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The Relationship of Depression to Associations and Immediate Recall

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THE RELATIONSHIP OF DEPRESSION TO ASSOCIATIONS
AND IMMEDIATE RECALL

by

Karen Eggen Gundersen

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of Loyola University of Chicago in Partial Fulfillment
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LIFE

The author, Karen Eggen Gundersen, is the daughter of Margaret (Sjol) Eggen and the late Byron Raymond Eggen. She was born February 22, 1955, in Bemidji, Minnesota. October 4, 1980 she was married to David Michael Gundersen in Grand Rapids, Minnesota.

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INTRODUCTION

In the last decade, cognitive-behavioral theories of depression have increasingly incorporated both cognitive and environmental parameters to account for the complex symptomology present in depressive disorders. These theories place primary emphasis on the role of cognitions in determining emotions; that is, one's beliefs about events are seen as central to depressive emotions. Considerable research supports these contentions.

Recent research by Gordon Bower (1981) provides additional data concerning the relationship between emotion and cognition. Bower suggests that emotion serves as a memory unit that enters into associations with coincident events. Activation of this emotion aids in retrieval of events associated with it and primes themes for other cognitive processes. In the group of studies associated with this theory, Bower has obtained significant results relating hypnotically-induced emotions and cognitive processes.

While Bower's research has significant implications for theories of depression, two questions arise from this research. The first concerns demand compliances resulting from the hypnotic manipulations. Although Bower has defended this criticism with related research, additional studies should be carried out. A second question is related to the generalizability of Bower's results. The generalizability of these

results may be evidenced if research in naturalistic settings also found a relationship between emotions and cognitive processes. Partial replications in normal or clinical settings might adequately demonstrate the relevance of Bower's findings in a clinical setting.

The following project was designed to expand upon Bower's research and study various degrees of unmanipulated (naturally-occurring) depression in a normal population. Specifically, the relationship of various levels of depression and word associations, the content of affect-laden word recall, the amount of total recall, the amount and affect of interjections, and the ordering of recall were observed.

REVIEW OF RELATED LITERATURE

Introduction

Philosophers have related affect and cognitions for 2000 years. Kant suggested that reason synthesizes experiences according to its own nature and our understanding of the outside world is possible only in terms of our modes of perception. Kant's philosophy maintained that the laws of man determined what laws of nature can be discovered. Dynamic theorists have also addressed the issue of the relationship between affect and cognitions for nearly 90 years (James, 1890; McDougall, 1921): In the last decade cognition and affect have again become major areas of theory and research in depression following several years of inactivity due to the popularity of strict behaviorism and its extreme stimulus-response approach. One reason some researchers have returned to studying cognition is that many responses are not predictable from the stimulus situation alone. Cognitive events intervene between the two to sufficiently warrant attention. In this short time, some theorists have come to view affective states from both operant and cognitive terms.

The following sections will be devoted to contemporary theories and relevant issues about depression as viewed by cognitive-behavioral researchers. First, three ways of classifying depression will be defined. Next, an extended view of the cognitive determinants of depression will be presented. Regarding this theme, several researchers have proposed that depressed people interpret their world and themselves

differently than nondepressives (Beck, 1972; Ferster, 1974; Rehm, Note 1; Seligman, 1975). Recent research by Bower (1981) suggests that emotions powerfully influence specific cognitive processes through an associative network process.

In summary, this review intends to show the increasing use of cognitive explanations to depressive behavior. Specific attention will be given to research relating depression to selective attention, memory, and associations.

Classifying Depression

Researchers classify and define depression in a variety of ways from a simple mood state to a complex syndrome consisting of behavioral, cognitive, affective, and physiological parameters (Becker, 1974). In general, these classifications fall into three groups (Roth, 1977): qualitative classifications, dimensional or trait classifications, and cognitive-behavioral classifications.

The first group of classifications consists of theorists who have adopted a symptom cluster model and propose "qualitatively" distinct types of depression. Types of depression are differentiated on the basis of symptomology, etiology, response to treatment and background factors (age, family history, etc.). In the past, one of the most frequently used nosological systems was the American Psychiatric Association Diagnostic Criteria (DSM II, 1968). The seven depressive syndromes cited were: psychiatric depressive reaction, manic depression-depressed type; manic depression-manic type; manic depression-circular type; involutional depression, neurotic depressive reactions, and cyclothymic

personality. Each subtype was differentiated from the other on the basis of etiological and/or symptomatic factors. For instance, both psychotic and neurotic depressive reactions were thought to be precipitated by environmental stresses while the remaining subtypes were related to physiological, constitutional, and genetic variables. Similarly, manic-depressive patterns were discriminated from involuntional-depression on the basis of past symptoms, and from cyclothymia on the basis of symptom severity.

Recently, the diagnostic criteria were revised (DSM III, 1980). The revision lists the following depressive syndromes: major depression, single episode; major depression, recurrent; bi-polar disorder, mixed; bi-polar disorder, manic; bi-polar disorder, depressed; cyclothymic, and depressive neurosis. Each subtype is differentiated from the other on the basis of three axes: clinical syndromes, personality and developmental disorders, and physical disorders and conditions. In addition to those distinctions, a clinician can also use two additional supplement diagnoses: severity of psychosocial stressors and highest level of adaptive functioning in the past year.

Another proponent of the qualitative classification of depressions is Winoker and his associates (1970) who have differentiated subtypes of depression in terms of depressive symptoms and the presence of other psychiatric disorders. He has made distinctions between grief reactions, primary affective disturbance and secondary affective disturbance. [A grief reaction is considered a loss induced, transient depressive episode. A diagnosis of primary affective reaction is given

if the client has no other psychiatric disorder, and secondary affective reaction is indicated when a preexisting psychiatric dysfunction was evident. Winoker further divides primary affective reactions into unipolar subgroups along a similar line of thinking.

Another type of qualitative classification of depression is employed through sophisticated statistical instruments. Cluster analyses (Everitt, 1972) and factor analytic procedures (Fleiss, Lawlor, Platman, and Fieve, 1971) have been used to isolate qualitatively distinct types and subtypes of depression. Grinker, Miller, Sabashin, Nunn, and Nunally (1961) performed one of the earliest factor analytic studies of depression. The resulting types were: empty depression, angry depression, hypochondriacal depression, and anxiety depression. Friedman, Cowitz, Cohen and Granick (1963) isolated subtypes similar to that of Grinker et al., (1961).

The second group of classifications conceptualizing depression as a family of disorders, each of which differs with regard to the severity or intensity of experienced symptomology. This type of classification is called the "dimensional" or "trait" conceptualization of depression. Unlike type theorists, a trait theorist does not view depression as encompassing a variety of qualitatively distinct syndromes. Distinct syndromes may exist but they are viewed as being reduceable to a finite number of common dimensions in which individual differences are best represented as gradations along a single dimension (unidimensional system), or along a combination of several dimensions (multidimensional system). A second assumption of this approach to classi-

fication is that the nature of the depression has a basic underlying feature, that is, a client is seen as "generally depressed." It is also assumed that the depression is a covariation of one or more of discrete symptoms (or traits) which are obtained by conventional factor analytic procedures. Since a trait is independent, a high score on one gives a researcher little or no information about any remaining traits. Variation in blends among the basic traits accounts for the variability of clinical depressions (Rosenthal and Gudeman, 1967).

A variety of unidimensional systems have been derived. For example, Klerman (1971) and Zubin and Fleiss (1971) state that psychotic and neurotic depressions are not qualitatively distinct and only differ in regard to symptom intensity. Similarly, Kendell (1968) and Kendell and Gourlay (1970) suggest that the traditional endogenous-reactive dichotomy (Hamilton and White, 1959; Kilooh and Garside, 1963) may instead be symptom clusters occupying opposing ends of a single depressive trait.

Multidimensional trait systems are common in the field. The variety may in part be attributed to use of different subject populations (inpatient, outpatient, college students) and different measures of depression (MMPI-D, Beck Depression Inventory, Multiple Depression Inventory). The common theme contained in all these multidimensional systems is that underlying all depressive states is a "general" depressive disorder containing several "group" or "specific" factors.

Perhaps the most investigated multidimensional system is that of

endogenous-reactive depression. Traditionally, reactive depression was thought to be environmentally precipitated while endogenous depression was linked to internal physiological causes. Trait theorists have reported symptomatic differences. For instance, Kiloh and Garside (1963) evaluated 92 clinically diagnosed "endogenous" or "reactive" subjects on 35 measures (age, previous attacks, etc.). Two factors accounted for a large portion of the variance, a "general" depression factor and a bi-polar factor related to the endogenous-reactive dichotomy. Specific symptoms such as self pity, existence of a precipitant, inadequacy, initial insomnia, depression worse in the morning, agitation, obsessions, hypochondriacal complaints, etc. were related to the reactive end of the dimension. Other symptoms such as early morning awakening, depression worse in the evening, onset in fourth decade of life, etc. were loaded on the endogenous end of the dimension. Similar patterns have been found by other researchers (Hamilton and White, 1959; Carney, Roth, and Garside, 1965; Kiloh, Andrews, Nielson, and Bianchi, 1972; Mendels and Cochrane, 1968).

