1991

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Publication Details

Journal of Experimental Psychology: General

Journal of Experimental Psychology: General
1991, Vol. 120, No. 3, 301–309

0096-3445/91/$3.00

Depressive Deficits in Memory: Focusing Attention Improves Subsequent Recall

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Ss diagnosed as depressed, recovered from depression, or without a history of depression performed an unintentional learning task, followed by tests of free and forced recall. In the learning task, Ss decided whether a series of nouns sensibly completed corresponding sentence frames that varied in decision difficulty. For half of the Ss, the focus of attention was unconstrained by the demands of this task. The others, however, were required to repeat the targeted noun at the end of the trial as a means of focusing their attention on the task. Depressed Ss in the unfocused condition subsequently recalled fewer words than did both control groups, but this deficit disappeared in the focused condition. These results suggest that depression might not fundamentally impair the resources required for good performance on such tasks. The results' relevance to resource-allocation, initiative, and inhibition accounts of depressive deficits in memory is discussed.

A depressed mood is often accompanied by perceived and actual difficulties in remembering past events. This observation has received empirical support within the clinical and experimental literatures (see reviews by Ellis & Ashbrook, 1988; Williams, Watts, MacLeod, & Mathews, 1988). The most widely held interpretation of depressive deficits in memory is that depression imposes a limitation on the cognitive resources that are available for performing beneficial memory procedures. This "resource" account of depressive deficits originated from a distinction between automatic and effortful processes (Hasher & Zacks, 1979) and was further developed by Ellis and Ashbrook's (1988) emphasis on resource allocation. In both developments, the theoretical footing was supplied by Kahneman's (1973) assumption of a fixed capacity or pool of cognitive resources available for conscious attention.

The resource account assumes either that depression reduces capacity physiologically or that it occupies a portion of the available resources through the allocation of attention to task-irrelevant matters; fewer resources are therefore available for performing procedures that will benefit later attempts to remember. This formulation was derived from work with college students who were either naturally dysphoric or experimentally "depressed" by mood-induction procedures, but it has received some support from studies conducted with clinically depressed patients (see Williams et al., 1988).

In this report, we provide evidence of greater flexibility in depressed subjects' allocation of resources than what has been implied by the resource account. Most tasks used in demonstrations of depressive deficits allow variation in the performance of specific procedures. These tasks are not designed to prevent diversions by guiding all subjects through procedures that will be ultimately beneficial. For example, when subjects are asked to study a list of inherently organized words (as in Weingartner, Cohen, Murphy, Martello, & Gerdt, 1981), some subjects might merely notice that the words are organized, whereas others will develop elaborate retrieval schemes that are based on the organization. When depressed subjects do only the former, we cannot assume that they are incapable of doing the latter. Indeed, depressed subjects might be quite capable of performing procedures that are well specified, regardless of the attentional demands involved. Their failure to do so spontaneously in unstructured situations might implicate difficulties in planning and initiation (Hertel & Hardin, 1990) or difficulties in inhibiting attention to sources of distraction (Hasher & Zacks, 1988) and degenerated intentions (Kuhl & Helle, 1986), but not necessarily limitations on their capacity for effortful thought.

In research with dysphoric and experimentally depressed college students, Hertel and Hardin (1990) found depressive deficits in the spontaneous use of strategies during recognition testing, that is, deficits that were reduced or eliminated when such strategies were provided. Leight and Ellis (1981) demonstrated, through experimental inductions, depressive deficits in the detection of strategies for learning, but not in the use of such strategies when they had been detected in a previously neutral state. Similarly, providing clinically depressed subjects with strategies for problem solving is an effective way to reduce the usual impairment (Abramson, Alloy, & Rosoff, 1981; Silberman, Weingartner, & Post, 1983). These investigations of strategic processing *suggest* that depressed subjects are capable of effortful thought, but the relative attentional demands in the inception and use of such strategies remain unknown.

This research was supported by Grant RO3MH44044 from the National Institute of Mental Health to Paula T. Hertel.

Five colleagues in clinical psychology and psychiatry deserve praise for their sponsorship, guidance, and referrals. We are very grateful to Susan Erikson, Raymond Faber, and Vroni Heatherly, from the Departments of Psychology and Psychiatry at the Audie L. Murphy Veterans Administration Hospital, San Antonio, Texas, and to Raymond O. Henke and Paul McCullom, in private practice in San Antonio, Texas. We also thank the following research technicians and experimenters for their very careful work: Monica Lanum, Patti Boulanger, Meg Johnson, Tammy Hardin, and Anne Marie DeWitt. Henry Ellis and two anonymous reviewers made helpful comments on an earlier version of the article.

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The research reported here illustrates a more basic approach. In designing this experiment, we hoped to show that depressed people are capable of performing effortful procedures when the task requires them to focus attention. Participants in the experiment included clinically depressed outpatients, outpatients recovered from depression, and a community sample of adults with no history of psychological disturbance. Our experimental method was similar to the one used in Experiment 3 by Ellis, Thomas, and Rodriguez (1984); it was chosen because that study is frequently cited in support of the resource account.

