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ABSTRACT

The mood-dependent retrieval hypothesis states that mood will enhance recall by acting as a recall cue if the stimuli have been learned initially in the same mood. Material learned in a happy mood will be best recalled when the person returns to a happy mood; the same holds for a sad mood. Mood-dependent retrieval effect has been regularly demonstrated but has also regularly failed to replicate in a laboratory setting. Relations between mood states, states in general, and memory are not well understood. A first possible specification of what causes the mood-dependent retrieval effect is experimenter demand. An important precondition for obtaining the mood-dependent retrieval effect is to insure strong mood-inductions. Another moderator of mood-dependent retrieval may be whether or not retrieval cues alternative to mood, such as the room, are available to cue recall. Item-mood associations can be heightened using to-be-remembered stimuli that can be perceived as causing the mood or by having subjects generate their own items for recall while in the particular mood. None of these factors suggested to explain mood-dependent retrieval can do so by itself. If mood dependent retrieval is found in experiments which simultaneously use effective mood inductions, eliminate alternative cues, and enhance mood-stimuli associations, then more reliable demonstrations of mood-dependent retrieval may be possible. (ABL)

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Detecting Mood-Dependent Retrieval

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## Detecting Mood-Dependent Retrieval

The mood-dependent retrieval hypothesis states that mood will enhance recall by acting as a recall cue if the stimuli have been learned initially in the same mood. Material learned in a

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happy mood will be best recalled when the person returns to a happy mood; the same holds for a sad mood. The present paper will in part update the recent review of such effects by Professor Blaney (1986). In what may be the first study of mood-dependent retrieval, Weingartner, Miller & Murphy, (1977) studied whether manic-depressive patients would best recall free-associates to stimuli that had earlier been generated in a depressed mood, when the subjects were returned to that depressed mood by their illness. In essence, Weingartner et al. expected depressed mood to serve as a contextual cue to aid recall for the previously-learned stimuli. Manic moods were expected to serve the same purpose. Such a mood dependent retrieval hypothesis is simply a specific type of context-dependent retrieval. Results indicated that a depressed mood did facilitate recall of material previously learned in a depressed mood. A manic mood also heightened recall for responses generated in a manic mood.

In the Weingartner study the to-be-recalled stimuli were the patients' free associations, and so reflected a mixture of episodic and semantic memories, and one cannot tell which memory component was affected by the mood shift. To overcome such problems, experimental procedures to study mood-dependent

retrieval were developed.

Macht, Spear, & Levis (1977) manipulated mood by means of a threatening electric shock during learning and memory. They obtained a mood-dependent retrieval effect (in one of two conditions) but were later unable to replicate it. Bower, Monteiro, & Gilligan manipulated mood by enhancing happy or sad personal memories with hypnosis. They obtained mood-dependent retrieval effects in the last of three studies, but by 1982, Bayer & Spanos (cited in Bower & Mayer, 1985), and later Bower & Mayer (1985) and Wetzler (1985) were all unable to replicate it.

By around 1982, therefore, the mood-dependent retrieval effect had been demonstrated in the laboratory, but often failed to replicate. That was four years ago. At present, the effect is still regularly demonstrated -- yet also regularly fails to appear. It is the purpose of this talk to communicate some of the issues that are currently believed to govern the presence or absence of the effect. I will concentrate on four relevant aspects of detecting mood-dependent retrieval: demand, mood measurement, the elimination of confounding cues, and strengthening item-mood associations.

Difficulties in Obtaining MDR. Before discussing these issues, it should be noted that the relations between mood states, states in general, and memory are not well understood. Experimental understanding of mood in and of itself is underdeveloped. At the outset of mood-dependent retrieval studies, few techniques of mood induction were available and little was known of them. The understanding of state- or context

dependent memory, the general class of memory effects to which mood-dependent retrieval belongs, was not well understood. In fact, context-dependent memory effects themselves are not always obtained. Context dependent memory had been demonstrated with rooms -- where being in the same room during retrieval as learning enhanced that retrieval. But Fernandez & Glenberg (1985), for instance, failed to get the "room effect" in eight recall experiments. To get mood-dependent retrieval in the laboratory requires the convergence of both useful theories, and practical, valid procedures. Some progress may have occurred in all these areas in the last four years. The next several years will tell if the progress has been real.