↑ The third major way of classifying depression does so in terms of the frequency of occurrence of specific behaviors, thoughts, and physiological symptoms. This is referred to as the cognitive-behavioral classification of depression. ↓ These theorists assume that no two depressions are identical; each comprise a unique set of deficits and excesses. No assumptions are made about covariation among depressive symptoms. That is, the appearance of one symptom does not suggest certain others are expected. Ferster (1973, 1974) was one of the first

behaviorists to advance this position when he viewed depression as involving a reduced frequency of "adjustive behaviors," an increased frequency of avoidance and escape responses, and a passive behavioral mode of controlling one's environment. Variations of the basic behavioral framework attributing varying degrees of importance to the cognitive component in depression have been advanced by a number of other researchers (Beck, 1972; Rehm, 1977; Seligman, 1974, 1975; Williams, Barlow, and Agros, 1972). It is important to note that all of the theories in this classification of depression in some way implicate cognitions. In some, the cognitive alterations are viewed as symptoms while in others they are central to depression. The following sections will be devoted to contemporary cognitive-behavioral theories providing frameworks from which one can explain both overt-motoric symptomology and verbal-cognitive symptomology. Both environmental and cognitive parameters are considered causal factors.

Cognitive-Behavioral Models of Depression

This section is an elaboration of the previously described "cognitive-behavioral" classification of depression. As stated before, theories in this classification of depression incorporate both environmental and cognitive factors of causality to different degrees. First, theories heavily weighing the environmental causes of depression will be reviewed. The remaining cognitive-behavioral theories of depression will be reviewed in order of increasing prominence of the cognitive factor.

Behavioral Perspectives. A number of theorists have suggested that depression is related to an insufficient amount of reinforcement (Lazarus, 1968; Liberman and Raskin, 1971; Lewinsohn, 1974, 1975; Ferster, 1974; Coyne, 1976). Lewinsohn and his colleagues (1974) have developed a model of depression which best represents this viewpoint. Classical and operant conditioning processes are both involved in their framework. Specifically, a low rate of response contingent reinforcements acts as an unconditional stimulus eliciting a variety of depressive symptoms (verbal statements of dysphoria, self depreciation, rejection, guilt, fatigue, sleeplessness, loss of appetite, headaches, etc.). Once elicited, these symptoms are maintained in an operant fashion through social reinforcement (sympathy). A low rate of reinforcement places the depressed person on a extinction schedule. Other depressive response patterns are subsequently developed and maintained i.e., the behaviors cause the depressed person to be avoided, the individual receives less reinforcement, and continues to behave in depressed ways.

Lewinsohn argues that obtained reinforcement is a function of: (a) the number of events which an individual finds potentially reinforcing; (b) the number of potential reinforcers available; and (c) the individual's ability to obtain available reinforcers (1974, p. 158). Lewinsohn has primarily examined the relationship between depression and low rates of response contingent positive reinforcement. The differential amounts of reinforcement which depressed clients and their families obtain has been systematically evaluated. Using a verbal interaction coding system, Lewinsohn and Shaw (1969) found that a minimal

amount of time was spent discussing topics which were reinforcing to the depressed client relative to the time spent on topics reinforcing to the spouse. Similar results were found in a number of naturalistic settings (Martin, Weinstein, and Lewinsohn, Note 2; Lewinsohn and Atwood, 1969; Lewinsohn and Shaffer, 1971).

In more rigorously controlled investigations, the emphasis remained on the covariation of mood and reinforcing activity. Lewinsohn and Libet (1972) examined depressed patients, nondepressed psychiatric controls, and normal controls and found a significant correlation between their mood (Depression Adjective Checklist, 1965) and the number of pleasant activities in which they engaged (MacPhillany and Lewinsohn Pleasant Events Schedule, 1971). The results of this study were replicated by Lewinsohn and Graf (1973). In a similar procedure, MacPhillany and Lewinsohn (1974) found that depressives reported distinct types of activities over the same period as controls. When all subjects rated the Pleasant Events Schedule items in terms of the reinforcing value, depressives' ratings were significantly lower than those of nondepressives. This supports Lewinsohn's contention that depressives experience fewer events or activities as potentially reinforcing.

Other researchers have reported findings to support this framework. Wener and Rehm (1975) found that individuals receiving low levels of reinforcement became more depressed than individuals receiving high amounts of reinforcement. Lazarus (1968), Liberman and Raskin (1971), Hersen, Eisler, Alford and Agras (1973), and McLean, Ogston, and Grauer

(1973) have reported that they have treated clients with low levels of reinforcement. Improvement in all of these cases was correlated with obtaining more reinforcement. Finally, a number of investigators have found depression to covary with the occurrence of "life stressors" (events which a behaviorist would designate as losses of actual or potential reinforcement). Paykel, Meyers, Dienelt, Klerman, Lindenthal, and Pepper (1969) found that within the six month period prior to interviews, depressives experienced significantly more losses (marital, occupational, social, familial, etc.) than the controls. The results were essentially replicated by Leff, Roatch, and Bunney (1970) who examined endogenous and non-endogenous inpatients.

Lewinsohn has suggested that inadequate social skills may partially account for the depressive's infrequent receipt of reinforcement. This relationship has been assessed in group (Lewinsohn, Weinstein, and Alper, 1970; Libet and Lewinsohn, 1973), familial (Shaffer and Lewinsohn, Note 3), and laboratory contexts (Stewart, Note 4; Rosenberry, Weiss, and Lewinsohn, Note 5). Several findings emerged. Rosenberry et al., (Note 5) found that depressed subjects were less predictable and homogeneous in emitting rapport-inducing and supportive communications. Libet and Lewinsohn (1973) found that depressives engage in fewer activities, emit proportionately less reinforcers, communicate with a more restricted range of individuals, and take a longer time to respond to a verbalization. Stewart (Note 4) also found depressives to react slower to verbal and non-verbal prompts than nondepressives.

All together, rather extensive data has been collected to support Lewinsohn's hypothesis that depression is linked to low rates of response contingent positive reinforcement. However, this model is unable to account for all the complexities of depressive responses. In particular it can be argued that depression is not directly related to low rates of reinforcement but instead to cognitive processes which mediate between the activity and the cognitive symptomology (Rush, Khatami, and Beck, 1975). It could also be that depressives do not attend to or remember pleasant events and are minimally affected by their occurrence. These possibilities will be studied in a later section.

A second theoretical perspective which strongly weighs the environmental component in depression is exemplified by Ferster (1966, 1973, 1974). Ferster's conceptual position on depression appears to be a link between the environmentally and cognitively oriented theories. Coming from a radical behaviorist persuasion, Ferster studied both descriptive and functional aspects of depression. The description of depressive disorders is seen as consisting of both behavioral deficits and excesses. Deficits are defined as a reduced frequency of normal activities (1974, p. 31). "Frequency reduction" refers to rate and quantity alterations as well as occurrence and nonoccurrence of certain behaviors. Behavioral excesses are related to deficit conditions for instance when a compulsive activity appears when normal problem solving behaviors are no longer emitted.

Functionally, depression is assumed to be related to loss of im-

portant discriminative stimuli, certain reinforcement schedules, aversive environmental influences, and cognitive distortions. More specifically, Ferster contends that depression is apt to be precipitated by the loss of a source of reinforcement or stimuli leading one to emit positive behaviors (death of a spouse, loss of a friend, moving to another city, change of job, etc.). Lazarus (1968) suggested that the outcome of such a loss is related to the individual's overall availability of reinforcers.

Ferster also saw certain intermittent schedules of reinforcement as precipitants of depressive reactions. From animal studies, certain fixed schedules of reinforcement providing small gains for a large behavioral expenditure results in a lower rate of responding. The lowest rate of behavior is seen immediately after reinforcement is administered.

Depressed individuals often spend a great deal of effort in avoiding being punished by decreasing engagement in aversive behaviors. Ferster (1973) suggests that this decreased behavior leads to further depression since "it commits such a large part of a person's repertoire to activities that do not produce positive reinforcement " (p. 867).

Ferster (1973, 1974) goes beyond a strict stimulus-response explanation of depression however, to suggest that the individual's perception of the world affects his receiving of reinforcement. More specifically, he speculates that the depressive has a limited view of the world and has difficulty discriminating among different environmental stimuli. Because of these discrimination difficulties, the depressive

is apt to emit a response inappropriate to the situation and be punished. An example might be that a depressive considers home, work, and a party all appropriate places to engage in depressive behaviors. People at a gala party may consider his strange behavior, avoid the individual, and shut off another source of reinforcement. Only partially recognizing that punishment is contingent on the inappropriate behavior, the depressive acquires a "lousy view of the world" (Ferster, 1973, 1974). The environment is thought of as providing limited support, pleasure, and much distress and unhappiness.

In summary, both Lewinsohn and Ferster expouse behavioral theories of depression. Ferster's approach has to a greater extent than Lewinsohn's attempted to relate depression to both cognitive and environmental parameters. He suggests that a one to one relationship between environmental stimuli and depressive response does not exist and one must take into account the non-observable cognitive processes which mediate.

