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Sensitivity to aversive events in currently depressed and remitted depressed subjects

Sigmon, Sandra Tate, Ph.D.

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U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

Sensitivity to Aversive Events in Currently Depressed and Remitted Depressed Subjects

by

Sandra Tate Sigmon

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Approved by

Rosemary O. Nelson-Gray

Dissertation Adviser

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

Dissertation Adviser Rosemary O. Nelson-Gray

Committee Members Jacqueline W. White

Ernest A. Kazdin

[illegible]

Jack L. Bradley

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Greater sensitivity to aversive events exhibited by depressed individuals has been assumed to be a correlate of current depression. Alternatively, Lewinsohn (1985) has proposed that this greater sensitivity may be a predisposing factor in the development of a depressive episode and/or that this sensitivity represents a "scar", resulting from the previous experience of a depressive episode (1988). The present study examined sensitivity to aversive events in currently and remitted depressed subjects to test the correlate versus predisposing-scar hypotheses.

Twenty currently depressed, twenty remitted depressed, and twenty control subjects completed this study. Each subject completed a social and a learning task. In the social task, GSR recordings were taken while subjects listened to positive, negative, and neutral social interaction scenes. Mood and pleasantness ratings were obtained prior to and after each type of scene presentation. In the operant learning task, subjects were assigned to one of two conditions: Positive Reinforcement Only consisting of points awarded with no penalties, and Positive Plus Response Cost consisting of an additional contingency where subjects had to make a point within a minute or lose a half point. A MULT DRL/FR schedule was in effect for both conditions. Both conditions consisted of a 32-minute acquisition and a 32-minute extinction phase. Mood and pleasantness ratings were obtained prior to and immediately after the task. Subjects also completed two questionnaires to assess experienced aversiveness of common and important life events occurring prior to their involvement in the study.

The results of the present study were more consistent with the predisposing-scar hypotheses regarding greater sensitivity to aversive events. The response of remitted depressed subjects was very similar to that of currently depressed subjects. Both currently and remitted depressed subjects exhibited higher GSR reactions to negative social scenes and greater extinction effects in the Response Cost condition when compared to control subjects. Remitted depressed subjects did not differ from control subjects on assessment of depressive symptoms nor on their experienced aversiveness of common unpleasant events and life events. The present study also provided some support for the passive avoidance model of depression as a framework for understanding the development of greater sensitivity to aversive events.

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CHAPTER I

INTRODUCTION

The clinical syndrome of depression is characterized mainly as a disorder of mood with diverse symptoms in the following areas: emotional (e.g., feelings of sadness and dysphoria); cognitive (e.g., difficulty in concentrating or remembering); behavioral (e.g., psychomotor retardation or agitation, and problems with social interactions); and somatic (e.g., sleep disturbance, low energy levels or fatigue). Due to the wide variability in the experience and severity of depressive symptoms, the Diagnostic and Statistical Manual of Mental Disorders - Revised (DSM III-R; American Psychiatric Association, 1987) proposed that an individual should exhibit a certain number of the symptoms along with the central symptom of dysphoric mood in order to meet the criteria for a diagnosis of depression. With such diverse depressive symptoms, there is a pervasive impact on an individual's life in almost every area of functioning.

Depression has been called the "common cold" of psychiatric disorders (Seligman, 1975). It has been estimated that at least 4% of the population at any given time could be diagnosed as severely depressed (Weissman & Myers, 1978). Researchers have estimated that 25-50% of the population will experience an episode of depression at some point in their lifetime (Amenson & Lewinsohn, 1981; Myers &

Weissman, 1980). Clearly, the phenomenon of depression represents a disorder with a high rate of occurrence among the general population.

Due to the high incidence rate of depression in the population, researchers have begun to identify factors or characteristics that predict if individuals are at risk to develop the disorder. Epidemiological studies have found that the incidence of depression is two to three times higher in females than in males (Weissman & Klerman, 1977) and that women are much more likely to have recurring depression (Amenson & Lewinsohn, 1981). The prevalence of depression increases between the ages of 20 and 40 (Lewinsohn, Hautzinger, & Duncan, 1984) and with chronic difficulties or an increase in the occurrence of stressful life events (Brown & Harris, 1978; Lewinohn & Hoberman, 1982; Paykel, Myers, Dienelt, Klerman, Lindenthal, & Pepper, 1969). Other factors that have been identified include having previous episodes of depression (Gonzales, Lewinsohn, & Clarke, 1985; Keller, Shapiro, Lavori, & Wolfe, 1982), and having fewer coping skills (Billings, Cronkite, & Moos, 1983; Billings & Moos, 1985).