Ellis et al. (1984) induced depressed or neutral moods in college students before presenting them with an incidental learning task. The task required subjects to make decisions about the semantic fit of words into sentence frames. These frames were more or less difficult to complete with the targeted words, according to independent ratings. An unexpected test of free recall of targets followed the learning phase. The results from this test and others using similar procedures (Hertel, 1989; Hertel & Rude, 1991; Tyler, Hertel, McCallum, & Ellis, 1979) showed that subjects in a neutral mood recalled more words from the difficult sentences than from the easy sentences. However, Ellis et al.'s depressed subjects recalled similar numbers of words from easy and difficult sentences and thereby demonstrated impaired memory for materials from difficult contexts.

Our method included a similar learning phase, but we varied the extent to which attention to the targeted words was required during that phase. In the focused condition, the target appeared only briefly at the beginning of the trial and was followed by the sentence; with the offset of the sentence, subjects repeated the word aloud and reported their judgment of fit (yes or no). In the unfocused condition, the target remained on the screen; subjects were allowed to report their decision at any point during the trial and were not asked to report the target. (The unfocused condition was closer to the method used by Ellis et al., 1984, who presented sentence frames and noun pairs successively and allowed subjects to choose the correct alternative by pressing a button at any point during the presentation of the pair.) Subjects in the unfocused condition could engage in further processing after the decision was made or could allow their minds to wander.

We predicted that depressed subjects would be less likely than nondepressed subjects to maintain their attention to the task when not explicitly required to do so (i.e., in the unfocused condition). The rationale for this prediction rests on the well-documented tendency for depressed people to show chronic levels of self-focused attention or otherwise to focus on task-irrelevant matters (see Ingram, 1990). As Hasher and Zacks (1988) proposed for elderly samples, irrelevant focus disrupts task-appropriate processing and enhances competition during retrieval. The consequence would be a depressive deficit in recall following the unfocused learning task. In contrast, all subjects in the focused condition were kept on task by the requirement to repeat the word and the decision at the end of the trial. We therefore predicted comparable levels of recall from the nondepressed and depressed subjects in the focused condition, all of whom should be capable of allocating sufficient resources to comply with task demands.

The method used in this research also included a secondary-task technique for assessing the availability of attentional resources. Subjects pressed a key in response to a brief tone that occurred during their exposure to the sentence frame. Longer latencies to respond to the tone are offered as indications that fewer resources are available for tone detection, typically because they are allocated in greater proportion to the primary task (see Inhoff & Fleming, 1989; Kerr, 1973; Tyler et al., 1979).[1] Longer response latencies by depressed subjects might also reflect motor retardation or the allocation of attention to task-irrelevant matters. In an exploratory attempt to address these issues, we included two series of baseline trials in which tones were presented apart from the primary task. The baseline trials were used to evaluate preexisting differences in response latencies (as might be incurred by task-irrelevant thinking or by motor retardation on the part of depressed subjects). These differences were partialed out in subsequent analyses of secondary-task performance. The adjusted latencies were then used to examine depression-related differences in the allocation of attention to the learning task.

In summary, participants were currently depressed, recovered from depression, or reporting no history of depression. Regardless of their diagnostic status, they were assigned to an incidental learning task that varied in the extent to which it constrained the focus of attention and that was followed by an unexpected test of recall. We predicted that depressed subjects would show impaired recall compared with nondepressed controls, but only under unfocused learning conditions, when subjects' attention could be diverted to task-irrelevant matters. By requiring more attention to the task, the focused condition was expected to eliminate differences associated with a depressed state. Finally, a secondary task was used to investigate possible differences in the allocation of attentional resources.

Method

Subjects

Criteria. Our criteria for participation included (a) an upper limit of 55 years of age; (b) a high-school diploma or its equivalent; (c) fluency in English; (d) no prior history of shock treatment, organic

[1] Conceptual problems arise from secondary task-methods for assessing use of fixed capacity (see Hasher & Zacks, 1988). These problems, however, are inherent in the assumption of a unified pool of resources and the concomitant need to assess the resource demands of a particular task, independent from memory performance. The secondary-task technique is probably the best one available for those purposes and has produced consistent results across experiments performed with the methods we use in this report (see Hertel, 1989; Hertel & Rude, 1991; Tyler et al., 1979).

Somewhat different issues regarding secondary tasks were raised by Williams et al. (1988). They reviewed evidence suggesting that the use of a secondary task may reduce the frequency of distracting thoughts in depression (which would reduce deficits in subsequent recall). This issue would arise in the context of the present research, if a deficit were not observed; the use of the secondary task was a constant factor with respect to the conditions of our primary task.

impairment, seizures, or thought disorder; and (e) no recent history of substance abuse. Subjects recruited for the depressed and recovered groups must have had diagnoses of depression with no evidence of manic episodes. Subjects recruited for the nonpsychiatric-control group must have had no prior history of psychological disturbance.

Recruiting methods. Potential participants were contacted through several sources. The primary source for depressed and recovered outpatients was the Audie L. Murphy Veterans Administration (VA) Hospital in San Antonio, Texas. Psychiatrists and a psychologist on the staff wrote letters to psychiatric outpatients who conformed to our criteria (which were later verified by checking the records). Nonpsychiatric controls were obtained through other medical clinics. Another major source was a private clinic that routinely tests applicants for the Texas Rehabilitation Commission. Suitable clients were contacted by mail by the psychologists on its staff.