Cognitive-Behavioral Perspective. On the basis of small animal analogue research, Seligman and his colleagues have developed a cognitive model of reactive depression in humans. The major construct utilized by this group is called "learned helplessness." Learned helplessness views depression as resulting from cognitions of response-outcome independence: that is, beliefs that consequences are independent of behavior.

Recently, Abramson, Seligman, and Teasdale (1978) reformulated the learned helplessness model of depression. The reformulation

recognizes the importance of attributions in predicting reactions to uncontrollable outcomes. Attributions, i.e., explanations for events, may be stable or unstable, global or specific, and internal or external attributions of cause. The type of attribution chosen influences whether the future helplessness will be chronic or acute, broad or narrow, and whether helplessness will lower self-esteem or not. Seligman further stated that individual differences in attributional style probably exist and those who typically attribute failure to global, stable and internal factors are most prone to general and chronic helplessness depressions with low self-esteem.

Two pieces of research are particularly relevant in highlighting the role of cognitive factors in the development of learned helplessness patterns of behaviors. Hiroto and Seligman (1975) found that uncontrollable experiences on a motoric task adversely affected performance on a cognitive task and vice-versa. The transfer of learned helplessness experiences is seen as providing support for cognitions concerning response-reinforcement independence. Additional support for the cognitive interpretation comes from research directly manipulating the instructional set (Miller and Seligman, 1973; Hiroto, 1974; Miller and Seligman, 1975). In particular, performance on a task was found to vary according to whether a subject was informed that the outcome is related to chance or skill. Similar effects are found for a chance instructional set and an actual helplessness experience (Hiroto, 1974). Again, these are taken as support of mediating cognitions. In the instructional set paradigm the subject is "given" the cognitive pattern while in the actual

learned helplessness situation the cognition is "learned" or "created" by the subject.

Additional research has shown that the cognitive changes produced in learned helplessness experiences are accompanied by a host of behavioral response patterns. First, helpless subjects behave less aggressively and less competitively than non-helpless subjects (Powell and Creer, 1969; Maier, Anderson, and Liberman, 1972). Passivity and retarded associativity are more prominent after time (Overmier and Seligman, 1967; Overmier, 1968). Also, uncontrollable traumatic experiences are thought to precipitate some physical and physiological dysfunctions. Weight loss, anorexia and norepinephrine depletion have all been cited (Weiss, 1968; Miller and Weiss, 1969; Weiss, Stone, and Harrell, 1970).

Seligman draw parallels between learned helplessness and depression in areas of etiology and symptomology. Symptomatically, Seligman only draws parallels to reactive depressions consisting of: passivity, negative expectations, lack of aggression, dissipation in time, and also parallels weight loss, anorexia, and norepinephrine depletion (Seligman, 1974). The etiology of a depressive episode is like learned helplessness in that it is highlighted by the uncontrollability of reinforcement (Teasdale, 1978). The cognitions need not be accurate (Seligman, 1974, 1975). Aging, death of a loved one, loss of a job are considered precipitants of depression in that they limit one's control over the environment or lead one to believe that control does not exist.

Seligman has also addressed the issues of prevention and treatment of learned helplessness. In the past, treatment was seen as exposing the helpless subject to situations in which the outcome is controllable (Seligman, Maier, Geer, 1968; Seligman, Rosellini, and Kozak, 1975; Klein and Seligman, 1976). Prevention on the other hand was seen as a history of reinforcement contingent upon one's actions (Seligman and Maier, 1967; Seligman and Groves, 1970; Seligman, 1975). So, the prevention and antidote of helplessness seemed to be the demonstrated helpfulness of one's actions. As a result of the reformulation, researchers presently suggest a variety of prevention and treatment suggestions. Therapists can aid depressed individuals by helping them to change the estimated probability of aversive outcome, to change the expectation from uncontrollability to controllability, or to change their attributions for success or failure. Abramson et al., (1978) has suggested specific ways these suggestions can be implemented (p. 69, Table 3).

For Seligman, the goal is the development of personal "competency" cognitions. Individuals must believe they are generally able to control their environment. Klein and Seligman (1976) reported that success on a simple discrimination problem had a therapeutic effect on depressed subjects' performance and beliefs of control. Response contingent reinforcement is expected to help prevent depression (Seligman, 1974, 1975).

In summary, Seligman has developed a theory of depression supported by extensive research. He has argued that while environmental factors cause the emission of depressive behaviors, they are mediated and

probably secondary to the influence of cognitive factors. An interesting question arises here, especially for those subjects with the attributional style that typically attributes failure to global, stable, and internal factors. Why do depressives with this attributional style not concentrate on their positive control experiences? Perhaps their depressive moods tend to cause them to associate to other depressive situations. It is also possible that their recall of positive contingent reinforcement situations is poor.

Cognitive Perspectives: One of the most well known exponents of the cognitive view is Beck (1967, 1970, 1974). Beck argues that depression is not conceptualized as an affective disorder; but rather, as a cognitive disorder. The primary symptom of depression is the cognitive triad which refers to an organized system of negative evaluations of oneself, one's future, and the environment. Low self-esteem, thoughts of incompetency and inadequacy, poor body image, thoughts of impending distress, and perceptions of environmental hurdles were all examples of the depressive's cognitive set. Behavioral and affective symptoms are seen as consequences to the depressed cognitions.

Research conducted by Beck has been twofold. The development of a self-report test of depression (Beck, Ward, Mendelson, Mock, and Erbaugh 1961) and a helplessness scale (Beck, Weissman, Lester, and Trexler, 1974) were the first focus of attention. In addition, Beck has attempted to support his contention that depressives have a negative view of themselves, their future and their environment. Research has shown that

depressives dream significantly more about themes of deprivation, rejection, depreciation, self-injury, distorted body image, etc., than do nondepressives (Beck and Hurvick, 1959; Beck and Ward, 1961). Similarly, depressives' earliest recollections have more themes of rejection than those of nondepressives (Beck and Ward, 1961). Depressed individuals are more likely to identify with a pictorial character who has had an unpleasant experience than a character who has avoided such an experience or had a pleasant experience (Beck, 1967). Beck (1972) also reports that depressives are apt to down-grade their positive attributes when asked to compare them with their peers. Finally, depressed subjects exhibited weaker self reference recall than normals suggesting they may describe themselves inconsistently (Davis, 1979). All these studies support Beck's contention that depressives have a negative view of themselves, their future, and their environment. Davis' study (1979) may additionally suggest differential recall between depressives and normals.

In summary, Beck has developed a theory of depression which clearly emphasizes the role played by cognitive factors and deemphasizes the relative importance of environmental parameters. An important part of Beck's research seems to be the distinction between the nominal and the actual antecedent to depressive behavior. In essence, cognitions about rather than physical stimuli often determine the course of one's behavior.

Rehm and coworkers have developed another cognitive theory of

depression which is based on a modified version of Kanfer's self-control model (Kanfer, 1970a, 1970b, 1971; Kanfer and Karoly, 1972). Although this model has been used as a method for achieving behavioral change, in this context it will aid in explaining the occurrence of a variety of depressive symptoms. In particular, depressive behaviors are seen as arising from maladaptive self control patterns. Kanfer has argued that behavior is maintained and altered by subject mediated regulatory processes as well as the environment. Self regulation consists of three basic sequentially ordered operations: self monitoring, self evaluation, and self reinforcement. Each of these will be described and its relationship to depression presented.

The first component of Kanfer's model involves self monitoring. Both internal and external stimulus and response events can be monitored. Motoric responses such as running, studying, hair pulling, etc., all fall into this category. Covert responses such as thoughts, imagery, and sensations like auditory hallucinations (Rutner and Bugle, 1969), obsessional thoughts (Mahoney, 1974), and critical self statements (Hannum, Thoreson, and Hubbard, 1974) can be monitored.

In relating self monitoring processes to depression, a high frequency of negative verbalizations and a low frequency of potentially enjoyable behaviors can be suggested. Rehm (1977) argues that depressives have two such deficits. First, they attend to negative rather than positive events. Second, depressives are thought to give their attention to immediate effects of their behavior rather than to its

long term consequences.

With regard to the first notion, Beck (1972) has proposed a similar mechanism to account for cognitive distortions, namely that depressed individuals are seen as selectively abstracting the unpleasant aspects of their experiences. A number of studies provide suggestive support for this concept. Pluchtick, Platman, and Fieve (1970) have examined the relationship between depression, ideal self-concept, and actual self-concept. Depression was found to correlate with negative actual self concept rather than an altered ideal self concept. One might speculate that this is a result of selective attention and memory from actual positive events toward actual negative events. Roth (1977) researched this hypothesis and although he did not find support for differential memory of positive and negative adjectives, he did find evidence of differential selective attention. Relative to nondepressives, depressed subjects monitored significantly more of their own negative and significantly fewer positive behaviors. Furthermore, it was postulated that procedural parameters may have precluded the demonstration of recall differences.