In addition to increased interest in identifying factors that predispose individuals to depression, researchers have begun to examine variables that predict depressive relapse. Regardless of treatment modality, researchers estimate that 30% of treated depressed subjects will experience a second depressive episode within a year (Gonzales et al., 1985; Keller et al., 1982). Approximately 22% of females who have experienced one depressive episode will experience a second episode. Individuals who meet the diagnostic criteria for Dysthymic Disorder are

more likely to relapse than those diagnosed as Major Depressive (Keller et al.,1982). Gonzales et al. (1985) conducted a three year follow-up on 113 unipolar depressives and found that the following variables were significant predictors of relapse: a greater number of previous depressive episodes, a family history of depression, poor health, higher dissatisfaction with life roles, and younger age. Although these individuals are substantially at risk to develop another depressive episode, researchers have not been able to identify any consistent theory-related variables in these depression-prone individuals (Youngren & Lewinsohn, 1980; Zeiss & Lewinsohn, 1987).

The data suggest that certain individuals are at risk for developing an initial episode of depression. The major theories of depression propose variables to account for these data. According to the foremost cognitive theory (Beck, 1967), depression is due to the activation of the cognitive triad, superordinate schema, and cognitive errors. The cognitive triad consists of the negative view that depressed people have of themselves, the world, and the future. Cognitive errors are logical errors in the thinking of the depressed person that maintains the person's belief in the validity of their negative thoughts despite the presence of contradictory evidence. Superordinate schema represent long standing beliefs and often irrational thoughts. These stable cognitive patterns develop during the early developmental years and are hypothesized to predispose an individual to develop a depressive episode. Although Beck's theory has led to a successful treatment program for depression, the causal nature of negative thought patterns in depression has not been empirically

demonstrated. In addition, in longitudional studies, individuals who develop depression at a later time did not consistently exhibit negative cognitive patterns prior to becoming depressed (Hamilton & Abramson, 1983; Lewinsohn, Steinmetz, Larson, & Franklin, 1981) or after depression had remitted (Lewinsohn, Hoberman, & Rosenbaum, 1987). Although Beck's theory identifies negative schema as being predictive of those who will develop a depressive episode, to date no study has provided evidence to support this hypothesis.

Early behavioral analyses of depression (Skinner, 1953) described it as a weakening of behavior due to disrupted established sequences of behavior that the social environment had positively reinforced. Most behavioral models of depression share a common emphasis on environmental causation and on the role of reinforcement by the social community (e.g., the loss of reinforcement for normal behaviors or the reinforcement of depressive behaviors). Ferster (1973) suggested that sudden environmental changes, aversive control, and shifts in reinforcement schedules give rise to reduced rates of behavior (i.e., depression). Lewinsohn and his associates (Lewinsohn, Weinstein, & Shaw, 1969; Lewinsohn, 1975) elaborated on earlier behavioral analyses and hypothesized the following regarding the etiology of depression. A low rate of response-contingent positive reinforcement was posited as the critical antecedent. In addition, a deficit in requisite social skills and a higher rate of punishing or unpleasant events than pleasant experiences predisposed an individual to develop a depressive episode. Lewinsohn and his colleagues posited that a social skills deficit represented the major risk factor in the development of a depressive

episode. Thus far, no studies have unequivocally supported the hypothesis that social skills deficits lead to depression or that the social skills of remitted depressives differ from normal controls (Youngren & Lewinsohn, 1980; Zeiss & Lewinsohn, 1987). Partial support, however, was found in a study by Weissman and Paykel (1974) that looked at interview-based ratings of interpersonal difficulties in a group of remitted depressives. An impairment was found in the communicative abilities of these depressed women after successful treatment and again at a four year follow-up (Bothwell & Weissman, 1977; Weissman & Paykel, 1974). Although some support exists for an impairment in the social functioning of remitted depressives, no studies have been able to identify a social skills deficit in individuals who later develop a depressive episode.