All letters offered the opportunity to participate in a research study at Trinity University. Prospective participants were told that the study involved the use of a computer to perform routine cognitive tasks. The letter promised payment of $10 per hour and provided the names and phone numbers of individuals to contact. When volunteers phoned, they were screened for uncorrected or poorly corrected vision.

The third source of participants was the staff of Trinity University, which was added midway through the study for the purpose of recruiting nonpsychiatric controls. We circulated fliers that described the study, payment, method of volunteering, and certain criteria (age, language, and educational level).

Final sample. A total of 86 individuals volunteered. Ten volunteers did not show up for their appointments (others did not show up for initial appointments, but were rescheduled successfully). For their data to remain in the sample, depressed subjects were required to meet Research Diagnostic Criteria (RDC) for major or minor depression (Spitzer, Endicott, & Robins, 1978), with no report of manic episodes. These criteria were applied to responses collected during a structured clinical interview (see the procedures). On the basis of this interview, participants with prior diagnoses of depression were classified as recovered from depression if they did not meet the RDC and if they scored less than 14 on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Taylor and Klein (1989) recommended that a cutoff score of 14 on the BDI should be used as an index of recovery. The same criteria regarding the interview and BDI were also used to validate the nondepressed status of nonpsychiatric controls.

Data were set aside for 12 subjects who did not meet our initial criteria (4 subjects showed evidence of manic episodes revealed during our clinical interview, another 3 subjects described current experience of substance abuse, 2 subjects had received shock treatments, 2 subjects did not meet educational criteria, and 1 was too old). Data were set aside for another 4 subjects whose BDI scores fell outside the preestablished range. Finally, the data from 2 randomly selected subjects were eliminated from analyses to equalize numbers across task conditions. The distribution of the 58 remaining subjects, according to diagnostic group, is described in Table 1, along with the demographic characteristics of the sample. (Age and the number of years of education did not reliably vary according to diagnostic status or the type of learning task.) Of the 58 subjects, 23 were recruited from the VA, 11 from private practice, and 14 from the staff at Trinity University.

Table 1
Characteristics of the Sample

Measure	Diagnostic status: Nonpsychiatric	Recovered	Depressed
Total *n*	16	16	26
Age	38.9	41.1	40.7
Education	13.9	14.9	13.8
Gender			
Female	9	6	6
Male	7	10	20
Ethnicity			
Anglo	10	11	17
Asian	0	1	0
Black	2	2	1
Hispanic	4	2	8
Hospitalization			
None	16	11	15
<1 year	0	0	4
>1 year	0	5	7

Note. Most entries are the numbers of participants in each category; age and education are noted in mean numbers of years. Hospitalization refers to the interval between participation and hospitalization for psychiatric purposes.

Experimental Materials

Learning task. The learning task conformed to the methods of Tyler et al. (1979, Experiment 4), but was computer-implemented. It consisted of 40 sentence-completion trials. Each trial required the subject to view a word followed by a sentence with one word missing and to decide whether the word fit sensibly into that sentence frame. Unknown to the subject at the outset, all words fit sensibly into the corresponding frames. The 40 words were nouns high in frequency, concreteness, and meaningfulness; their accompanying sentence frames had been pretested for difficulty of completion (see Hertel, 1989). Each word appeared with easy frames for approximately half of the subjects in each experimental conditions and with difficult frames for the others. For example, the word *artist* was sometimes followed by *The young man's portrait was painted by the ____*. Other subjects saw *artist* followed by *The young man's physique was admired by the ____*.

The learning task was implemented on a CompuAdd-286 computer. The program began with the presentation of instructions, 15 baseline trials of tone detection, and 4 practice trials that represented each level of difficulty and tone delay. All practice and learning trials began with a 1-s display of a word at the top center of the screen. In the focused condition, the offset of the word occurred simultaneously with the onset of the sentence frame, which was centered on the screen and remained exposed for 8 s. In the unfocused condition, the word remained exposed for the duration of the sentence frame. On 80% of the trials in both conditions, a weak but detectable tone occurred at delays of 1, 2, 4, or 6 s after the onset of the frame. With the offset of the frame, a question mark appeared and the trial was terminated by a keypress. A blank screen lasting 1 s separated trials.

The 40 words were grouped into blocks of 10. Each block contained 4 five-letter words, 4 six-letter words, 1 seven-letter word, and 1 eight-letter word. Across subjects, words were maintained in these blocks as they rotated through the 10 counterbalanced orders obtained by crossing sentence difficulty (easy vs. difficult) with tone delay (no tone or a delay of 1, 2, 4, or 6 s after the onset of the sentence). The order of tone delays was constant for all subjects.