Cognitive distortions seen in depressives' self monitoring may occur because depressives "expect the worst." Friedman (1964) reported that while depressives and nondepressives performed equally well on a number of tasks, the depressive expected to do worse. Similarly, Miller and Seligman (1973), Klein and Seligman (1976), and Guza (1979) found that depressed persons had lower expectancies of success than nondepressed persons on laboratory tasks. Beck (1972) also suggested that

depressives are likely to entertain negative future oriented cognitions. With this research supporting such negative self monitoring it is easy to imagine why depressives may not look at the long term consequences of their behavior. Some studies suggest that when they do look at longer range consequences, depressives then ruminate about the delayed detrimental effects of their behavior (Schless, Schwartz, Goetz, and Mendels, 1974; Beck, 1972; Seligman, 1975).

The second component of Kanfer's model is the self evaluatory process. Monitored responses are evaluated against an internal criterion. Performance may fall above or below this standard. Rehm (1977) hypothesizes two maladaptive patterns of self evaluation. First, depressed individuals often make inaccurate attributions of causality. Second, the depressive is likely to have stringent evaluative criteria.

With regard to attribution, Rehm argues that depressives ascribe negative events to internal factors and positive events to external factors. For instance, a bad performance on a task would be due to personal inability while a good performance on the same task due to luck. Miller and Seligman (1973) arguing for the independence of responding and reinforcement, reported that depressives had lower expectancies regarding the likelihood of future successes after behaving successfully than did nondepressives. The same finding has been replicated in two other studies (Miller and Seligman, 1975; Klein and Seligman, 1976). One might infer the subjects attributed their success to external factors. In addition to research support for external attributions, Guza (1979) reported the depressives were more likely to make attributions in an

internal direction following feedback of failure at a task.

Rehm (1977) also proposed that depressives employ a stringent self-evaluative criteria. Rehm states the evaluative criteria for depressed people may be characterized by a high threshold for "excellence" and a low threshold for "failure." Similar notions have been offered by behavioral theorists (Marston, 1965; Bandura, 1971) and neo-analytic theorists (Melges and Bowlby, 1969). Common to all these perspectives is the theme that the depressed person has unreachable and unrealistic goals and standards. Investigations (Golin and Terrell, Note 6; Murdock-Kitt, Note 7) have substantiated that depressed students tend to set higher goal levels than did nondepressed students. In addition, therapists have reported anecdotally that depressed patients may employ overly high criteria to evaluate their behavior (Bandura, 1971). All in all, studies support the hypothesis of depressed subjects having stringent self evaluations.

Some of the self evaluation research suggests a differential recall component contributing to the stringent self evaluations of depressives. DeMonbreun and Craighead (1977) and Nelson and Craighead (1977) reported depressed subjects recalled less positive and more negative feedback than controls at high levels of reinforcement. Nelson et al (1977) also reported that depressed subjects accurately recalled negative reinforcement while normals underestimated the same. These studies suggest that emotional state may be related to the content of an individual's recall, specifically mood may be related to recall of mood-congruous material.

The final stage of the self control chain involves self reinforcement. Contingent self reward and self punishment enables an individual to increase or decrease certain response patterns. The effect of self reinforcement on associated behaviors has been extensively reviewed by Thoreson and Mahoney (1974) and Mahoney and Thoreson (1974). Rehm (1977) postulates that depression is characterized by high rates of self punishment and low rates of self reward.

Support for the contention that depression is associated with maladaptive self reinforcement is obtained from three studies. When subjects were told to reward themselves if they thought they were incorrect or not reinforce themselves when they were unsure of their responses, Rozensky, Rehm, Pry, and Roth (Note 8) found that depressed patients administered more self punishments and fewer rewards than nondepressed patients or normal control patients. The groups did not differ with regard to actual correct responses. Roth, Rehm, and Rozensky (Note 9), who partially replicated this study, found that depressed college students emitted significantly more self punishments than nondepressed college students. Nelson and Craighead (1977) also report depressed subjects self reinforcing less than controls but did not find different rates of self punishment. In general, studies support that reinforcement is related to more stringent requirements in depressed individuals.

Behavioral passivity is often cited as a core symptom of depression. Many behaviorists argue that retarded movements, infrequent participation in previously reinforcing activities, etc. are related to a

lack of external reinforcement (Lazarus, 1968; Ferster, 1974; Lewinsohn, 1974). Self control literature suggests that self administered and externally administered reinforcements are equally able to maintain behavior patterns (Roth, 1977).

Summary. Five theories of depression were described. All these theories of depression implicated cognition in some manner. Lewinsohn and Ferster suggest that the role of cognition in depression, if it exists at all, is merely a symptom resulting from environmental influences. Seligman proposes that cognition plays a more important role in depression. A cognition of learned helplessness, as a result of response-outcome inconsistency, becomes a mind-set through which future behaviors are affected.

Beck and Rehm are the strongest advocates of the cognitive determinant in depressive behavior. Both theorists suggest that cognitions are central to depression rather than merely symptoms of depression. Beck's main premise states that cognitions about stimuli rather than the physical stimuli determine the course of an individual's behavior. Rehm has developed a theory in which depressives' self monitoring, self evaluation, and self reinforcement differ from normals. Research suggests that self evaluation and possibly self monitoring may be affected by differential recall.

Bower's Research on Cognition and Emotion

Recently, Gordon Bower, a cognitive psychologist, presented several studies concerning the relationship between mood and cognitive

processes (1981). Bower's work adds supporting data and a somewhat different perspective to the previously discussed cognitive theories of depression. Whereas cognitive theories view affect as resulting from cognitions, Bower introduced affect to aid in understanding memory and cognition.

Theoretically, Bower approaches the relationship between depression and cognitive processes from a strong cognitive perspective. Still the importance of emotions playing a causal role in behavior is illustrated by his associative network theory of emotional behavior. "In this theory, emotion serves as a memory unit that can enter into associations with coincident events. Activation of this emotion unit aids in retrieval of events associated with it..." (p. 129). An emotion can also prime themes for other cognitive processes such as free associations, interpretation of ambiguous material, perceptual organizations, etc.

Three major areas of study have been opened under Bower. In all cases, research has primarily been done on subjects in which happy or sad moods have been induced hypnotically. One area of study concerns mood-state-dependent memory. In a representative study (Bower, 1981), subjects learned two lists of words, one while happy and one while sad. Then they were asked to free recall the original list while either in the same or opposite mood. Controls who learned both lists and free recalled all in the same mood were also included. Compared to the controls, state-dependency appeared in better recall in the same-mood list and worse recall in the opposite-mood list. Emotional mood was a helpful feature in distinguishing target material from interfering material.

State-dependent effects were also found in subjects remembering personal and childhood experiences. That is, people remembered a greater percent of experiences that were affectively congruent to the mood they were in during recall.

A second area researched by Bower is that of emotion's powerful influences on cognitive processes such as free associations, fantasies, social perceptions and snap judgments about others. For example, Bower (1981) demonstrated that mood significantly influenced the interpretation of ambiguous scenes from TAT cards. This finding is consistent with the research of Roth and Rehm (1980) demonstrating that mood biased categories used in interpreting ambiguous interpersonal scenes. Clinically depressed subjects rated their interview behavior as having significantly more negative and unskilled behaviors than nondepressed subjects. This also agrees with Rehm's (1977) hypothesis that depressives self monitor their own behaviors more negatively than nondepressives. Bower, Forgas, and Krantz (cited in Bower, 1981) partially replicated this experiment on college students hypnotized to feel either socially competent or incompetent. Students feeling socially incompetent rated their behaviors more negatively than students hypnotized to feel socially competent.

People's moods also had powerful effects on free associations they gave to neutral words (Bower, 1981). Hypnotized subjects generated chained associates to five words when they were happy and to another five words when they were angry. When blind judges evaluated whether the chain showed "happiness" or "anger" or "can't decide," they judged anger accurately 83% of the time and happiness 73% of the time, signifi-

cant at the .01 level. Fisher and Marrow (1934) used hypnosis-induced moods and Madigan and Ballenbach (Note 10) used moods induced by the Velton procedure with much the same results.

The associative network theory also implies mood affects snap judgments of people or objects. Isen, Shalcker, Clark and Karp (1978) found subjects gave more positive ratings on mock consumer surveys when they were feeling good after receiving a gift. Bower (1981) found subjects' thumbnail sketches of others were affected by their happy or angry moods. It is suggested that current mood activates and primes mood-congruent categories into readiness and these are used to assimilate and classify ambiguous experiences.

The third area of study which Bower reviewed and researched is that of salience of mood-congruous material. That is, people attend to and remember information which is emotionally salient to their mood. Bower gave two examples of subjects showing lower recognition thresholds for emotionally salient material. Clore (cited in Bower, 1981) found that happy and angry subjects responded quicker and with less errors to mood-salient material. Postman and Brown (1952) reported lower recognition thresholds (less bright exposures needed) for successes-versus-failure words for subjects who had just experienced success or failure in an unrelated task.