Most contemporary theories of depression have tended to be unidimensional and espouse linear models, i.e., given event X, an episode of depression (Y) will occur. In this type of model, X is necessary and sufficient for the development of a depressive episode. Recently, several researchers have criticized the unidimensional approach to depression and proposed that depression can best be viewed as having multiple causes that produce the same end result, i.e., a depressive episode (Billings & Moos, 1982; Craighead, 1980). Following a polydimensional view, depression can be conceptualized as having multiple causes that include the interaction of personal and environmental factors (Billings & Moos, 1982; Lewinsohn, Hoberman, Teri, & Hautzinger, 1985).

Following this caveat, Lewinsohn and his colleagues (Lewinsohn et al., 1985) have proposed a polydimensional theory of depression that includes a vulnerability construct. Their new theory proposes that predisposing characteristics of various kinds can increase or decrease the risk for the development of a depressive episode. These vulnerabilities represent stable characteristics of the person or their environment and include demographics such as being poor, being female, and being between the ages of 20-40. In addition, Lewinsohn has identified an increased sensitivity to aversive events as one of the few predisposing factors that represents a behavioral response to events and goes beyond demographic categorization. Unlike Lewinsohn's earlier theorizing, this new theory does not posit that a social skills deficit is a predisposing factor in depression development. Lewinsohn's new theory combines the previously identified risk factors (along with sensitivity to aversive events) into a vulnerability construct that predisposes an individual to depression given an aversive evocative event.

The Role of Aversive Events in Depression

Aversive events have been implicated in many conceptualizations of depression: as an antecedent factor, interactive with other predisposing factors, and as a maintaining factor. Several researchers have examined the occurrence of social stressors as an etiological factor in the development of depressive episodes (Brown, 1972; Brown & Harris, 1978; Paykel, 1982). Social stressors have been defined as life events, i.e., events that involve a disruptive change in an individual's life. The stressful impact of life events is judged not only by their

aversiveness but also by the demands the event places on an individual's coping skills and resources (Carson & Carson, 1984). Examples of life events include marital problems, difficulties with work, health problems, and loss of an important relationship. Quantification of life events has been aided by the development of scales such as the Social Readjustment Rating Scale (SRSS; Holmes & Rahe, 1967).

Paykel (Paykel, 1978, 1979, 1982) and Brown (Brown & Harris, 1978; Brown, Harris, & Petri, 1973) have presented evidence suggesting a strong relationship between life events and onset of clinical depression. Using an interview format, depressed and normal control subjects were asked about the occurrence of stressful life events (Paykel et al., 1969). Results indicated that depressed individuals reported three times more life events than matched controls in the six months prior to depressive onset. Using a similar methodology, other researchers (Brown et al., 1973) found that depressed subjects reported more life events in the three weeks preceding a depressive episode when compared to matched controls. In general, the data indicate that depressed individuals tend to report more life events during the six months prior to depressive episode onset.

When depressed subjects are compared to psychiatric or medical patient controls on life event occurrence, the results are mixed. Two studies comparing life events in depressed and medical patients found only weak support for excess life events in depressed subjects (Forrest, Fraser, & Priest, 1965; Hudgins, Morrison, & Barcha, 1967). Life events may tend to cluster before the onset of a medical disorder and hospital

admission (Paykel, 1982). Although depressed individuals tend to report more life events than schizophrenic patients (Beck & Worthern, 1972; Jacobs, Prusoff, & Paykel, 1974), few differences are found between depressed and mixed psychiatric patients (Malmquist, 1970; Uhlenhuth & Paykel, 1973). These results suggest that stressful life events also precede other psychiatric disorders and medical disorders at a higher rate than in the general population.

Schless, Schwartz, Goetz, and Mendels (1974) administered the SRSS to 76 depressed inpatients and normal controls upon admission and discharge of the depressed patients. The authors were interested in examining the differential assignment of weights to life events in depressed patients in a depressed and remitted depressed state. The researchers found that depressed subjects gave higher weights to the life events than normal control subjects. Results indicated at both administration periods, depressed subjects rated the life events as more aversive. Even when experiencing few depressive symptoms, depressed subjects rated the life events as more aversive. The researchers also found this to be true regardless of whether the depressed person had experienced the life event or not. Schless et al. (1974) suggest that the results, though correlational in nature, may reflect some enduring personality aspect of persons who develop clinical depression.

