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Depression and Memory: Are Impairments Remediable Through Attentional Control?

Paula T. Hertel

People who are in depressed mood states or who are formally diagnosed as clinically depressed frequently complain of impaired memory. Such complaints have been substantiated by laboratory research, most of which supports the theoretical assumption that attentional resources play a causal role in producing the impairments. Specific theoretical frameworks do differ, however, in the proposed nature of this role and in their corresponding implications for remediation. The most prevalent positions are versions of a capacity framework (e.g., cognitive effort or resource allocation).¹ If you are depressed, according to the capacity framework, your attentional resources are either reduced neurochemically or allocated pervasively to matters of personal concern.² Either way, if the task at hand requires hard thinking, your performance is impaired by the insufficiency of attentional resources. Presumably, the lifting of the impairment awaits successful psychopharmacological treatment or resolution of your personal concerns.

Now consider the viewpoint of what I have called the cognitive-initiative framework.³ According to this framework, your attentional resources are sufficient. What is missing is the initiative to control them. In the absence of explicit instructions or task constraints, depressed

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people show less initiative in allocating readily available resources to ultimately beneficial procedures. The implication from this framework is that artificial control can produce cognitive competence.

To show that depressed people attend excessively to matters of personal concern—sometimes to the point of exasperation—is not to imply that such perseverations are inevitable. Attentional control can be achieved through experimentally established procedures for focusing attention on the task and for monitoring the relevance of the past. These two general categories of means for attentional control provide an organizational structure for my research on depression and memory.

FOCUSING ATTENTION ON THE TASK

The advantages of attentional control were most simply demonstrated in the following experiment, performed with clinically depressed outpatients and nondepressed control subjects.⁴ In the first phase, they made decisions about whether target words fit sensibly in accompanying sentence frames. On some trials, the word was the obvious choice for the missing element in the frame (e.g., *dream* for the frame "She was awakened by her frightening ____"). On other trials, the word was just one of several words that might fit the frame (e.g., *dream* for "He was alarmed by the frightening ____"). In the former case, the words and frames could be integrated easily to provide elaborations (i.e., meaningful con-

texts for the target words) that would benefit performance in Phase 2, when subjects were tested on their free recall of the target words. In the latter case, such elaborations presumably would be more difficult, but ultimately more distinctive, and thereby would establish even greater advantages in later recall. Ellis and his colleagues⁵ had used a similar procedure to show that college students who were experimentally induced to feel "depressed" recalled fewer words from the difficult frames than did students in a neutral mood. They argued that depressed moods reduced the amount of attentional resources available for the task at hand; sufficient resources were available for elaboration on the easy trials, but not on the difficult ones.

Rude and I⁴ also found impaired recall of targets from the difficult trials, but only when the procedures in Phase 1 were arranged loosely (as they were in the induced-mood experiment) so that subjects were allowed to report the decision whenever they chose to do so during each 8-s trial (the unfocused condition). In the focused condition of Phase 1, however, the procedure differed in two ways: We asked the subjects to wait until the end of each trial to report their decisions and also to repeat the word. Recall of targets from both the easy and the difficult frames in this focused condition showed no evidence of depression-related impairment. The mean percentages of words recalled from the difficult frames after the unfocused and focused orienting tasks are shown in Figure 1. Depressed subjects were clearly capable of such focused attention and needed only some environmental support to sustain it. (What appears to be a depression-related advantage in the focused condition was not reliable.) In contrast, the subjects in the unfocused condition of Phase 1 could sustain attention on their own initiative or could decide quickly and then let their minds wander to other mat-

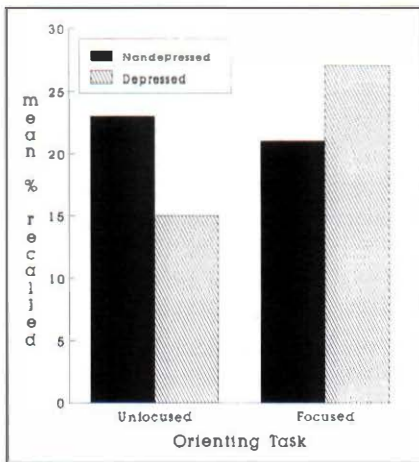


Fig. 1. Mean percentage of words recalled from the difficult frames following the unfocused or focused orienting task. From Hertel and Rude.⁴

ters—perhaps to personal concerns. We therefore attributed the depressed subjects' lower recall to impaired initiative in sustaining attention to the task and to the missed opportunities for distinctive elaborations that would aid recall.⁶