Research also shows evidence of mood-salient memory. In one experiment (Bower et al., in press), subjects were made happy or sad by post-hypnotic suggestion and read a balanced third person account of two people, one who was happy-everything was going well, and one who was

sad-everything was going wrong. Subjects were found to identify with the mood-salient character and reported that this character was the central one in the story. The next day while in a neutral mood subjects recalled more facts about the character who exhibited the same mood they had felt the day before. Because they were in a neutral mood at the time of recall, this was a mood-congruous effect. In another experiment (Bower, in press) subjects were induced to feel happy or sad by post-hypnotic suggestions and read about one character who related an unrelated series of happy or sad incidents. Subjects reportedly remember more incidents related with their mood. Happy readers recalled one and one half as many happy incidents as sad incidents and sad readers recalled one and one third as many sad as happy incidents. So, the mood contiguity effects seems to affect learning or memory.

In summary, Bower has investigated the effects of mood and cognitive process in terms of a network theory. Using primarily hypnotized subjects, Bower reported three major findings. First, he reported a strong mood-state-dependent effect of memory. Secondly, he suggested that emotions affect cognitive processes such as free association by assimilating and categorizing mood congruent categories into readiness. Lastly, Bower reported evidence in which learning or memory for mood-congruous material is higher than for mood-discordant material.

Bower's findings have strong implications for the cognitive theories of depression. Bower's approach agrees with their basic premise that cognitions are central to depression. In addition, this research extends cognitive models of depression by investigating the relationship

between emotions and cognitive processes to further the understanding of how cognitions influence behavior. Specifically, Bower suggests that emotions have powerful influences on memory, associations, fantasies, social perceptions, snap judgments, and salience of mood congruous material. Differences in these cognitive processes, in turn, show up in differences in behavior. In sum, Bower's research as added supporting data and somewhat different perspective to the previously discussed cognitive theories of depression.

Two questions arise from this research. The first is one that Bower has raised, that is, do demand characteristics play a role in the findings? Bower (1981) reports a series of experiments (Bower and Vallone, cited in Bower, 1981; Stanislavski, 1936; and Teasdale and Fogarty, 1979) which attempt to distinguish between automatic versus demand compliance interpretations of the data. Specifically, are the emotions evoked by hypnotism real and if they are, were the subjects responding naturally to the stimuli or were they responding to please the experimenter? Although research attempting to control for demand characteristics suggests that they do not play a role in the results, further research in which demand characteristics are not involved is suggested. A second question concerns the generalizability of Bower's results. Although the expected results are obtained by using experimentally induced moods, would naturally occurring moods found in the "real" world still have discernible effects on cognitive processes? To determine whether Bower's findings have relevance for understanding and treating depression in clinical settings, research with subjects showing varying

degrees of naturally-occurring depression is necessary.

STATEMENT OF THE PROBLEM

Several cognitive-behavioral theories of depression have developed in the last decade. Increasingly, these theories have incorporated both cognitive and environmental parameters to account for the complex symptomology of depression. In addition to these parameters, there is a move to include emotion and its relationship to depressive symptomology. Gordon Bower (1981) has recently postulated the Associative Network Theory to explain the relationship between emotion and cognitions. In the group of studies associated with this theory, Bower has obtained results primarily through inducing moods with post-hypnotic suggestion. Two questions arise from this research. The first concerns demand compliance biases. Although Bower has defended this criticism with related research, additional studies which control for demand compliance should be carried out. A second question is related to the generalizability of Bower's results. Bower's research shows a remarkably strong relationship between emotions and mood in a lab setting with hypnotic induction of mood states. If one wishes to determine the relevance of Bower's results for the "real" world, research with less dramatic manipulations or in naturalistic conditions is necessary. Partial replications using depressed and nondepressed subjects in normal or clinical settings might adequately demonstrate the relevance of Bower's findings for a clinical setting.

The present study was designed to expand upon Bower's research and its implications for understanding depression. This project examined various degrees of naturally-occurring depression in a normal population and its relationship to cognitive processes. Specifically, the relationship between levels of depression and word associations, the content of affect-laden recall, the amount of total recall, the amount and affect of interjections, and the ordering of recall were observed.

HYPOTHESES

1. Depression will be related to the affective content of what is recalled.
 - a. High depressed subjects will remember more sad words than happy words.
 - b. Low depressed subjects will remember more happy words than sad words.
2. Level of depression will be related to the total number of words recalled.
 - a. Depressed subjects will recall the least number of words.
 - b. Normal (or medium depressed) subjects will remember more words than the high depressed subjects but less than low depressed subjects.
 - c. Low depressed subjects will remember the most words.
3. Level of depression will be related to the order of recall.
 - a. High depressed subjects will remember sad words generally before the happy or neutral words.
 - b. Low depressed subjects will remember the happy words generally before the neutral or sad words.
4. Level of depression will be related to whether words are interjected into recall.
 - a. Low and high depressed subjects will interject more words than medium depressed (or normal) subjects.

5. Level of depression will be related to the nature of the words interjected.

a. High depressed subjects will interject more sad words.

b. Low depressed subjects will interject more happy words.

6. Level of depression will be related to the nature of the chain associations to neutral words.

a. High depressed subjects will chain associate more depressively to neutral words while low depressed subjects will chain associate more positively to neutral words.

METHOD

Subjects

The subjects in this study were undergraduate students who volunteered to participate in this experiment as an extra credit option for their introductory psychology course. They were divided into three groups of high, medium, and low depression based on their score on the Multiscore Depression Inventory (Berndt, Petzel, & Berndt, 1980), an inventory designed to measure depression in a normal population. Because it was difficult to get depressed subjects to volunteer for extra credit, some subjects were called and asked if they wished to receive extra credit for participating in a research project. Information on their depression level was available from a group of survey tests given at the beginning of the semester. To be in the high depression group, subjects scored 50 or higher (one standard deviation above the mean) on the MDI; the medium or normal depression group was based on subjects who scored between 10 and 50 on the MDI; and the subjects who scored 10 or below (one standard deviation below the mean) constituted the low depression group. In addition, to provide further validation of the level of depression, the subjects were measured on the Beck Depression Inventory. The Beck scores for the three groups were as follows: Low Depression Group, $\bar{M} = 1.7$, s.d. = 2.1; Medium Depression Group, $\bar{M} = 4.4$, s.d. = 4.1; High Depression Group, $\bar{M} = 12.5$, s.d. = 8.5; 83 subjects were used in all (Low- 20, Medium- 42, High- 21).

Materials

Beck Depression Inventory. Subjects were given the Beck Depression Inventory (BDI: Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and the Multiscore Depression Inventory (MDI: Berndt, Petzel, & Berndt, 1980). The BDI is comprised of 21 items, each of which represents a discrete depressive symptom. Each item includes graded statements pertaining to the severity of the symptom. The examiners endorse the statement best matching their behavioral or experimental state. An evaluation of the internal consistency of the BDI (Beck, 1967) resulted in a reliability of .86 using the Pearson r; with a Spearman Brown correction of this rose to .93. The traditional test-retest method of assessing stability and consistency were not considered appropriate because the memory factory might inflate the score however, an indirect method of estimating the stability of the instrument found that changes in the score of the inventory paralleled changes in clinical ratings (made by psychiatrists) indicating a "consistent relationship of the instruments to the patient's clinical state" (Beck, 1967, p. 195). A concurrent validity of .75 was found in a correlation between the BDI and the MMPI-D scale. Also a validity score of .66 was obtained between the BDI and the Depression Adjective Check List. Further measures of internal consistency, concurrent validity, and construct validity are available in Beck (1967).

Multiscore Depression Inventory. The Multiscore Depression Inventory (MDI: Berndt, Petzel, and Berndt, 1980) is a multidimensional trait scale designed for normal populations which contains 118 items to be marked true or false. Besides providing a global (full scale) measure

of depression, the MDI provides measures on ten subscales: guilt, instrumental helplessness, learned helplessness, pessimism, energy level (fatigue), low self esteem, sad mood, irritability, cognitive difficulty, and social introversion. The length of most of the subscales is 12 items except for guilt which has 10 items. The mean score of the full scale test is 30 with a SD of 3. The MDI full scale score has a Kuder Richardson reliability of $\underline{r} = .96$ on initial and cross validation samples. More information of the reliabilities of the subscales is available on Table 1. Evidence of concurrent validity of the full scale MDI was obtained by correlations with the BDI and the DACL ($\underline{r} = .69$, $p < .001$ and $\underline{r} = .77$, $p < .001$, respectively). Face validity of the subscales was established by role playing students who scored higher on the scales after reading a character sketch (for all subscales $p < .001$). Results from ten clients in therapy provided criterion-related validity for the full scale MDI and all its subscales (for the Fatigue subscale $p < .01$, for the Social Introversion subscale $p < .05$, and for the full scale MDI and all the other subscales $p < .001$). Further information of reliability is available in Berndt, Petzel, and Berndt (1980).