Prospective studies have been used to ascertain the effects of stressful life events on the subsequent development of depression. In following bereaved subjects, only 25% of the subjects sought psychiatric help for depressive symptoms (Clayton, Desmaris, & Winokur, 1968). A

second study found that approximately 35% of bereaved subjects exhibited depressive symptoms within one month and only 17% experienced depressive symptoms after one year (Bornstein, Clayton, Halikas, Maurice, & Robins, 1973). Similar results have been found in studies that examined depression after childbirth, hysterectomies, and myocardial infarction. Only a small percentage of individuals experiencing these stressful events develop the clinical syndrome of depression.

Since it appears that it is not just the experience of life events per se that induces depression, researchers have begun to search for other factors that may interact with stressful life events to produce depression. Brown and Harris (1978) have identified few social supports, presence of several young children in the home, and lack of employment as vulnerability factors that make the development of depression more likely to occur after a stressful life event. Similarly, Paykel et al. (1980) have found the absence of social supports in conjunction with life events to be a predisposing factor in the development of depression. In two studies that examined predictors of relapse in depression, little social support has emerged as a significant contributor (Billings & Moos, 1985; Gonzales et al., 1985). Carson and Carson (1984) have suggested that "people at risk for depression react more intensely to various life stressors by virtue of some mediating characteristics, such as physiological or biological hypersensitivity, coping-skill deficits, or maladaptive cognitions." (p. 354).

Although the incidence of depression is increased for persons experiencing stressful life events, only a minority will actually become clinically depressed (Brown et al., 1973; Paykel, 1982). Paykel (1974) has estimated that less than 10% of stressful life events will result in an episode of depression. The true contribution of life events or factors interacting with life events remains open to question because life events reported by depressives are experienced equally by nondepressives. Even in persons with recurring depression, not all will experience episodes of depression when experiencing stressful life events (Paykel & Tanner, 1976). The moderate correlation between life events and depression incidence clearly suggest that life events are not a sufficient or necessary cause of depression. However, the data on life events and depression have led other researchers to investigate the relationship of unpleasant events and depression.

In his earlier theory of depression, Lewinsohn emphasized a low rate of response-contingent reinforcement as the critical antecedent. In addition, more punishing experiences than rewarding experiences and deficits in social skills that normally produce reinforcement are proposed to be responsible for depression development (Lewinsohn et al., 1969). Moreover, a high rate of aversive events paired with a heightened sensitivity and a skills deficit in terminating aversive events precipitate depression (Lewinsohn & Hoberman, 1982). Thus, a low rate of reinforcing events and an increase in aversive events are thought to play a major role in depression onset.

Because aversive events are central to several conceptualizations of depression, much research has been generated to develop a method to identify unpleasant events and to compare the rates of aversive events in depressed and nondepressed populations. Lewinsohn and Talkington (1979) devised the Unpleasant Events Schedule (UES) to investigate the rate of occurrence and subjective aversiveness of events in depressed persons. In subsequent studies, results indicate that events pertaining to work, domestic inconveniences, and interpersonal relations are rated more aversive by depressives than by normal controls (Grosscup & Lewinsohn, 1980; Lewinsohn & Talkington, 1979). Interestingly, depressed persons did not rate all events as more aversive nor do they report more frequencies of aversive events than normals. Lewinsohn and Talkington (1979) suggest that UES events represent ongoing sources of aversiveness rather than discrete life events that the SRSS measures. Although depressed individuals tend to rate some events as more aversive (particularly socially related events) than normals, these results are correlational in nature and do not explain why depressives experience the same event as more aversive than normals. Since not all depressives experience an increase in aversive events prior to becoming depressed, frequency of aversive events cannot address causality issues.

Ferster (1973) viewed depression as aversively-motivated behaviors. The most obvious aspect of a depressed person's repertoire is a greatly reduced frequency of positively reinforced behaviors and an increase in the frequency of avoidance and escape behaviors. Aversive stimuli occasion avoidance and escape behaviors which thereafter terminate the aversive events or lead to a suppression of behavior. Ferster (1973)

proposed that the depressive repertoire may efficiently avoid aversive stimuli but still may lack sufficient positively reinforced activities. Conversely, the aversively maintained behavior may come from the absence or sudden reduction of positively reinforced behavior. Many aversive events may precede a clinical depression such as sudden environmental changes, excessive punishment, aversive control, and shifts in reinforcement schedules (Ferster, 1973).

