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Naturally Occurring Mood and Learning: Comment on Hasher, Rose, Zacks, Sanft, and Doren

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We comment on the article by Hasher, Rose, Zacks, Sanft, & Doren (1985) in which they failed to find mood-congruent learning (MCL). MCL occurs whenever subjects learn more about materials that are congruent with their moods (e.g., depressed subjects learn more sad material). Hasher et al. failed to observe MCL with normal college students who scored high versus low on the Beck Depression Inventory and an affect checklist; in contrast, positive MCL has been observed with clinically depressed patients and with normals given laboratory mood inductions. Hasher et al. argue that moderately depressed normal students may be qualitatively different from clinically depressed patients and mood-induced subjects. Although we accept the findings of Hasher et al., we think it is also plausible that MCL may be a general though small effect which is present among normal college students as well.

Hasher, Rose, Zacks, Sanft, and Doren (1985) reported in this journal that college students assessed as depressed by a self-report scale did not differ from nondepressed students in either their level of story recall or in their selective learning of pleasant versus unpleasant story content. Because we, as well as others (e.g., Bower, Gilligan, & Monteiro, 1981; Bower & Mayer, 1985; Breslow, Kocsis, & Belkin, 1981; Derry & Kuiper, 1981; Gilligan & Bower, 1984; Kuiper & Derry, 1982; Weingartner, Cohen, Murphy, Martello, & Gerdt, 1981), have reported mood-congruent learning, we comment on the failure of Hasher et al. to observe this effect.

The mood-congruent learning hypothesis (MCL) states that affective material will be learned better when the valence of the material (pleasant vs. unpleasant) agrees with the learner's current mood. Thus, pleasant material should be learned better by happy learners, and unpleasant material by sad, anxious, or angry learners. Several theories predict MCL. The spreading activation theory (see Bower, 1981; Clark & Isen, 1982; Isen, Shalker, Clark, & Karp, 1978) assumes that an emotion serves as an active site in memory which spreads its activation to other mood-associated concepts and events in memory. This creates greater availability of mood-associated concepts, thus permitting greater elaboration of mood-congruent learning material, and therefore better memory (see Anderson & Reder, 1979). A second theory (Beck, 1967) claims that depressives build up a schema of largely negative associations during their mood disturbance; this negative schema provides a framework for interpreting, storing, and retrieving neutral material in a negative way.

Although the MCL prediction is straightforward, firm empirical conclusions about MCL are elusive. In studying MCL, investigators have used several approaches, each of which may incur different experimental problems and complications. If all experimental approaches to a topic were to yield the same conceptual result, the underlying hypotheses would have strong support from these converging operations (Campbell & Fiske, 1959).

One approach to MCL is to experimentally manipulate mood states by using a laboratory Mood Induction Procedure (MIP). Typical MIPs include the Velten procedure, in which subjects read a number of self-referent sad (or elated) statements (Velten, 1967, 1968);

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the guided imagery inductions, in which subjects identify with a sad character in a story (Thompson, Cowan, & Rosenhan, 1980); or the personal memories procedures, in which subjects replay personal memories of happy or sad events to create the mood (Bower, 1981; Kelley, 1982). The guided imagery and memory inductions can be augmented by sad music (Clark, 1983) or by hypnotically reinforced suggestions (Blum, 1967; Bower, 1981; Gidro-Frank & Bull, 1950; Zimbardo, Maslach, & Marshall, 1972). In contrast to these laboratory manipulations of mood, an alternative approach examines selected subgroups of individuals who already differ in mood. By this second approach, one selects either clinically depressed individuals or any subjects who score at various levels on a test of depression or mood.