Demand Explanations. A first possible specification of what causes the mood-dependent retrieval effect is experimenter demand. If this explanation were true, the effect would be of little theoretical interest. It is true that demand-like behaviors of subjects are present in some studies. On rare occasions in our own studies we have seen some subjects recall exclusively or almost exclusively from what they learned in the "same" mood-state, and recall nothing from what was learned in a different mood. The extremity of their responses, in a context in which no one else was showing the effect, raises the question of whether the subjects were behaving in the way they thought the experimenters wanted. But if positive results are due to demand, it is unclear why demand failed to produce the effect in four similar mood-dependent retrieval studies we have conducted (Bower & Mayer, 1986). It would seem fair that, except in the most outlandishly demand-prone conditions, critics believing effects

are due to demand should try to produce the effect versus make it disappear by changing demand conditions. Until those demonstrations are successful, we will continue to believe the demand issues are overstated.

Mood inductions. Other than the possibility of demand, the first important precondition for obtaining the mood-dependent retrieval effect is to insure strong mood-inductions. As Drs. Ashbrook and Ellis noted, there is general agreement that the researcher should examine mood reports and screen out subjects who do not meet a preselected mood criterion. Good classification and measurement of moods is important to the area. Fortunately, excellent work on the psychometrics of mood has recently been conducted by Russell (1978), Watson & Tellegen (1985), and others. This research indicates that even a small subset of well-sampled mood adjectives can yield two factor scales of mood, the first pleasant-unpleasant factor running from happy, lively, and joyful to depressed, sad, and blue, the second arousal dimension running from angry, and afraid, to calm, and relaxed. Use of such scales will permit better comparisons between mood at learning and retrieval, thereby yielding better decisions concerning which subjects are to be included in analyses.

Alternative retrieval cues can disrupt the effect. Another moderator of mood-dependent retrieval may be whether or not retrieval cues alternative to mood, such as the room and the experimenter, are available to cue recall (Eich, 1980). The presence of alternate cues could reduce or eliminate the mood-

dependent retrieval effects. Thus, one might sadden people, have them learn a word list, and then cheer them up for recall. But if a second cue besides mood were present, such as the identical room and experimenter, then those constants may compensate for recall decrements caused by changing mood states, by serving as alternative cues and thus washing out the effects.

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This possibility is supported by Bower et al.'s (1978) initial finding that the mood dependent retrieval effect is more likely to be found when a two list interference design is used. By these procedures, when only one list is learned and later recalled, the experimental situation itself, including the room and experimenter, serve as alternative recall cues. By having subjects learn two word lists, one in a happy, the other in a sad mood, experimental context cues other than mood will lose their power -- and that enhances the likelihood of mood dependent retrieval. In the 1978 study, Bower, Monteiro, and Gilligan found the effects with such a two-list design, but not a single list design. Exactly the same manipulation -- two lists versus one -- led to the same result in a study by Share, Lisman, & Spear (1981). But as you can see, there have been negative findings as well by Bayer & Spanos, and ourselves and others.

Mood-stimuli associations. I have just discussed how alternative cues can provide alternative encoding strategies that may reduce mood-dependent retrieval effects. In essence, learning always takes place in a field of potential cues. For

mood to play a strong role in such a field, it is useful to eliminate other competing cues. Alternatively, one can raise the saliency of mood as a cue in the field. Several suggestions for heightening mood-to-item associations have been made.

The first of these is the causal-belongingness hypothesis which involves using to-be-remembered stimuli that can be perceived as causing the mood. In our causal-belongingness experiments, we had subjects read and imagine brief positive vignettes such as, "you are praised for getting a very high grade on an exam" to induce a happy mood. In the same way, we used negative vignettes to induce a sad mood, and then had subjects try to recall all vignettes in a final happy or sad mood. Stimulus-to-mood associations are strengthened by telling subjects to use each vignette to move their mood one step further up a staircase of positive mood or down a staircase of depressed mood. This creates the causal association.

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Such an approach was used successfully by Bower & Mayer who found a mood-dependent retrieval effect. Regrettably this effect was not replicated in the following experiment, number 5.