Impaired initiative to attend was also the focus of an experiment that included an indirect test of memory—identification of briefly flashed words. Such words are identified more easily if they have been presented during an earlier phase than if they are new words in the experiment. Compared with direct tests like free recall, word identification seems to be affected little by elaboration during initial exposure to the materials; all that matters is that the words are processed as lexical units, rather than being viewed as collections of isolated letters.⁷ With these findings in mind, I recruited clinically depressed outpatients and nondepressed control subjects to participate in an experiment with three phases.⁸

In the first phase, the subjects performed two rating tasks on separate lists of words. Words on one list were rated for their emotionality; words on the other list were rated on purely perceptual features (the degree of angularity or curvature in the displayed word). The third phase of

the experiment was a direct test of free recall of the rated words. Performance on that test was as expected: The words that had been processed meaningfully were recalled more frequently than the others, and the depressed subjects recalled fewer words from both tasks. All of this was old news, but a more interesting outcome was obtained in Phase 2.

Nested between the rating tasks and the recall test was an indirect test of word identification. The rated words and an equal number of new words were each flashed briefly; the task was to read each word aloud. The effect of prior exposure (percentage of rated words identified minus percentage of new words identified) is shown in Figure 2. The percentage of new words identified did not differ reliably across conditions.

As is found typically, nondepressed subjects showed similar effects of prior exposure across the two rating conditions. Further, the effect of prior exposure in the conceptual task (emotion ratings) did not differ reliably according to mood. Words that were rated for their perceptual features, in contrast, showed a reduced effect of prior exposure in the depressed sample. Although the subjects were not re-

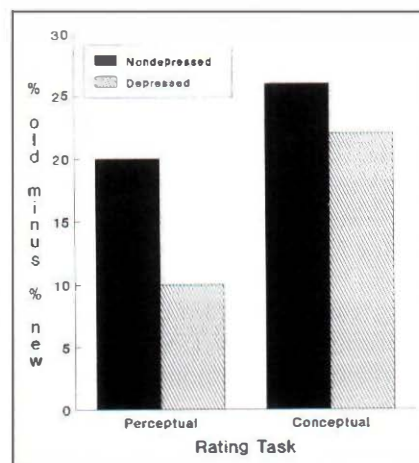


Fig. 2. Mean effect of prior perceptual or conceptual ratings on word identification (percentage of old words identified in each condition minus percentage of new words identified). From Hertel.⁸

quired to approach those materials as lexical units during the rating task, apparently the nondepressed subjects did what most of us would expect and attended to the materials as words, whereas the depressed subjects showed less initiative in this most basic respect. This assumed lack of attention to words *qua* words in Phase 1 meant that the depressed subjects could not read the words as effectively on the later identification test. To the extent that the mind of the depressed person is "elsewhere," depression-related impairments can be revealed, even on an indirect test. Capturing attention with a request to rate emotional value, however, ensured the typical effect of prior exposure. These findings are difficult to explain by reference to capacity alone; reading words in the perceptual rating task requires few resources.

MONITORING THE RELEVANCE OF THE PAST

Direct tests of memory obviously require subjects to focus their attention on the past; its relevance is made explicit. Indirect tests are designed to avoid conscious recollection of the past, and if that objective is achieved, performance on indirect tests should not be subject to variations in initiative to reflect back. Indeed, with the exception of the experiment just described, depressed and nondepressed subjects have shown similar effects of prior exposure on several indirect tests.⁹ Jacoby and his colleagues, however, have argued recently that tests of memory are rarely, if ever, pure measures of either controlled reflection on past events or their nonreflective effects; no test is entirely a "direct" or "indirect" measure of memory.¹⁰ For example, consider how tests of recognition memory can tap both conscious recollection and feelings of familiarity. Recogni-

tion, moreover, sometimes reveals depression-related impairments and sometimes does not, perhaps as a function of the degree to which the judgments are recollective or familiarity-based. The initiative to monitor the relevance of the past context, rather than to rely primarily on a sense of familiarity, should be correlated with depression. This was the issue investigated in the following experiment,¹¹ which was modeled on Jacoby's process-dissociation paradigm.