Procedure and Other Materials

The experimental session began with informed consent, followed by an initial administration of the Multiple Affect Adjective Check List (MAACL Today Form, Zuckerman & Lubin, 1965). The experimenter assigned subjects to conditions for the learning task on the basis of their previous diagnosis. Assignment to the focused or unfocused condition was random, with the constraint of obtaining equal numbers in each type of task within each diagnostic group. As described above, crossing the two levels of sentence difficulty with the five levels of tone onset for counterbalancing purposes produced 10 stimulus-presentation orders to which subjects could be assigned. The 13 depressed subjects in each learning condition were distributed across these 10 orders such that all orders were represented. Because there were only 8 recovered and 8 control subjects in each learning condition, all 10 orders could not be used in these groups. But sentence difficulty was balanced, and the 8 subjects in each group received unique orders with one exception: In one group only 7 of the 10 possible orders were used.

Instructions and examples for the learning task were presented orally and on the computer screen; they were augmented by further clarification by the experimenter when it was necessary. Subjects were informed that two different tasks would be performed simultaneously: a primary sentence-completion task and a secondary task of detecting an auditory signal. For the primary task, subjects were instructed to decide whether the word presented at the top of the screen fit sensibly into the incomplete sentence presented below it. If they were assigned to the focused condition, they were told to repeat the word and the decision (by saying "yes" or "no") when the question mark appeared at the end of the trial and then to press a key when they were ready for the next trial. Subjects in the unfocused condition were asked to report their decision whenever they chose to do so; the question mark signaled them to press a key when they were ready for the next trial. All subjects were informed that most trials would require a "yes" response, but that some subjects would experience a few negative instances; therefore, they should consider all decisions carefully.

Instructions for the secondary task told subjects to respond to the tone by pressing a key with a finger on their nondominant hand. Fifteen baseline trials for tone detection were presented first and followed by a review of the requirements for the upcoming primary task. This preview emphasized pressing as quickly as possible in response to the tone, but without sacrificing attention to the primary task. The experimenter answered any questions before resuming the program. The four practice trials preceding the learning trials provided additional opportunities for clarification.

After the learning task and a final set of 15 baseline trials, subjects solved arithmetic problems for 2 min (to prevent recency effects in free recall). Then the experimenter asked the subjects to write down all the words they could remember from the words appearing at the top of the screen during the learning phase; 2 min were allotted for free recall. Then the experimenter asked them to try harder to recall and to write at least 20 words, guessing if necessary. So that we could later differentiate between free and forced recall, a line was drawn beneath the last word of their initial attempt. (For discussions of the forcing procedure, see Erdelyi, Finks, & Feigin-Pfau, 1989; Roediger, Srinivas, & Waddill, 1989.)

Next, subjects filled out another MAACL and the BDI. The experimenter orally administered Wechsler Adult Intelligence Scale—Revised (WAIS–R) Vocabulary subscale. Then she conducted an interview that provided information about age, educational level, history of psychological treatment, and prescribed and nonprescribed drugs currently or recently used by the subject. The interview progressed through a series of questions that allowed us to use RDC for determining specific diagnoses of depression and anxiety. (RDC guidelines are straightforward; the experimenter's notes on responses were independently scored by two judges who agreed completely.)

Results and Discussion

Recall

The mean number of total words recalled (free and forced) are shown in the top half of Table 2. What is readily apparent (and also reliable) is that a depressive deficit was obtained in the unfocused learning condition, but that depressed subjects recalled as well as controls in the focused condition.

Table 2
Mean Number of Words Recalled

Learning task	Diagnostic status: Nonpsychiatric	Recovered	Depressed
	Total recall		
Unfocused			
Easy frames	2.88	4.12	1.46
Difficult frames	4.62	5.00	3.08
Both	7.50	9.12	4.54
Focused			
Easy frames	3.50	4.62	3.77
Difficult frames	4.25	4.62	5.38
Both	7.75	9.25	9.15
	Free recall		
Unfocused			
Easy frames	1.88	2.75	0.77
Difficult frames	3.62	3.25	1.46
Both	5.50	6.00	2.23
Focused			
Easy frames	1.88	3.00	2.54
Difficult frames	3.00	2.88	4.00
Both	4.88	5.88	6.54

Note. $n = 8$ for nonpsychiatric, 8 for recovered, and 13 for depressed.

A mixed-design analysis of variance, with between-subjects factors for diagnostic group (nonpsychiatric, recovered, and depressed) and learning task (unfocused vs. focused) and within-subjects factors for sentence frame (easy vs. difficult) and type of recall (free vs. forced), revealed several reliable effects. For all effects examined here and throughout this report, α was set at .05. Reliable effects that involved diagnostic status were further examined through orthogonal comparisons: (a) depressed versus both control groups and (b) nonpsychiatric versus recovered controls. These planned comparisons were used for all dependent variables, so that uniform issues could be addressed.

First, subjects in the unfocused condition recalled fewer words than did those in the focused condition, $F(1, 52) = 4.14$, $MS_e = 2.30$. This disadvantage, however, reliably depended on diagnostic status, $F(2, 52) = 3.82$. Depressed subjects derived a greater benefit from the focused task than did the control groups (who did not differ reliably in this regard), $F(1, 52) = 7.64$.

Second, subjects recalled more words that had been evaluated in the difficult sentence frames, compared with the easy ones, $F(1, 52) = 8.38$, $MS_e = 1.99$. The difficulty of the frame, however, did not reliably interact with diagnostic status or the type of learning task.