Another approach to detecting mood-dependent retrieval has been suggested by Eich and Metcalfe, in which subjects generate their own items for recall while in the particular mood. Self-generated items may somehow be more strongly associated to one's internal mental state. The original studies by Weingartner et



al. used subject-generated materials -- word associations -- as the to-be-remembered stimuli. As already noted, this choice had been criticized because the materials confound mood effects on episodic versus semantic memory. An alternative procedure developed by Slamecka & Graf (1978) solves these problems by placing such self-generated associations under experimental control. In this procedure the experimenter asks for an association by giving a highly restricting cue such as: "Give me the name of an ice-cream flavor that begins with the letter V [pause]". The subject then generates vanilla. In comparison with free associations used earlier in the Weingartner procedure, the word produced is almost entirely under experimenter control. The generation process may more closely associate the stimuli to the mental state.

In two studies employing these methods, Eich found mood state dependent retrieval when the items to be recalled were subject-generated, but not for items which were fully provided by the experimenter. This is clearly one of the most interesting findings regarding mood-dependent retrieval to-date. Once again, the conclusion is somewhat tempered by an earlier negative study. In this study, Wetzler (1985) asked subjects to generate their own memory items in a free association task, and then had them recall the items during a second testing under the same or different moods. He did not find the mood-dependent retrieval effect. It may be, however, that because the Wetzler experiment administered the Velten mood-induction procedure in groups that the moods were not sufficiently strong to obtain mood dependent

retrieval. Professor Eich has noted that he has found the effect in a third study. Or perhaps we must conclude that subject generated material is not a foolproof way to detect the effect either.

We are frustrated by our inability to figure out a generalization from these studies that will permit us to reliably predict when mood-dependent retrieval will occur. The idea behind experimental psychology is that if you repeat the essentials of the experiment, you should find the same results. Unfortunately, the results in this area are challenging our belief that the world is lawful. One hopes that results don't depend on irrelevancies like the experimenter's tone of voice, the exact stimulus items, or the precise time limit. So, we're puzzled. In essence, each of the factors suggested to explain mood-dependent retrieval do not do so by themselves. But perhaps they are just probabilistic predictors. None are necessary, none are sufficient, but they may each increase the chances of mood-dependent retrieval. Fortunately, the hypotheses "on the table" for how to reliably obtain mood-dependent retrieval are not contradictory and can be combined together in the same experiment to enhance the likelihood of obtaining effects. One can simultaneously use effective mood inductions, eliminate alternative cues, and enhance mood-stimuli associations. If mood-dependent retrieval is found within experiments that simultaneously employ all these characteristics, then more reliable demonstrations of mood-dependent retrieval may be possible. Thank you.

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# THE MOOD-DEPENDENT RETRIEVAL HYPOTHESIS

		RETRIEVAL CONTEXT	
		HAPPY MOOD	SAD MOOD
LEARNING CONTEXT	HAPPY MOOD	ENHANCED RETRIEVAL	
	SAD MOOD		ENHANCED RETRIEVAL

## METHODS TO ENHANCE MOOD-DEPENDENT RETRIEVAL

### I. DECREASING SALIENCE OF ALTERNATIVE (NON-MOOD) CUES.

#### A. POSITIVE FINDINGS:

1. BOWER, MONTEIRO, & GILLIGAN (1978)
2. SHARE, LISMAN, & SPEAR (1984)

#### B. NEGATIVE FINDINGS:

1. BAYER & SPANOS (1983)
2. BOWER & MAYER (1985)
3. BOWER & MAYER, EXPS. 2 & 3 (1986)

## METHODS TO ENHANCE MOOD-DEPENDENT RETRIEVAL

### II. INCREASING SALIENCE OF MOOD-ITEM ASSOCIATIONS

#### A. CAUSAL ASSOCIATIONS BETWEEN MOOD AND ITEMS

1. POSITIVE FINDING: BOWER & MAYER, EXP. 4 (1986)
2. NEGATIVE FINDING: BOWER & MAYER, EXP. 5 (1986)

#### B. SUBJECT GENERATION OF RECALL ITEMS

1. POSITIVE FINDING: EICH & METCALFE (1986)
2. NEGATIVE FINDING: WETZLER (1985)