Stimulus Words. For the recall portion of this project, a list of 21 words (7 happy, 7 neutral, and 7 sad) were used. The happy and sad words were picked from those found on the Depressive Adjective Check List (DACL: Lubin, 1967) which distinguished between depressed and nondepressed people. The reliabilities of the DACL words range from .82 to .93 for normals. This indicates that subjects basically respond the same way to a word over time. Correlations between the DACL and the BDI as well

TABLE 1

Internal Consistency Reliabilities for Original and Crossvalidated
Samples on the Total and Subtotal Scores on the MDI

Scale	Sample	
	Original (n=200)	Cross Validated (n=263)
Sad Mood	.87	.86
Fatigue	.91	.91
Learned Helplessness	.83	.71
Social Introversion	.86	.84
Irritability	.84	.85
Instrumental Helplessness	.85	.87
Pessimism	.84	.85
Low Self Esteem	.86	.82
Cognitive Difficulty	.82	.82
Guilt	.79	.78
Full Scale MDI	.96	.96

Note. From "Development and Initial Evaluation of a Multiscore Depression Inventory" by D.J. Berndt, T.P. Petzel, and S.M. Berndt, Journal of Personality Assessment, 1980, 44(4), p. 396-403.

as the Zung Depression Scale are significant at or beyond the .05 level suggesting that identifications with these words are valid indicators of depression (Lubin, 1967). The neutral words were picked on the basis of their neutral face validity. The three categories of words were matched on frequency of use (Kucera and Francis, 1967). Each word was printed on a 3 x 8 card in black magic marker and placed in random order. The resulting list of words given each subject was: Miserable, Interested, Plant, Lost, Guarantee, Introduce, Somber, Lucky, Active, Failure, Cheerful, Happen, Metal, Joint, Wonderful, Burdened, Discouraged, Enthusiastic, Invest, Weary, and Animate. Table 2 explains which words were in each category. In addition, the experimenter had a half sheet of paper with the list of words on it to record the number and order of the words recalled.

For the association part of the experiment, 5 neutral words were picked on the basis of their face validity. The words were: Life, Experience, Idea, Music, and Function. The words were each placed on separate 4 x 9 sheets of paper. Each sheet with a word had five lines below the word where associations were written. The five sheets for each subject were stapled together with a cover sheet for directions on the front.

Procedure

Each subject was seen individually for 45 minutes. The subjects began this experiment by taking the Multiscore Depression Inventory and the Beck Depression Inventory, respectively. They had been told that the experiment was studying "the effect of certain personality

TABLE 2
Recall Words Divided According to Affect

<u>Happy Words</u>	<u>Neutral Words</u>	<u>Sad Words</u>
Interested	Plant	Miserable
Lucky	Guarantee	Lost
Active	Introduce	Somber
Cheerful	Happen	Failure
Wonderful	Metal	Burdened
Enthusiastic	Joint	Discouraged
Animate	Invent	Weary

characteristics on cognitive processes." Secondly, they were given the word association packet which had the following directions taped on the cover page: "On each of the following pages, look at the typed stimulus word and write the first 5 words the stimulus brings to mind." After the subjects were finished with the word associations, they were told:

Next, I am going to show you 21 words, one at a time. When I finish, I would like to see how many you can remember. Just recall as many as you can and I'll mark them down on this paper. No one can remember them all, just recall as many as you can. Any questions? Ready?

Each word was shown and verbalized to the subject one at a time for 2 second intervals. The entire list was read and shown to the subjects and they were asked to verbally recall as many as possible. After the subjects had recalled as many as they could initially, the experimenter asked if they wished to have more time. Any additional words remembered were also recorded. When the task was completed, the subjects were allowed to look at the experimenter's list on which their responses were recorded. It was explained that the experimenter was interested in which words as well as how many were recalled and how that might be related to subjects' scores on the inventories.

RESULTS

This study was designed to examine the relationship between depression and two cognitive processes, immediate recall and association. Specifically, the six hypotheses were examined. They involved the relationship between: depression and affective content of recall; depression and amount of total recall; depression and the order of recall; depression and the number and affective content of interjected words; and depression and associations to neutral words. The results are organized and presented as they apply to each hypothesis.

Depression and Affective Recall

Table 3 presents a mean number of happy, sad, and neutral words remembered in different levels of depression for all 83 subjects. An extremely orderly visual trend is seen in the direction of the hypothesis. That is, subjects scoring as low depressed (happy subjects) recalled an average of 3.277 happy words and only 2.666 sad words. On the other hand, high depressed subjects remembered on the average only 2.952 happy words and 3.330 sad words. At all levels of depression, neutral words were remembered at lower rates than happy or sad words (low depression = 2.444, medium depression = 2.545, high depression = 2.850). Not only does there appear to be an orderly progression within each level of depression, there also appears to be expected results between each level of depression. That is, happy words seemed to be remembered on the average more often by happy subjects than medium or high depressed

TABLE 3

The Mean Number of Happy, Neutral, and Sad Words Recalled
at Different Levels of Depression for 83 Subjects

	Happy Words Recalled	Neutral Words Recalled	Sad Words Recalled	Total Words Recalled
Low Depression	3.277	2.444	2.666	8.389
Medium Depression	3.182	2.545	3.1591	8.909
High Depression	2.952	2.850	3.300	8.952
Average Words Recalled	3.145	2.590	3.072	8.807

subjects (3.277, 3.182, 2.952, respectively) and sad words appeared to be remembered on the average more often by highly depressed subjects than medium or happy subjects (3.330, 3.159, 2.666, respectively). A further investigation into the orderliness of these mean scores was accomplished by breaking the large group of medium depressed subjects into two groups called low-medium depression and high-medium depression. The resulting mean number of happy, neutral, and sad words showed smaller yet still orderly results in the direction of the hypothesis. This summary can be seen in Table 4.

Several sets of analyses (a multivariate analysis, a univariate analysis, and a regression analysis) were used to examine the relationship between depression and affective content of recall suggested by Tables 3 and 4. The results of these analyses are in the following paragraphs.

A multivariate analysis using level of depression (high, medium, and low) as the predictor variable and number of happy, sad, and neutral words recalled was performed. There was no overall effect when a general linear models procedure from the Statistical Analysis System (SAS, 1979) was used. This procedure produced four different multivariate F scores, none of which were significant:

Hotelling-Lawley Trace, $F(6,154) = .71$, NS;

Pillai's Trace, $F(6,158) = .71$, NS;

Wilk's Criterion, $F(6,156) = .71$, NS; and

Roy's Maximum Root Criterion, $F(2,80) = 2.03$, NS.

TABLE 4

The Mean Number of Happy, Neutral, and Sad Words Recalled When Splitting the Medium Depression Group into Low-Medium Depression and High-Medium Depression

	Happy Words Recalled	Neutral Words Recalled	Sad Words Recalled	Total Words Recalled
Low-Medium Depression (MDI: 14-26)	3.24	3.08	2.44	8.2
High-Medium Depression (MDI: 28-44)	3.00	2.58	3.21	8.5

The failure to find significance with the multivariate analysis would lead one to believe the univariate analysis of variance would not be significant. This was indeed the case. The analysis of variance showed there was no relationship between the three levels of depression and the number of neutral words recalled, $F(2,80) = .45$, NA. A test of linear contrast showed no trend between depression and the number of neutral words recalled, $F(1,80) = .79$, NS. There was also no significant relationship between depression and the number of happy words recalled, $F(2,80) = .29$, NS. A check for the linear relationship between depression and happy words recalled was also not significant, $F(1,80) = .57$, NS. Thirdly, there was no relationship between level of depression and the number of sad words recalled, $F(2,80) = 1.41$, $p = .2495$, however, this latter relationship was considerably less likely to happen by chance than in the first two analyses. The linear contrast again showed no trend, $F(1,80) = 2.55$, NS. In sum, there was no statistically significant difference between levels of depression and the affective content of the words remembered. Each level of depression recalled approximately the same number of happy words, each level of depression recalled approximately the same number of neutral words, and each level of depression recalled approximately the same number of sad words.

In an effort to obtain results by using the entire range of depression scores as predictors, a group of regression analyses were also performed on the data. A simple regression of the MDI full scale score's ability to predict the number of happy words remembered approached significance, $F(1,81) = 3.03$, $p = .085$. A regression of the MDI full scale

score with the number of neutral words recalled, $F(1,81) = .21$, NS, and with the number of sad words recalled, $F(1,81) = 1.99$, NS, yielded no significant results.

Since the MDI had ten subscales of depression, it seemed reasonable to also examine their contributions in more detail. Table 5 shows the summary of a regression analysis testing for the variance uniquely accounted for by each of the ten MDI subscales in recalling happy words. The regression analysis showed that the ten MDI subscales accounted for a statistically significant 27.70% of the variance in the number of happy words recalled, $F(10,72) = 2.76$, $p < .01$. Only one MDI subscale (Low Self Esteem) was able to uniquely account for a significant pattern of variance in the number of happy words recalled, $F(1,72) = 7.41$, $p < .01$. However, the subscales for Sad Mood, Learned Helplessness, and Guilt approached significance. (for Sad Mood, $F(1,72) = 3.22$, $p = .077$; for Learned Helplessness, $F(1,72) = 2.95$, $p = .09$; and for Guilt, $F(1,72) = 3.20$, $p = .07$). Overall, the ten MDI subscales could not predict a significant portion of the variance of the sad words recalled, $F(10,72) = 1.41$, NS. Also, there were no statistically significant relationships between the ten subscales and the number of neutral words recalled, $F(10,72) = .46$, NS.