The third set of reliable effects involved the type of recall test. We obtained a reliable three-way interaction of the type of test, the diagnostic status, and the type of learning task, $F(2, 52) = 5.19$, $MS_e = 2.17$. This interaction was understood by examining recall within each type of testing condition. Essentially, the interaction of diagnostic status with the type of learning task described above occurred for free recall, but not for forced recall.

Free-recall means are presented in the bottom half of Table 2; the difference between the depressed group and the controls reliably depended on the type of learning task, $F(1, 52) = 15.41$, $MS_e = 2.55$. Depressed subjects freely recalled fewer words than controls following the unfocused task (Ms = 2.23 for depressed and 5.75 for controls), but slightly more words following the focused task (Ms = 6.54 for depressed and 5.38 for controls). In contrast, no reliable differences were found among means for forced recall (obtainable by subtracting means in the bottom half of Table 2 from means in the top half).

Among others, Johnson and Magaro (1987) suggested that depressive deficits in recall result in part from a conservative bias in depressive styles of responding. Such a bias should be revealed by the forced-recall procedure in the present experiment, in that depressed subjects should recall more words than nondepressed subjects when forced to guess. Depressed subjects recalled 2.46 additional words, on average, whereas the mean for all controls was 2.84. Our results therefore did not provide evidence that deficits in free recall are confounded by response bias.

Finally, the effect of the frame's difficulty depended on the type of test, $F(1, 52) = 4.29$, $MS_e = 1.57$. Again, no reliable effects were found for forced recall, but the effect of difficulty on free recall reliably obtained, $F(1, 52) = 12.40$, $MS_e = 1.80$.

Recall and severity of depression. Johnson and Magaro (1987), in a review of memory and clinical depression, concluded that severity of depression is an important factor. When the total number of words recalled by all subjects in this study were entered into correlation with their BDI scores, a reliable but low association was found, $r(56) = -.36$. The correlation was not reliable in the focused condition, $r(27) = -.23$. It was reliable in the unfocused condition, $r(27) = -.56$, but not reliably higher than the correlation in the focused task. However, when *free* recall was correlated with BDI scores, a reliable difference obtained ($r = -.10$ in the focused condition and $-.67$ in the unfocused condition; $z = 2.171$). Severity of depression, then, appears to be moderately correlated with recall under conditions in which attentional constraints are minimized.

Recall according to the response on the learning task. During the learning task, subjects made a mean number of 2.07 negative responses to difficult sentence frames and subsequently recalled a mean number of 0.60 words judged not to fit in those frames. These negative responses and subsequently recalled words were evenly distributed across conditions and no reliable differences were revealed. As might be expected, negative responses to easy frames were negligible in number ($M = .17$), and so were the numbers of words recalled from those trials ($M = .05$).

Latencies in Responding to the Tone

Baseline trials. Means of median latencies from each set of baseline trials are shown in the top half of Table 3. A mixed-design analysis of variance with factors for diagnostic status, type of learning task, and time of administration (before or after the learning task) revealed a reliable main effect of timing, $F(1, 52) = 15.52$, $MS_e = 26696.10$. Subjects responded more quickly after the learning task.

Table 3
Means of Median Latencies in Milliseconds

Condition	Diagnostic status		
	Nonpsychiatric	Recovered	Depressed
Baseline trials			
Before learning task			
Unfocused task	305	333	820
Focused task	481	670	466
After learning task			
Unfocused task	296	294	584
Focused task	335	387	443
Secondary task (adjusted by baseline medians)			
Unfocused task			
Easy frames	610	810	876
Difficult frames	785	971	1380
Focused task			
Easy frames	755	776	1076
Difficult frames	993	937	1304

Note. $n = 8$ for nonpsychiatric, 8 for recovered, and 13 for depressed.

The analysis also revealed a reliable three-way interaction, $F(2, 52) = 5.68$, which was understood by examining median latencies on each set of baseline trials. On the set of baseline trials that occurred before the learning task, diagnostic status reliably interacted with the type of task, even though it bad not yet occurred, $F(2, 52) = 3.77$, $MS_e = 184385.99$. More specifically, longer latencies by depressed subjects occurred only for those who later received the unfocused task, $F(1, 52) = 7.07$. After the learning task, the only reliable effect pointed to longer latencies by depressed subjects overall, $F(1, 52) = 5.73$, $MS_e = 86238.06$. The interaction in the pretask trials is difficult to interpret. For example, the data collected on severity of depression (e.g., BDI scores and distributions across RDC categories described below) do not indicate that the subjects in the unfocused learning condition were more depressed. Regardless, the posttask effect suggested that both depressed groups were affected by task-irrelevant factors that operated throughout the learning task and beyond.