Our earlier reports of MCL used laboratory MIPs. For example, MCL has been found with moods induced hypnotically (Bower et al., 1981, Experiments 1, 3, & 5; Bower & Mayer, 1985; Gilligan, 1982, Experiments 3, 4, & 5; Gilligan & Bower, 1984; Mauro, 1984, Experiment 4), with the Velten procedure (Teasdale & Russell, 1983, Teasdale & Taylor, 1981), and with guided fantasy in children. (Nasby & Yando, 1982, Experiments 1 & 2). On the other hand, MCL has sometimes not occurred using hypnosis (Bower, Monteiro, & Gilligan, 1978, Experiments 1, 2, & 3), guided imagery (Kelley, 1982, Experiments 1 & 2), and success versus failure at a game (Isen et al., 1978).

MCL occurs more consistently in studies of clinical groups; it was reported in two published reports (Breslow et al., 1981; Stromgren, 1977), and in two out of three dissertation studies with psychiatric patients (Cole, 1980; Gundersen, 1983; vs. Finkel, 1981). But MCL has generally not been found when comparing high versus low scoring college students on various mood scales. The negative results of Hasher et al. confirm an earlier negative result by Hettena (1979) in this regard.

Our view of the evidence is that when there is strong, experimental manipulation of moods, or when depression is sufficient to require hospitalization, mood-congruent learning effects of small magnitude are likely. We now consider why mild variations of mood among college students may not yield the same effect.

Hasher et al.'s Explanation of the Divergent Results

One possibility suggested by Hasher et al. is that the MCL effects in MIP studies are due to experimenter demand conveyed to the subject. But we find the demand explanation insufficient to resolve the conflicting studies. The demand explanation is weakened, first, because there is an explicit demand to subjects in most MCL experiments to learn and recall all the material presented. Second, demand from the experimental procedure is not by itself sufficient to elicit the effect. For example, in their report, Hasher et al. note that they recruited subjects for a study advertised as involving "mood and memory," then tested students upon arrival with the Beck Depression Inventory (BDI), a transparent mood-assessment device, and then, presented passages containing pleasant and unpleasant information. Thus, the experimental demand for MCL in the Hasher et al. study was probably as obvious as that in the usual MIP experiments. Third, in several MIP experiments listed earlier, MCL failed to occur despite the presence of all the hypothesized demand features (e.g., Kelley, 1982). Finally, evidence for MCL occurs in cases where experimental demand has been controlled by deceptive cover stories (e.g., Laird, Wagener, Halal, & Szegda, 1982).

Although not totally discounting the contribution of demand, we would note that similar arguments for the presence of demand could be leveled against a multitude of classic investigations, such as studies of the role of reinforcement in human learning, or opinion change caused by persuasive communications, or practically any behavior modification program.

Could the Difference in Results be Due to Demand Plus the Use of Highly Suggestible Participants?

Hasher et al. speculate that hypnotizable subjects, as well as subjects selected for use in the Velten MIP experiments of Teasdale & Taylor (1981), are in some sense more suggestible than average and therefore more

compliant with subtle experimenter demands. However, if MCL were exhibited only by hypnotizable subjects, and if Hasher et al.'s pool included the usual proportion of hypnotizable subjects (estimated at 20%; Weitzenhoffer & Hilgard, 1962), then even Hasher et al. should have observed some small MCL. Furthermore, Coleman (1975) and Velten (1967) found that people who are highly susceptible to hypnosis were no more vulnerable than were nonsusceptibles to having their behavior altered by the Velten MIP. In a review of such evidence, Goodman and Williams (1982, p. 378) concluded that MIP effects "are not merely the result of subjects trying to please the experimenter or due to the presence of highly suggestible subjects within the MIP group." In fact, "suggestibility" itself is an ill-defined construct, often imputed to mean more, in behavioral terms, than the facts warrant. Many different kinds, forms, and measures of suggestibility exist, and the intercorrelations among them are generally quite low (Moore, 1964). It is, in fact, difficult to find tasks on which hypnotizable participants are more subject to social influence or subtle persuasion in experiments than are nonhypnotizables (Miller, 1980). Finally, these arguments attributing MCL to demand are not applicable to the positive findings with psychiatrically depressed subjects, where there is no mood manipulation to elicit a demand response. In consequence, we conclude that suggestibility combined with experimenter demand is not sufficient to explain the several positive demonstrations of MCL.