College students in naturally depressed or nondepressed moods were first exposed to a list of word pairs. Each pair was presented briefly on a computer monitor, and the subjects judged the relatedness of the two words (although all pairs were unrelated by typical standards). Next, the subjects listened to another list of words and tried to remember them. The final phase of the experiment was a recognition test for which there were two different sets of instructions. Half of the target words (first members of pairs) from Phase 1, half of the heard words, and an equal number of new words were evaluated under standard recognition instructions: Subjects judged whether each word had occurred in any earlier phase of the experiment or was new. These judgments could be based on feelings of familiarity, on recollection of prior context (such as the second members of the pairs), or more likely on a mixture of both processes. As is often the case, performance on this test failed to show a depression-related impairment in the number of targets endorsed as old. The question, however, was whether subjects relied on familiarity to make those judgments, and whether the two groups of subjects would differ in their ability to make more controlled recollective judgments if required. To answer this question, subjects were given a second set of instructions for the remaining items on the recognition test.

Under these instructions, subjects were asked to reserve the judgment of "old" for words from the second (auditory) phase of the experiment and to call all words from the first phase "new," along with the truly new words. If targets from Phase 1 were judged erroneously to be old, they must have seemed familiar but not been recollected as having occurred in that phase; otherwise, accurate reflection on prior context would have produced the judgment of "new." According to procedures established by Jacoby, Milan and I submitted the percentage of targets that were judged old under each set of instructions to a set of equations for deriving estimates of each component of recognition memory—familiarity and recollection—for each subject. Familiarity estimates were quite similar across the two mood conditions. The estimates for recollection, however, were reliably lower for the depressed subjects.

This impairment in the recollective component of recognition (or in source monitoring) might well have been caused by the inability to allocate sufficient resources during the original exposure to the targets or during the recognition test. But rather than assuming that the depressed students were incapable in either phase, we sought means for establishing better cognitive control. In a separate set of conditions, we reinstated the second members of the pairs from Phase 1 as contexts for targets on the recognition test and told the subjects that they might find these second words useful. (We explained that these paired words obviously were new words when the targets were not from Phase 1.) This procedure, however, served only to increase both components of recognition—familiarity and recollection—for depressed and nondepressed subjects alike.

Figure 3 shows the mean estimates of each component of recognition memory, collapsed across the single-item and paired-item tests.

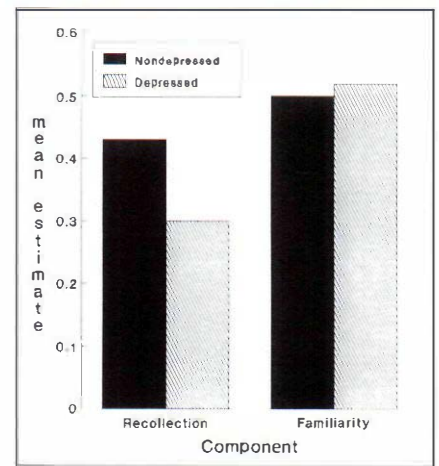


Fig. 3. Mean estimates of recollection and familiarity, collapsed across single-item and paired-item tests. From Hertel and Milan.¹¹

These findings are compatible with a capacity framework. Within the cognitive-initiative framework, instead of assuming inflexible allocation of resources, we seek means for training controlled recollective strategies. Although the provision of context in this experiment did not help the depressed subjects more than the nondepressed, some previous research I conducted with Hardin provides a more successful example of these efforts.³

Again, college students in naturally depressed or nondepressed moods performed three tasks. All materials and the subjects' responses were spoken. First, we asked the subjects questions such as "What are the days of the week?" As shown in this example, some of the questions contained a homophone—a word that sounds the same as another word but has a different meaning and spelling, as week is a homophone of weak. The second task was a rapidly paced spelling test; some of the words were homophones, and some of the homophones were taken from the question phase. (This test served as an indirect measure of memory and failed to reveal depression-related differences.) The final task was a recognition test for words from the question phase. The nondepressed

subjects recognized the homophones more accurately than did the depressed subjects (as measured by d' , a statistic from signal detection theory). Moreover, the decisions made by nondepressed subjects (but not depressed subjects) depended on how they had spelled those homophones in the second phase. For example, if they had used the spelling "week" instead of the more frequent spelling "weak," they were more likely to recognize that word as having been used during the question phase. We therefore inferred that the nondepressed subjects had devised a strategy for recognition as exemplified by this series of questions: "Was the word on the spelling test? How did I spell it? Was that word part of one of the questions I had been asked earlier?" We then used these questions as the basis for new instructions for the recognition test. That is, we asked other subjects to take the recognition test by answering each of these questions for each item. On this guided test, the depressed subjects' recognition of Phase 1 homophones improved to "normal" levels and also depended on how the subjects had spelled the words. In short, the impairment was eliminated by the provision of a strategy for monitoring the relevance of the past. Figure 4 presents the mean percentage of homophones from the question phase that were judged to be old under unguided versus guided instructions.