Secondary task. Median latencies on the secondary task were reliably correlated with median baseline latencies, $r = .66$, $F(1, 51) = 38.93$, $MS_e = 533956.60$. They were consequently adjusted by the baseline medians, averaged across the two sets. The adjusted means are shown in the bottom half of Table 3. An analysis of covariance revealed only a marginally reliable main effect of diagnostic status, $F(2, 51) = 2.79$, $p < .08$. But because differences in the availability of cognitive resources are central to resource accounts of depressive deficits, we examined comparisons among diagnostic groups. Only the comparison between the depressed subjects and the controls was reliable, $F(1, 52) = 5.40$; depressed subjects responded more slowly to the tone, even when baseline differences were controlled.

The type of learning task did not reliably affect latencies (with or without the covariate). The only reliable effect in the overall analysis occurred with respect to the difficulty of the sentence frame, $F(1, 52) = 10.02$, $MS_e = 148816.95$. As is typically found, subjects took longer to respond to the tone on the more difficult trials.[2]

Diagnostic Indices

WAIS–R Vocabulary subscale. Scores on this test were submitted to an analysis of variance, with factors for diagnostic group and type of learning task. Means are presented in Table 4. Although there was an apparent trend for subjects in the focused condition to score higher, there were no reliable differences. Scores on the WAIS–R were not reliably correlated with recall performance, $r(56) = .03$. The correlation between recall and years of education was not reliable as well, $r(56) = .04$.

BDI. Kendall, Hollon, Beck, Hammen, and Ingram (1987) recommended reserving the label *depression* for subjects who score 16 and above on the BDI and who also meet criteria for depression ascertained through a structured clinical interview. Two subjects whom we categorized as depressed produced BDI scores of 14 or 15, but these subjects met RDC for definite major depression. Consequently, we included their data in the depressed conditions. Recovered subjects all scored below 14 on the BDI. Mean scores on the BDI are presented in Table 4; they were submitted to two separate analyses of variance: one for scores obtained from recovered and control subjects in both conditions of the learning task and the other for scores obtained from the two groups of depressed subjects. (Analyses were separated because we had established cutoff scores on the BDI.) These analyses revealed no reliable differences.

RDC. Of the 13 depressed subjects in the unfocused condition, 10 met criteria for definite major depression, 1 met criteria for probable major depression, and 2 met criteria for minor depression. Of the 13 subjects in the focused condition, 12 met criteria for definite major depression and 1 met criteria for probable major depression. Eight of the depressed subjects in each learning condition also met criteria for anxiety.

Table 4
Means on Diagnostic Measures Collected in Session

Measure	Diagnostic status: Nonpsychiatric	Recovered	Depressed
WAIS–R Vocabulary			
Unfocused task	10.4	10.6	9.8
n	8	8	13
Focused task	11.4	10.1	11.8
n	8	8	13
BDI			
Unfocused task	5.6	4.6	25.1
n	8	8	13
Focused task	6.5	4.5	26.2
n	8	8	13
MAACL–Depression			
Pre	−6.4	−9.7	1.5
n	16	16	26
Post	−2.2	−9.1	0.1
n	16	16	26
MAACL–Anxiety			
Pre	−3.7	−4.8	1.2
n	16	16	26
Post	−0.6	−4.9	0.5
n	16	16	26

Note. Subscales on the Multiple Affect Adjective Check List (MAACL) were computed by subtracting the negative score from the positive score in each affective category. WAIS–R refers to the Wechsler Adult Intelligence Scale—Revised. BDI refers to the Beck Depression Inventory.

MAACL. To produce approximately normal distributions of scores on the MAACL, the positive and negative dimensions of the scales for depression and for anxiety were collapsed by subtracting the negative score from the positive score. The resulting scores for depression and anxiety were submitted to separate analysis of variance, with factors for diagnostic status and type of learning task and repeated measures on the time of administration (before the learning task or after recall). Means are shown in Table 4. Lower scores indicate lower levels of the mood in question.

Neither analysis showed reliable effects involving the type of learning task. The analysis of depression scores revealed a reliable main effect of diagnostic status, $F(2, 52) = 17.85$, $MS_e = 58.59$. Planned comparisons showed that the depressed group scored higher than the control groups, $F(1, 52) = 28.53$, and that nonpsychiatric controls scored higher than recovered subjects, $F(1, 52) = 7.17$. In addition, the interaction of diagnostic group with time of administration was reliable, $F(2, 52) = 5.22$, $MS_e = 14.54$. The depressed subjects maintained their initial moods to a greater degree than did control subjects, $F(1, 52) = 6.83$. And there was a trend for the moods of nonpsychiatric controls to worsen more than the moods of recovered control $F(1, 52) = 3.62$, $p < .07$.

The analysis of anxiety scores revealed similar effects. The main effect diagnostic status, $F(2, 52) = 14.47$, $MS_e = 22.66$, was partitioned into the same two comparisons: Depressed subjects were more anxious than controls, $F(1, 52) = 23.95$, and nonpsychiatric controls were more anxious than recovered controls, $F(1, 52) = 4.98$. Diagnostic status reliably interacted with the time of administration, $F(2, 52) = 6.68$, $MS_e = 5.46$. Depressed subjects tended to maintain their initially anxious moods more than controls tended to stay relatively less anxious, $F(1, 52) = 5.92$. The anxiety levels of nonpsychiatric controls increased more than those of recovered controls, $F(1, 52) = 7.44$. 9

Medication. One subject among the 16 nonpsychiatric controls reported taking an antidepressant, prescribed for reasons other than depression. In the group of 16 recovered controls, 31% were currently medicated with antidepressants and 25% with antianxiety drugs. Among the 26 currently depressed subjects, 35% reported current use of antidepressants and 35% antianxiety medications. About half of the subjects in each diagnostic group reported use of other prescribed medications. All subjects reported only slight to moderate use (if any) of alcohol and infrequent use (if any) of other recreational drugs.