Do MIPs Act Like Naturally Occurring Moods?

Hasher et al. (p. 115–116) suggest that laboratory induced moods may not be an appropriate analogue of naturally occurring moods. But this suggestion ignores the evidence originally amassed in favor of the mood-induction procedures. Velten (and others) regarded his MIP as valid precisely because it elicited the behavioral changes found in earlier studies of natural mood variation in college students (Johnson, 1937; also see reviews by Clark, 1983, and Goodman & Williams, 1982). As an illustration of similarities of MIPs to ecologically valid moods, one of the common symptoms for classifying depressed patients is their bleak, pessimistic view of the future (Beck, 1967). Similar pessimism in forecasts have been observed with hypnotic MIPs (Bower & Cohen, 1982), with moods induced by happy versus unhappy stories (Johnson & Tversky, 1983), and also with naturally occurring moods in college students (Mayer & Bremer, 1985; Mayer & Volanth, in press). Goodman and Williams (1982, p. 377) conclude, "Thus, not only at the level of affective disturbance, but also at the behavioral level there are indications that MIP's successfully model depressive states."

Partial Summary

In summary, the literature indicates that MCL is a small but frequent effect, especially likely with strong mood manipulations, or clinical levels of depression. MCL effects do not appear to covary systematically with experimenter demand. Nor do results appear to stem from capitalizing on highly suggestible subjects. Probably hypnosis and other MIP's provide far more mood variance than can be obtained in a classroom group test setting like that used by Hasher et al. For example, we have observed some of our MIP subjects cry in sad moods (at which point we immediately lessen their mood intensity), whereas we have never witnessed such displays in standard learning experiments in which we may presume our subjects experienced normal fluctuations in mood. Although we expected MCL with fluctuations in naturally occurring moods, the effects should have been smaller than those produced by laboratory MIPs or by the selection of clinically depressed and/or manic patients. In the following section, we note a few procedural issues that might have further diluted a possible MCL effect in the Hasher et al. studies.

Comment on Hasher et al.'s Experimental Procedures

State versus Trait Measures of Affect

According to spreading activation, and our related research, it is the present mood state that is expected to exert a selective influence on learning; but the theory makes no predic-

tions about trait dispositions. Both the Beck Depression Inventory (BDI) and the Multiple Affect Adjective Checklist (MAACL) used by Hasher et al. were developed to identify and/or classify clinically depressed patients. The content of the BDI suggests in part a trait measure of depression because many of its items seem to assess trait-level or long-term dispositions (e.g., "I feel I have failed more than the average person"; "I believe that I look ugly"). Similarly, some of the items on the MAACL (Zuckerman, Lubin, Vogel, & Valerius, 1964), although valid for clinical identification of depressed patients, do not appear to apply unambiguously to either depressed state or even mood (this was especially true of the reverse-scored items, e.g., *young, safe, strong*). It is not obvious that such items would measure state experiences. Even given that some state adjectives are on the scale, many people may have difficulty introspecting accurately about their feelings and would be unable to clearly label their mood in a classroom setting devoid of emotionally provocative stimuli. Instead of reporting vague or ambivalent moods of the moment, subjects may rely on trait information they believe about themselves, or report frequently experienced emotions of their recent past. Emotion terms like those on the scale, (e.g., *sad, anxious,* or *unhappy*) are *hybrids* (see Ortony & Clore, 1981), and apply ambiguously to either a state or a trait. Our point is that in the Hasher et al. situation, the BDI and MAACL may be measuring personality traits rather than, or in addition to, mood states.

Unmeasured Positive Affect

A second, related observation is that neither the BDI nor the MAACL measure positive affect in their subjects, which leads to several problems. Although the MAACL contains 20 nondepressed items, they were not selected or designed to measure positive affect; and in fact, none of the adjectives on the scale (e.g., *healthy, safe, clean*) overlap with other mood subscales such as *surgency* and *elation,* (Nowlis, 1965), *friendliness,* (McNair & Lorr, 1964), *joy,* (Zevon & Tellegen, 1982), or *pleasure* (Russell, 1979). In contrast, the adjectives of the latter scales overlap with each other.