IMPLICATIONS FOR REMEDIATION

In summary, this research acknowledges that the deployment of attentional resources is critical to

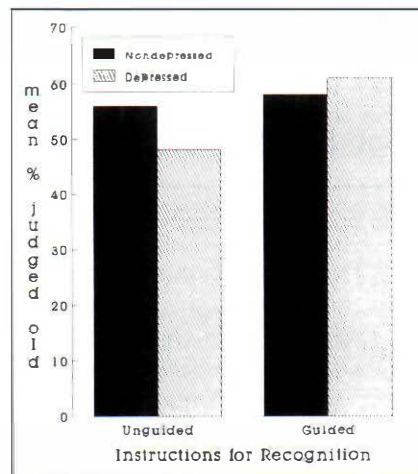


Fig. 4. Mean percentage of homophones from the question phase that were judged old under unguided or guided instructions for recognition. From Hertel and Hardin.³

performance on cognitive tasks and that deployment is a central problem in depression. In contrast to proponents of other approaches, however, I believe that a fuller understanding of cognition during depression can be achieved first by identifying the controlled procedures employed by nondepressed people on their own initiative and then by structuring tasks to require the use of those procedures by all subjects, regardless of mood. Only through the experimental control of attention can researchers understand the consequences of the lack of self-initiated control and learn to structure real-world tasks in ways that avoid impaired performance. Because feelings of incompetence can maintain depressed moods, finding means of producing competence should help in improving mood.

On a happier note, it is worth realizing that impaired attentional control is probably inconsequential in many everyday uses of memory. Past experience often informs cur-

rent experience in nonreflective ways, and depressed people seem to profit from automatic influences of the past as well as happier folks do. Understandably, depressed people's complaints about memory are based on instances of reflection, rather than on the more frequent occasions of nonreflective use.

Notes

1. See reviews by S. Hartlage, L.B. Alloy, C. Vazquez, and B. Dykman, Automatic and effortful processing in depression, *Psychological Bulletin*, 113, 247–278 (1993); J.M.G. Williams, F.N. Watts, C. MacLeod, and A. Mathews, *Cognitive Psychology and Emotional Disorders*, chap. 3 (Wiley, New York, 1988).
2. See R.E. Ingram, Self-focused attention in clinical disorders: Review and a conceptual model, *Psychological Bulletin*, 107, 156–176 (1990).
3. P.T. Hertel and T.S. Hardin, Remembering with and without awareness in a depressed mood: Evidence of deficits in initiative, *Journal of Experimental Psychology: General*, 119, 45–59 (1990).
4. P.T. Hertel and S.S. Rude, Depressive deficits in memory: Focusing attention improves subsequent recall, *Journal of Experimental Psychology: General*, 120, 301–309 (1991).
5. H.C. Ellis, R.I. Thomas, and I.A. Rodriguez, Emotional mood states and memory: Elaborative encoding, semantic processing, and cognitive effort, *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 10, 470–482 (1984).
6. Time to respond to a secondary task of probe detection during Phase 1 trials showed that depressed subjects were slowed in both the focused and the unfocused conditions. If this finding indicates that their resources were otherwise occupied, the limitation was insufficient to affect attention to the primary task in ways that were important for later recall.
7. L.L. Jacoby and M. Dallas, On the relationship between autobiographical memory and perceptual learning, *Journal of Experimental Psychology: General*, 110, 306–340 (1981); B.W.A. Whittlesea and A.L. Cantwell, Enduring influence of the purpose of experiences: Encoding-retrieval interactions in word and pseudoword perception, *Memory & Cognition*, 15, 465–472 (1987).
8. P.T. Hertel, Depressive deficits in word identification and recall, *Cognition and Emotion*, 8, 313–327 (1994).
9. For a review, see H.L. Roediger, III, and K.B. McDermott, Depression and implicit memory: A commentary, *Journal of Abnormal Psychology*, 101, 587–591 (1992). Also notice that these paradigms ensured that words in Phase 1 were processed for meaning, unlike the perceptual rating task used by Hertel, note 8.
10. L.L. Jacoby, J.P. Toth, and A.P. Yonelinas, Separating conscious and unconscious influences of memory: Measuring recollection, *Journal of Experimental Psychology: General*, 122, 139–154 (1993).
11. P.T. Hertel and S. Milan, Depressive deficits in recognition: Dissociation of recollection and familiarity, *Journal of Abnormal Psychology* (in press).