Kenrick, Baumann, & Cialdini, 1979) have argued that negative moods, such as sorrow and depression, increase helping behavior because by being generous to others, individuals can make themselves feel better. Their theory holds that people experiencing a negative mood are motivated to terminate it. Because we are socialized to view altruistic acts as personally gratifying, being altruistic is one way people can relieve negative moods. Cialdini et al. (1973) tested this theory by hypothesizing that witnessing or committing a transgression would fail to produce increased helping when an event designed to reduce negative affect was interposed between the transgression and the helping opportunity. As predicted, they found that subjects who caused harm to a confederate were subsequently more helpful except when they received praise or money after the transgression but before the opportunity for altruism.

Both associative and mood repair processes may occur in response to negative mood states, but in a temporal sequence. That is, initial cognitive (and even behavioral) activity following the induction of a negative mood state might be associated mood congruent thoughts and behaviors. Given time, and a certain amount of higher order processing, more functional, negative mood repairing thoughts and behaviors might take over, returning the organism to its initial affective equilibrium (cf. Izen, 1984). This process suggests a fruitful avenue for further research. It is possible that one difference between studies finding negative mood congruent thoughts and behaviors from those reporting opposite effects is the time at which such thoughts and behaviors are elicited. Immediately after negative mood induction, thoughts and behaviors are probably negative. Later, however, they become more positive and prosocial. A direct test of this hypothesis is needed.

**SOME CLINICAL IMPLICATIONS**

The associative network model of affect has often been extended to explain the cognitive underpinnings of depression. The depressed individual is thought to possess a particularly dense set of associations (connections in the network) around negative experiences and memories. When a negative event occurs, numerous congruent negative associations are activated and the person is flooded with depressed affect linked to these associations.

The empirical findings we have presented indicate an even more complicated and dynamic picture. The asymmetry of congruency in sad versus happy moods suggests that depressed individuals experience a two-step process. First, they may be more vulnerable to negative cues and have more dense associational networks around negative affect. However, this in itself would not be enough to maintain severe depression. If individuals also had the capacity to generate positive associations once they entered an aversive negative mood, we would not expect depres-
sion to emerge. It is those individuals who lack the capacity (due either to the severity of the negative cues or to their biochemical or psychological makeup) to summon up competing positive associations who fall prey to depression. Depression is not simply the presence of negative affect; it is the absence of positive associations in the presence of negative material. The evidence of the studies reviewed point to the possibility that individuals vulnerable to depression cannot "whistle in the dark" or "remember a few of their favorite things."

A model of depression that emphasizes simultaneous increases in negative associations with an inability to generate positive associations fits well with current thinking about the self-concept of the depressive (Linville, 1987). Linville emphasizes a lack of complexity in depressed individuals' sense of self. By defining themselves through only a few basic categories, a setback in one self-relevant domain has much greater significance than for individuals with more complex self-concepts. Presumably, the more complex individuals soften disappointments in one domain by reminding themselves of positive experiences or values in another important self-relevant domain. In the model of depression that we are espousing, the depressed individual cannot take this compensatory step. Whether it is due to a rigidity of self-concept or whether the positive associations exist but have become inaccessible is a question for future research.

Another direction to investigate is the possibility that biochemical changes associated with depression may play a role in depressed individuals' inability to call upon counteracting positive memories. The clinically depressed individual shows neurovegetative signs, including reduced energy, sleep disturbance, and appetite loss. The depletion of the neurotransmitters norepinephrine and serotonin have been strongly implicated in this condition. The severe depletion of energy in depression fits with the findings of Ellis et al. (1984, 1985) that intense depressed mood impairs encoding and retrieval of all material, positive and negative. The network of positive associations may be in place, but the depressed individual lacks the "fuel" to re-fire these connections. Treatment with anti-depressants may replenish the network, creating renewed energy for the individual and reactivating more positive associations.

Without relying on psychoactive medication, cognitive-behavioral therapy for depression may affect similar changes. By attacking cognitive fallacies (e.g., systematic negative biases or overgeneralization of negative experiences), cognitive-behavioral therapy attempts to blaze new connections to heretofore inaccessible positive associations. At the same time, it emphasizes the behavioral enactment of new positive experiences to create more recent and accessible cues to already stored positive experiences. These new cues facilitate efforts of the depressed individual to reach beyond the familiar set of negative associations. In both cases, antidepressant medication and cognitive-behavioral therapy, the treatment may remove the blockage to positive memories and associations that apparently exists in the depressed individual.

CONCLUSION

The Network Theory of Affect has spawned a wide variety of empirical investigations. Researchers have studied mood-memory congruencies in encoding and retrieval using many different mood states that are both naturally occurring and experimentally induced. Although support for Network Theory has been demon-
strated, results have not been as clear cut as initially anticipated. Predicted results for congruency in encoding have been most consistently obtained. One unexpect-
ed finding is an asymmetry in congruency in which happy moods and positive
memories are more closely associated than are sad moods and negative memories.
This result suggests that the Network Theory of Affect may need to incorporate
more motivational constructs in order to account for this observation. One possi-
ble mechanism, mood maintenance and repair, has been described.

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