Overall, the hypothesis that depression would be related to affective content of what is recalled received minimal support. Of the several analyses performed, significant results were only obtained in a regression analysis relating the contributions of the ten MDI subscales to the number of happy words recalled. One subscale, Low Self Esteem,

TABLE 5

A Regression Analysis Testing for the Variance Uniquely Accounted for
by Individual Subscales in Recalling Happy Words

Subscale	DF	Unique Variance Accounted for	f Value	Pr > F
Instrumental Helplessness	1	2.8375	1.96	.1661
Low Self Esteem	1	10.7482	7.41	.0081*
Sad Mood	1	4.6704	3.22	.0769
Learned Helplessness	1	4.2772	2.95	.0902
Energy Level (fatigue)	1	3.0821	2.13	.1492
Irritability	1	0.5817	0.40	.5285
Pessimism	1	2.6700	1.84	.1790
Cognitive Difficulty	1	2.0720	1.43	.2358
Guilt	1	4.791	3.30	.0733
Social Introversion	1	1.1140	0.77	.3837
10 MDI Subscales	10	27.70	2.76	.0061*

Note. *p < .05.

uniquely accounted for a significant portion of variance while three other subscales approached significance.

Depression and Total Recall

Table 6 also suggested a trend between level of depression and the total number of words recalled. The table showed low depressives remembering an average of 8.389 words, medium depressives remembering about 8.909 words, and high depressives remembering an average of 8.952. Such a trend, if significant would be in the opposite direction of the hypothesis. To test this data, another analysis of variance using three level of depression as predictors was performed. The analysis of variance showed no relationship between the MDI full scale score and the total number of words remembered, $F(2,80) = .804$, NS. Further, a multiple regression analysis indicated that the ten MDI subscales were able to account for 21.656% of the variance however, this was not significant, $F(10,72) = 1.99$, NS. In a step-wise multiple regression, the Low Self Esteem scale and the Guilt subscale best predicted the total number of words remembered. Together they accounted for 16.7% of the variance. The Guilt subscale uniquely accounted for 7% of the variance, $F(10,72) = 6.585$, $p < .01$ and the Low Self Esteem subscale accounted for 4.5% of the variance, $F(10,72) = 4.173$, $p < .01$.

In sum, even though a visual trend suggested differences, the hypothesis relating level of depression to total amount of recall was not statistically supported. Two subscales uniquely accounted for significant amounts of variances suggesting there may be a small relationship between some particular traits found in depression and amount of total

TABLE 6

A Step-wise Multiple Regression Analysis Testing for the Variance
Accounted for by Individual Subscales in Total Words Remembered

Subscale	% of Unique Variance Accounted for	% of Variance Accounted for	Beta Weights	F
Guilt	7.165	6.108	.3914	6.585*
Low Self Esteem	4.541	10.588	.3470	4.173*
Energy level (fatigue)	2.277	.915	.2302	2.093
Social Introversion	.901	1.040	.1133	.828
Irritability	.859	1.235	.1101	.789
Cognitive Difficulty	--	.511	.1003	.457
Pessimism	.707	.305	.1550	.650
Instrumental Helplessness	.417	.574	.0986	.384
Sad Mood	--	.316	.0998	.307
Learned Helplessness	.02	.020	.0223	.018
10 MDI Subscales	--	21.657	--	1.99

Note. *p < .01.

recall.

Depression and Order of Recall

To analyze the order of the words remembered, the recalled words were divided into three groups, the first third of the words recalled, the second third of the words recalled, and the last third of the words recalled by each subject. Happy words were rated 1, neutral words were rated 2, and sad words were rated 3. The average level of affect in each of the three word groups was computed and regression analyses relating the total MDI scores to affect level in each word group were performed. There was no relationship between the level of depression (total MDI score) and the affect of the first group of words remembered, $F(1,80) = 1.11$, NS. Also, there was no significant relationship between the level of depression and the affect of the second group of words remembered, $F(1,80) = 3.72$, NS, or the affect of the third group of words remembered, $F(1,80) = .494$, NS.

A regression analysis relating the ten subscales' scores to affect of the first group of words recalled, $F(10,71) = .71$, NS, and second group of words recalled, $F(10,72) = .94$, NS, were both not significant. However, a regression analysis relating the subscale scores to affect of the third group of words recalled was significant, $F(10,72) = 2.05$, $p < .05$. On closer analysis, the Sad Mood subscale, $F(1,72) = 6.89$, $p < .01$, and the Learned Helplessness subscale, $F(1,72) = 4.09$, $p < .05$, uniquely accounted for a significant portion of the variance. Table 7 shows a summary of each of the ten subscales' relationship to the affect of the third group of words recalled.

TABLE 7

A Regression Analysis Relating Individual MDI Subscales to the Affect
of the Third Group of Words Recalled

Subscale	DF	Type IV SS	F	Pr > F
Instrumental Helplessness	1	.7835	3.10	.0826
Low Self Esteem	1	.6227	2.46	.1210
Sad Mood	1	.7431	6.89**	.0106
Learned Helplessness	1	1.0351	4.09*	.0468
Energy Level (fatigue)	1	.5946	2.35	.1295
Irritability	1	.5973	2.36	.1287
Pessimism	1	.4763	1.88	.1742
Cognitive Difficulty	1	.4924	1.95	.1671
Guilt	1	.5753	2.28	.1358
Social Introversion	1	.0024	.01	.9227
10 MDI Subscales	10	5.1894	2.05	.0399

Note. * $p < .05$

** $p < .01$

In summary, a regression analysis relating the total MDI score to order of the words recalled showed no significant results. When inspecting the subscales' relationship to order of words recalled, it was discovered that there was a significant relationship between the subscale score and the last third of the words recalled. Specifically, the Sad Mood and Learned Helplessness subscales were primarily responsible for this significance; scores on these subtests were positively related to recalling words of similar affect.

Depression and Interjected Words

A one-way analysis of variance predicting the number of words added from three levels of depression showed no relationship between level of depression and total number of interjected words, $F(2,80) = .327$, NS. This hypothesis was also tested using a regression analysis. An analysis predicting the number of words from the MDI full scale score also yielded no results, $F(1,81) = .05$, NS.

To predict the affect of added words from three levels of depression, the added words were scaled according to their affect level in the manner previously described and a MANOVA was performed. There was no overall effect. Four F scores were computed and none reached statistical significance:

Hotelling-Lawley, Trace, $F(6,154) = 1.13$, NS;

Pillai's Trace, $F(6,158) = 1.14$, NS;

Wilk's Criterion, $F(6,156) = 1.14$, NS; and

Roy's Maximum Root Criterion, $F(2,80) = 2.72$, NS.

This would lead one to believe that there were no univariate effects,

which was indeed the case. The one-way analysis of variance shows no significant relationship between a person's level of depression and the affect of the first word they may have added, $F(2,80) = .90$, NS; between the level of depression and the second word they may have added, $F(2,80) = .28$, NS; or between the level of depression and the third word they may have added, $F(2,80) = .80$, NS.

Overall, there was no support for either the hypothesis that depression was related to the number of words a subject may have interjected into recall or the hypothesis that level of depression was related to the affect of words a subject may have interjected.

Depression and Associations

To test the hypothesis that emotion influences chain associations to neutral stimuli, a procedure similar to Bower's was used. Two judges independently rated the subjects' chain associations as either made by a happy, neutral, or sad person. The criterion used to determine whether the associations were influenced by emotion was the judges' ability to correctly differentiate the depression level of the individual who made the associations. Table 8 is a summary of the average of the judges' ratings of the associations. The judges were able to accurately identify depressed subjects an average of 33.3% of the time, neutral subjects 56.8% of the time, and happy subjects 36% of the time. A Chi Square performed on the nine possible ratings of the judges was not significant, Chi Square (4) = 5.54, NS. The judges were not rating the associations at a significantly different from chance level. When neutral responses

TABLE 8

Average Results Obtained When Judges Judged Chain Word Associations
into One of Three Levels of Depression

Associations Actually	Associations Judged As			Raw Totals
	Depressed	Neutral	Happy	
Depressed	7	12	2	21
Neutral	7.5	25	11.5	44
Happy	2.5	9	6.5	18
Column Totals	17	46	20	83

were discarded (as in Bower's research), associations of depressed subjects were accurately distinguished from happy subjects' associations 77.8% of the time. Happy subjects' associations were accurately distinguished from depressed associations 72% of the time. Theoretically expected frequencies were too small to appropriately compute a two by two analysis using only the four corners of the table. So, although the percentages appear to be large, a Chi Square was not computed. In sum, the hypothesis relating depression to associations of neutral stimuli received minimal support.

DISCUSSION

This research was based on the general premise that mood is related to cognitive processes such as recall and associations. In general, only minimal support was shown for some of the hypotheses associated with this premise. Specifically, a relationship between depression and affective recall was apparent only in a regression analyses relating the ten subscale scores to the number of happy words recalled. Also, a small relationship between the total number of words recalled and some particular traits in depression was shown by the Low Self Esteem and Guilt subscales accounting for a significant unique variances. Again, only minimal support was given to the hypothesis between depression and the order of the words recalled when a regression analysis related two subscales to the last third of the words each subject recalled. Lastly, the relationship between depression and associations to neutral words was only given minimal support, i.e., although preliminary analyses were not significant, an analysis of the extreme scores (too small to compute a Chi square) visually supported the hypothesis.