[2] We acknowledge an interest in median latencies distributed across categories of tone delay; depressed subjects might show patterns that differ from nondepressed subjects. However, the 16 tone-present trials in each condition of difficulty, the four delays, and moderately variable raw latencies make meaningful analysis difficult.

Presence Versus Absence of Symptoms of Anxiety

Anxiety is a common presenting symptom in clinical interviews with depressed clients, and differential diagnosis is quite difficult (Greenberg & Beck, 1989). Most of our depressed subjects met RDC for anxiety as well as for depression. Yet, there are potentially important differences in the cognitive correlates of these disorders (Williams et al., 1988). We therefore performed additional analyses on the data from depressed subjects by using between-subjects factors for anxiety (presence or absence) and the type of learning task. There were 5 subjects without anxious symptoms in each condition of the learning task (and 8 anxious subjects). Age, ethnicity, educational background, and WAIS-R scores were comparable for anxious and nonanxious subjects, although the latter produced slightly higher scores on the BDI (29.50 vs. 23.25). Latencies and recall scores did not reliably differ according to the presence of anxious symptoms, but trends showed that nonanxious depressed subjects in the unfocused task took longer to respond to the tones and subsequently recalled slightly fewer words (the means were 4.00 for nonanxious and 4.88 for anxious subjects). In the focused condition, the means on recall and latencies showed no apparent trends.

General Discussion

When the nature of the learning task allowed greater variation in the focus of attention, depressive deficits occurred in subsequent recall; when the focus of attention was constrained by the nature of the learning task, these deficits were eliminated. These were the major findings demonstrated in this report.

The task used to demonstrate the effects of attentional control was chosen because it is representative of learning tasks in which depressive deficits have been observed. It is very similar to one of the tasks used by Ellis et al. (1984) in their examination of the relationship between depressive deficits and attentional resources. Although this report might be the first documentation of effective attentional control during the learning phase of an experiment on depressive memory, other investigations provide some basis for suggesting that depressive deficits can be more generally eliminated through the experimental control or constraint of cognitive processing. By controlling the use of strategies during retrieval, for example, Hertel and Hardin (1990) improved the recognition performance of depressed students. And in their review of findings from a variety of experimental paradigms, Hertel and Hardin suggested that depressive deficits typically occur when tasks permit variation in specific cognitive procedures. Nondepressed subjects are likely to detect or invent appropriate procedures spontaneously, but depressed subjects tend to do only what they are told to do.

In our experiment, opportunity for the spontaneous use of procedures was provided in the unfocused condition, in which subjects could choose to rehearse the materials and possibly provide elaborations and distinctions. In contrast, the focused condition required rehearsal of the target and delayed report of the decision, such that more elaborative and distinctive processing of the target in the context of the sentence frame was possibly encouraged. We are not interested in claiming that these specific processes occurred; rather, we suggest that these or other processes were more likely to be invoked by the focused learning task and more likely left to the subjects' initiative in the unfocused task.

Our evidence for a depressive deficit in initiative is consistent with the emphasis in the clinical literature on lack of self-efficacy and feelings of failure (see Rehm, 1988), but the balance of cognitive and motivational factors that might contribute to the deficit is difficult to determine. The most general issue that arises in this context involves the distinction between factors related to competence and those related to performance.

Performance-Competence Distinctions

Do depressive deficits in memory tasks result from insufficient abilities, or are depressed people simply unmotivated to perform at the levels of competence that would otherwise reflect unimpaired ability? The issue of competence is further complicated by the question: Ability to do what? If the ability to focus attention when the task requires it is the issue, as in the present report, we know that depressed people can focus well enough to recall at "normal" levels. But if the issue is the ability to muster attention when it is not required, the answer is unknown.

At first glance, it might seem that a motivational manipulation would help. For example, if the unfocused learning task were performed under conditions of intentional learning, and if no impairment in subsequent recall resulted, we might conclude that the depressed subjects were sufficiently motivated to exhibit their knowledge that it is important to pay attention to the words when they must later recall them. Even if such results obtained, however, we would need to account for the results from actual experiments on intentional learning that have shown depressive deficits (see Williams et al., 1988). In those cases, we do not know whether a lack of competence in discovering the best procedures was responsible, or whether the depressed subjects were not sufficiently motivated by the demands for recall to initiate their use.