Some unmeasured positive affect may have been present among members of Hasher et al.'s "depressed group," who may simply overreport strong emotions of all kinds (e.g., Depue & Monroe, 1978, discuss mood report among clinical and nonclinical subjects). Considerable literature indicates that pleasant and unpleasant feelings are partially independent (Pearson *r*s between them range from −.45 to −.65), so that they co-occur with some frequency (e.g., Warr, Barter, & Brownbridge, 1983; Zevon & Tellegen, 1982). This means that some subjects who scored moderately high on depression may also be expected, paradoxically, to have moderately high happiness levels as well. To the extent that somewhat sad scorers were also somewhat happy, the MCL effect would be reduced for them.

Because Hasher et al. did not measure positive affect, their contrast of depressed and nondepressed extreme quartiles of subjects on the BDI and MAACL was in reality extreme only on the depressed end. Their nondepressed quartile most likely included a mixture of neutral and happy subjects. This is neither as broad a range as the typical elation versus depression comparisons in MIP experiments, nor as broad a range as naturally occurring affect can provide; and this restriction in range would reduce the size of any expected MCL effect (McNemar, 1962, p. 144).

Other Negative Affects Were Not Utilized in Comparisons

Because other negative affects beside depression were not examined by Hasher et al., a third, additional, problem is that the nondepressed control groups of Hasher et al. could have been experiencing negative affects other than depression, such as frustration, anger, anxiety, or boredom. Of relevance to this conjecture is the fact that Nowlis (1965) found that the largest factor in an analysis of naturally occurring mood was "anger/hostility/aggression." Although this outcome surely depended on Nowlis' adjectives, our point is that other unpleasant, naturally occurring affects could exist in the nondepressed controls. If so, then such emotions could cause them to learn the material in somewhat the

same manner as the experimental depressed subjects.

Validity of the Learning Materials

Fourth, the specific learning materials used by Hasher et al. in Experiments 1 and 3 were not pretested with either depressed patients or mood-induced normal subjects to determine whether the materials could elicit MCL when it was expected. To obtain MCL, the learning materials must not only evoke a strong positive or negative evaluation, but the items should also be relatively independent of one another, almost like items on an unrelated word list or unrelated incidents from one's personal past. Selective recall will be reduced to the extent that items are strongly interassociated in natural-coherence units, so that they trigger recall of one another. Narratives of the sort used by Hasher et al. can have multiple coherence relations connecting text statements, such as concept or referent overlap, cause-effect or temporal-development sequences, problem-solution, contrastive opposition relations, and so on.

Professor Hasher supplied us with copies of three narrative stories used in their Experiment 1 (one of which was also used in Experiment 3), annotated for idea units and valence. The three stories had fewer affectively positive and negative idea units than the stories used by Bower et al. (1981), and in two of the three stories, the positive and negative idea units were disproportionate in number. For example, the positive story of their Experiment 1 had 26 positive clauses, 26 neutral clauses, and 11 negative clauses. Hence, the MCL depends critically on group differences in recall of those 11 negative clauses. But of those 11 clauses, 8 were (to our minds) linked directly to positive clauses. Examples of such negative- and positive-linked statements are

> Just then it struck me that I had left my train ticket at home [Negative]. I then remembered that I had put one in my wallet just in case [Positive]. Good, now I wouldn't have to pay full fare plus the penalty [Positive].

Another is

> . . . [my jacket] was just the right style [Positive] and in my favorite color [Positive]. However, I'd found holes in both pockets [Negative] and I was worried the store wouldn't exchange it for another [Negative].

These illustrate problem solution and contrastive opposition coherence relations.