These results seem rather inconsistent with Bower's work and the research of other cognitive theorists who have shown differences in memory and cognitive process between depressed and nondepressed subjects. The inconsistency in the results concerning depression and associations are particularly disturbing since results have been obtained when using

hypnotic manipulation or a Velton procedure. Some explanations might be offered to explain this study's failure to find a strong relationship between emotion and memory or associations.

First, one might hypothesize that these depression groups were not distinct. Even though the high depressed and low depressed subjects were respectively scoring one standard deviation above and below the mean on the MDI, that may not be a large enough difference. Indeed, the subjects were taken from an academic setting and although their depression level was varied for this setting, the depressed subjects were not considered clinically depressed. To test the hypothesis that the criteria for levels of depression in this experiment were not extreme enough to show a difference, an analysis of variance was done using only the ten least depressed subjects for the low depression group and only the ten most depressed subjects for the high depression group. This analysis of variance, using only the extreme scores, showed a significant relationship between level of depression and affect of words remembered, $F(2,36) = 3.27$, $p < .05$. Table 9 summarizes the mean words recalled by the different levels of extreme depression. It shows an even clearer trend in the direction of the hypothesis than was evident in Tables 3 and 4. This analysis supports the speculation that the depression groups were not distinct and offers considerable encouragement for future research in this area. Future studies examining affective content of recall should use subjects exhibiting a broader range of depression.

TABLE 9

Mean Words Recalled When Using Only the Ten Most Extreme Scores

Obtained on the Depression Level Continuum

	Happy Words Recalled	Neutral Words Recalled	Sad Words Recalled	Total Words Recalled
Ten Least Depressed Subjects	3.4	2.6	2.5	8.2
Ten Most Depressed Subjects	2.4	2.3	3.5	8.5

Similar analyses using the ten most extreme subjects on each end of the depression scale were performed on the other hypotheses with less encouraging results. An analysis of variance relating depression and total amount of recall still yielded no significant results, $F(1,18) = 4.41$, NS. A visual examination of depression and amount of words interjected showed the number of interjections for those scoring extremely high or extremely low on the depression scale was almost identical, reinforcing the previous conclusion that level of depression is unrelated to the number of words interjected. When examining the twenty most extreme cases for differences in the affect of the words they may have interjected, the ten highest depressives interjected four happy words and two sad words while the ten lowest depressives interjected six happy words and one sad word. None of the twenty extreme subjects interjected a neutral word. A Chi Square can not be computed on this data because of the small frequencies. One might speculate, however, that future examination of this phenomenon with a large group might yield significant results. All in all, post hoc analyses on the hypotheses (other than the relationship between depression and affective recall) yielded no significant results.

A second possible explanation for the failure of this study to find a relationship between depression and memory or associations might be the choice of words. The happy and sad words were chosen from the DACL which generally differentiates between depressives and nondepressives. In this study however, there was no guarantee that a word

stimulated the affect in a particular subject hypothesized by the experimenter. For instance, the word "wonderful" which was categorized as happy in the experiment may, because of an individual experience, have been seen as a neutral or depressing word by a particular subject. Another subject may see "guarantee" as a happy word when it was categorized as a neutral word in the experiment. Furthermore, in the present research, the experimenter was unable to determine how much affect was related to a particular stimulus word. For instance, do "animate" and "lucky" present generally equal amounts of positive feelings as stimulus words? If so, then do they present equal amounts of positive feelings to different individuals? One might also ask if the affect of the positive words was as extreme as the affect of the negative words and how neutral were the neutral words? In this research, it was difficult to determine if the affect of the stimulus word was the same for all subjects and if the same amount of affect was generated by each word to each subject. This explanation would account for an analysis of variance relating depression to amount of sad words remembered to be approaching significance while ANOVAs relating depression to the recall of happy, or neutral words did not i.e., perhaps the sad words were more uniformly extreme affective stimuli for more subjects. To control for this in the future, each subject should rate each stimulus word on a depression continuum.

A third explanation for finding minimal or no significant relationship between depression and amount of total recall, ordering of recall, number of interjections, or affect of interjections may be that there

actually is not relationship between depression and these aspects of memory. Other variables may be operating here. One such phenomenon was observed during the experiment. After subjects initially recalled the words they could remember, the experimenter routinely asked if they wished to have more time. On almost all occasions subjects recalled a few more words which were also recorded. After some time the experimenter observed that subjects varied widely on the number of words they would initially recall before giving up. They also seemed to vary considerably on the number of words they were able to recall after the experimenter's comment. Some subjects persevered longer and remembered more words before saying they were done and some gave up rather easily. The interesting fact here is that all subjects averaged approximately the same total recall, so those that gave up easily remembered less after the experimenter's prompt.

An interesting phenomenon to study during future research on memory is at what point in the recall the subject requires prompting. Here, depressed subjects seemed to give up more easily and require prompting earlier in the recall period, i.e., the subjects exhibited a performance deficit rather than a memory deficit. This hypothesis would agree with Ferster's hypothesis that depressed individuals exhibit decreased behavior (1973), Seligman and associates' hypothesis of lower competitiveness and behavioral passivity in depressives (Powell and Creer, 1969; Maier, Anderson, and Liberman, 1972), and the ideas that depressives have less confidence in themselves (Beck, 1967) and "expect the worst" (Friedman, 1964). Where there might be no actual

memory differences, future research using the MDI might yield a relationship between depression and performance differences. In fact, this might account for the choice of the two subscales which did uniquely account for a significant portion of the variance, the Low Self Esteem and Guilt subscales. People who score high on the Low Self Esteem scale report feelings of inadequacy and incompetence while those scoring high on the Guilt subscale typically evaluate personal actions as negative. Even though the subjects were prompted, these may still be picking up performance differences rather than any actual memory differences. In sum, the third possibility this study obtained little or no significant results between depression and several aspects of memory may be because there genuinely is no relationship. Supposed relationships may be suggested by performance deficits in depressed subjects rather than any actual memory differences.

With the limitations of the study in mind then, this research still contributes to Bower's preliminary work in relating depression to cognitive processes. First, this study did report significant differences between high and low depressed subjects in their immediate affective recall. It is certainly encouraging that a significant relationship between mood and memory was found in a study in which the design had significant limitations. This leads one to believe that the relevance of the mood-congruous effect on memory on naturally-occurring emotions is significant and an area worthy of future research. In addition to studying depressive affect, one might presume to find significant results using anger, sad and frightened affects as well. Secondly,

although there may be no differences in the total encouraged amount of immediate recall between high and low depressed subjects, there is probably a strong expectation difference which affects the subjects' initial effort at response. This expectation and resulting performance bias might well be predictable by a knowledge of the subject's depression. Furthermore, it seems significant to explore whether these performance differences are indeed a result of differential expectations which can be minimized by a mere statement of openness by the researcher rather than something more deep seated or an actual difference in capability. Such information seems valuable for those in clinical work. A third area of impact on Bower's preliminary research is the yet unclear relationship between depressive affect and ordering of significant recall responses found in this study. More research is needed to clarify possible organizational or conceptual differences in the cognitive processes of depressed subjects.

This study also contributes to Bower's preliminary work by showing memory differences related to extreme levels of naturally-occurring mood found in a normal college population. Some of the earlier reservations of previous researchers concerning the need to strongly manipulate the subjects' mood to obtain results, the "realness" of the mood induced, possible demand characteristics resulting from evident mood inducements, and generalizability of previous lab findings are minimized by this design.

More theoretically, the results of this study provide some support

for Bower's notion of the associative network theory of behavior, i.e., that emotion serves as a memory unit. The activation of emotion serves as a retrieval aid which affects cognitions and the resulting behavior. Specifically, Bower's theory of mood-congruous memory was supported when this study found a significant difference in the affective content between high and low depressed subjects. Future research should investigate performance measures involved in selective memory.

On yet a broader spectrum, this study contributes to the continually evolving literature on depression and predicting depressive behavior. Studies such as this highlight the complexity of the relationship between cognition and emotion and the need for a better understanding of the role that processes such as selective attention and memory may play in this relationship.

SUMMARY

This study investigated the relationship between level of depression and two cognitive processes, immediate recall and word associations. Specifically, the study looked at the relationship between various levels of depression found naturally in a college population to the content of affect-laden recall, amount of total recall, ordering of recall, amount and content of interjections, and chain associations to neutral words. A significant relationship between level of depression and affective content of immediate recall was found when college subjects scored on the extreme ends of the depression scale. There was some evidence that level of depression was related to the ordering or recall i.e., the Sad Mood and Learned Helplessness subscales on the MDI were related to the affect of the third group of words recalled. Three possible explanations were given for the study's failure to find more significant relationships and for improving the procedure for future research. The results of this study provided some support for Bower's associative network theory of emotions which conceptualizes emotion as a memory unit affecting cognitions. Specifically, the results supported Bower's theory of mood-congruous memory. The implications of these results for cognitive theories of depression were also discussed.

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The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Masters of Arts

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