The picture is further clouded by an analysis of motivational factors in performance. Riskind (1989) suggested that one important factor in depressive deficits in memory is lack of interest, which might be supplied by increasing incentives. This approach would require an identification of suitable incentives for depressed people. Yet all motivational variables do not reduce to incentives and some seem to be meshed inextricably with cognitive variables. For example, Rehm (1988) believed that depressed people easily access ideas related to failure and lack of self-efficacy as they perform cognitive tasks. Finally, certain types of "motivational" manipulations (e.g., intentional-learning instructions) might be better identified as cognitive variables. As we have implied, intentional-learning instructions might motivate subjects to perform well to preserve self-esteem. Alternatively, such instructions might operate simply as cues for learning procedures. If the instructions to learn the words do not cue the appropriate procedures, the analysis reverts to issues related to competence.

In short, the conceptual distinction between competence and performance as it relates to the nature of depressive deficits in memory is a difficult distinction to make on empirical grounds. This difficulty probably arises in part from artificial boundaries between cognitive and motivational factors. Nevertheless, on practical grounds it is important to understand the conditions that do produce competent performance by depressed people, so that tasks can be designed to tap these competencies (see Hertel, in press). This is the point that we want to emphasize, because our results speak directly to some aspects of competence. We next address those aspects in the context of two formulations of depressive deficits in memory: The resource-allocation account provided by Ellis and Ashbrook (1988) and an adaptation of Hasher and Zacks's (1988) model for cognitive difficulties associated with aging.

Resource Allocation

Despite the wide appeal of resource accounts of depressive memory impairments, they have not been fully developed. One neglected issue concerns the modifiability of resource limitations. In its strong form, the resource account makes a claim about the availability of resources by assuming that a certain proportion of attentional resources is made unavailable when a person is depressed. This form of the account is compatible with some biochemical approaches (see Weingartner et al., 1981). The central prediction of Ellis and Ashbrook's (1988) resource-allocation model is that tasks that involve greater attentional demands will result in greater disparities in the performance of depressed and nondepressed subjects. In particular, demands imposed by more difficult tasks are more likely to exceed the depressed subjects' available resources. Ellis and Ashbrook did not explicitly address the issue of modifiability, although they did acknowledge the potential influence on memory performance of "a variety of task variables, subject variables, mood variables, instructional variables, and other contextual variables" (1988, pp. 30–31).

As we view our results in relation to the resource account, we emphasize first that depressed subjects had sufficient resources available for attending to the learning task: Recall following the focused task did not show a depressive deficit. This improvement cannot be attributed to reduced demands on resources, the explanatory variable emphasized by Ellis and Ashbrook (1988), because the task that eliminated the deficit was no less demanding than the task that produced it. It should also be noted that depression was stringently defined in our research and that severity of depression was reliably correlated with performance under the less-focused-learning and testing conditions, but not when attention was more controlled. Thus, the strong version of the resource account cannot incorporate our results.

Nevertheless, the present findings do not demonstrate that depressed and nondepressed subjects have comparable amounts of resources available. Although the depressed subjects in the focused condition recalled as well as controls, their latencies on the secondary task were longer. Perhaps they thought harder about the task materials than did controls (without a corresponding benefit for recall), or perhaps they were occupied with other matters, but we cannot rule out a basic limitation on the availability of resources as an explanation of the longer latencies. Regardless, recall performance in the focused condition makes a case for competence in depression. From the point of view of resource theory, this means that sufficient resources were available to perform a task that Ellis et al. (1984) used to demonstrate that they were not available.

A weaker form of the resource-allocation model might eschew the claim of reduced availability. Such an account would say that depressed people perform poorly on certain cognitive tasks because they allocate fewer resources to them. This is another way of saying that depressed people perform poorly when they do not pay attention to the factors that could benefit later recall (a potentially circular argument). In this case, there is no advantage in reasoning about resources, but perhaps a good advantage in asking why depressed people do not spontaneously attend to task-relevant factors. This is the question addressed next.

Difficulties in Inhibition

Hasher and Zacks's (1988) criticism of limited-resource views on age-related performance in cognitive tasks led them to propose a new perspective that can be extended to the domain of depressive performance. Their model emphasized disturbances in inhibitory processes associated with aging; "off goal-path thoughts" and their prolonged maintenance occupy attention. Similarly, Kuhl and Helle (1986) found evidence that depressed subjects prolong attention to goals that are not immediately relevant. Difficulties in inhibiting irrelevant thoughts are proposed by several accounts of depression, but most of them emphasize distractions associated with self-focus and mood state (see reviews by Ingram, 1990, and Williams et al., 1988). Emphasizing a more general difficulty in inhibition is perhaps a more parsimonious approach to understanding depressive difficulties. The idea is not that depressed people are thinking pervasively about themselves and their feelings, any more than elderly people perseverate about themselves and the aging process; rather, disturbances in central inhibitory processes make any thoughts that come to mind distracting.

Hasher and Zacks (1988) further suggested that aging people compensate for these disturbances by relying on environmental cues for performance. Our position on depressive difficulties is similar. The lack of initiative shown by depressed people perhaps results from competing thoughts that leave them "in a muddle." But they can compensate for their distractions by relying on environmental cues that focus their attention on the task at hand and allow them to demonstrate their competence. Ultimately, the resolution of issues related to performance versus competence in depressive memory might be less important than the discovery that depressed people perform well when the environment guides their attention.

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Received September 5, 1990
Revision received February 7, 1991
Accepted February 15, 1991 ■