We suspect that these text relations may be serious departures from the independence of memory units required to maximize the chances of MCL. Similarly, the existence of large clusters of interconnected positive statements (or interconnected negative statements) reduces the effective sample size of functional memory units because these will be recalled as coherent chunks. The negative story of Hasher et al. had 10 critical positive items, of which 2 were linked to negatives, 6 were linked together in a coherent unit, and 2 stood more or less alone. The neutral story of Hasher et al. seemed to have fewer problems of connectivity between critical elements.

Finally, in the Hasher et al. passages, the sometimes rapid alternation between positive and negative ideas (as illustrated in the examples just mentioned) may limit an interaction between material valence and emotional reaction, because the processing time per item is too short for an adequate affective reaction to develop. The Andre/Jack story, used in Experiment 1 of the Bower et al. paper, had the least of this rapid alternation problem (at the same time, it included a number of functionally independent units). It may be no coincidence that the Andre/Jack story produced the stronger MCL effect Bower et al. (1981).

In their Experiment 2, Hasher et al. did use the Paul Smith story, which had been validated for MCL in the Bower et al. study; yet they still failed to find a reliable MCL. But unfortunately, in Experiment 2, Hasher et al. administered two additional mood scales in the 20-min interval between learning and retention testing. The second interpolated scale (the SDI) included 90 negative psychiatric symptoms, material that was highly related to the learning material (which described a young neurotic seeing a psychiatrist). Depressives would process and remember more of this interpolated material (see Derry & Kuiper, 1981), which would cause greater interference in the depressive's later selective recall of negative materials. This, in turn, would compromise a MCL effect.

Each of the aforementioned factors, which broadly concern mood measurement and

stimulus quality, could have reduced the MCL effect. Yet, the naturally occurring mood effect, if it exists, can probably be detected only under the most favorable conditions. As a relevant illustration, a survey of a dozen cognitive and motor tasks alleged to be sensitive to naturally occurring mood (Mayer, 1983; Mayer & Bremer, 1985; Mayer & Volanth, 1984) uncovered correlations for the best tasks that were consistently in the range .15 to .30. Assuming the MCL effect was at the lower end of this range, a less than optimal mood assessment or nonoptimal task-stimuli could all too easily reduce such a theoretically interesting effect to nonsignificance.

Concluding Comments

To review our main points, our review of the literature indicated that a weak MCL effect is present in MIP experiments and in experiments that studied clinically depressed patients. In contrast, the MCL effect does not occur in the more dysphoric subgroup of normals, as Hasher et al. assert.

We do not agree with some of Hasher et al.'s explanations for their divergent findings, however. We argued that the demand hypothesis is not sufficiently complex to deal with the range of conflicting results; also, the results seem not due to suggestibility of the subjects used in MIP experiments. In other instances, MIPs have been shown to successfully model naturally occurring mood. We then noted several procedural issues in the Hasher et al. studies which might have diluted a possible MCL effect. Although the Hasher et al. experiments would probably be adequate to detect a large effect, we noted that both the mood-state measures and the specific learning materials were less than optimal.

In summary, we agree with Hasher et al. that their divergent results are probably due to their use of naturally occurring mood. Our only disagreement, as we see it, is the following. Whereas Hasher et al. suggest that the domains of MIP, psychiatric depression, and naturally occurring mood may be fundamentally different, we continue to view mood effects on the three groups as probably similar. To Hasher et al., null results with naturally occurring mood is the true state of affairs for normal individuals and results from MIPs arise from demand and suggestibility. And to them, any MCL effects with the clinically depressed are limited because clinical depression may be qualitatively different from normal sadness.

Although Hasher et al. may be right, we believe that pending further research, there is a viable alternative. The alternative is that MCL is a small but general effect that should be operative in all three classes of subjects, except it may be especially difficult to detect when mood variation is smaller, as with naturally occurring moods during an experiment. Further, the effect may be obtained only in an optimal experiment. We suggest that the procedures and measuring instruments used by Hasher et al. were not equal to the task of detecting a weak effect. In sum, we have tried to integrate the results of Hasher et al. with relevant results found by others, to provide an alternative perspective regarding possible mood effects on learning.

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