Ferster's analysis of depression is very similar to the passive avoidance model of depression (Suarez, Crowe, & Adams, 1978). Suarez et al. (1978) hypothesize that depressed individuals have adopted a strategy of passive avoidance for dealing with a stressful environment. In passive avoidance conditioning, "aversive stimuli are conditioned to internal response-produced cues" (Suarez et al., 1978, p.22). Termination of a response may avoid response-produced cues associated with punishment but does not enable the organism to avoid external cues since the organism remains in the situation in which punishment occurred. Suarez et al. (1978) suggest that not responding may minimize aversive stimulation since the organism cannot completely escape the situation. If persons have a history of controlling aversive stimuli by not responding, then a behavioral suppression strategy may be employed. Thus, more positively reinforced behaviors may be preempted in response to stressful or aversive situations (Ferster, 1973; Suarez et al., 1978). Although aversive events are implicated etiologically in many conceptualizations of depression, their occurrence alone is not a sufficient causal factor in the development of a depressive episode.

Most of the research on aversive events and depression has focused on the contributory nature of these events. Several researchers have investigated the maintenance of depressive behaviors via aversive control in an interpersonal context specifically. Biglan and his associates (Biglan, Hops, Sherman, Friedman, Arthur, & Osteen, 1985; Biglan, Hops, & Sherman, 1987; Lewin & Biglan, 1987) have examined the social interactions of depressed subjects. Results indicate that a mother's depressed behavior is negatively reinforced by its avoidance of family members' behavior that is aversive to the mother (Biglan et al., 1985). Generally, depressed subjects emit more aversive behavior to others than nondepressed persons (Biglan et al., 1987). These findings are consistent with the work of Coyne (1976), investigating the effect a depressed person has on another's behavior with whom they are interacting. Interactions with depressed persons are characterized by more negative ratings from others (Hinchcliffe, Hooper, Roberts, & Vaughan, 1975; Linden, Hautzinger, & Hoffman, 1983). The results indicate that depressive behaviors are aversive to others with whom they are interacting and that depressive behavior can function in a way that reduces the aversiveness of interacting with others. Researchers have suggested that this aversive control pattern may be an important maintaining factor in depressive behaviors.

Sensitivity to Aversive Stimuli

Research has indicated that aversive events probably play an important role in the development of depressive episodes. The data suggest, however, that not all persons who experience stressful life events will develop depression and not all persons with recurring

depression will experience another episode when undergoing stressful life events. Depressed persons nonetheless rate unpleasant events as more aversive than normals even when they are not experiencing depressive symptoms. Some researchers have proposed that depression-prone individuals may have increased sensitivity to aversive events (Carson & Carson, 1984; Lewinsohn et al., 1985). This increased sensitivity may greatly increase the chances that stressful life events or unpleasant events will produce an episode of depression in some depressives. So far, sensitivity to aversive events has only been examined in persons currently experiencing depression and has been assumed to be a correlate of depression.

Zuckerman, Persky, and Curtis (1968) conducted one of the first studies investigating the relationship between depression and autonomic responding. In their study, three affects (i.e., hostile, depressed, and anxious) were observed or inferred in 29 male psychiatric inpatients and in 25 normal male controls. Autonomic responding was measured by heart rate, breathing rate, and galvanic skin response (GSR) before, during, and after a cold pressor task. Although patients with depressed affect did not differ from patients with anxious affect on nonspecific GSR, the authors concluded that the GSR offers promise in detecting differences on specific reactions to stimuli. It should be noted that the researchers used all male patients with questionable diagnostic criteria for forming the three affective groups.

Lewinsohn, Lobitz, and Wilson (1973) investigated GSR conductance levels on depressed, psychiatric control, and normal control subjects in response to shock. Measurements were taken for five trials prior to, during, and after shock administration. The authors found that depressed subjects had the highest skin conductance levels restricted to the actual occurrence of shock. No differences were found among the three groups during the trials prior to and after the shock was administered. In addition, female depressives showed a greater increase in skin conductance than males in response to shock but adapted more quickly to repeated administration of shock than males. The authors suggest that depressives' sensitivity to aversive stimuli may lead them to withdraw or to show an increased tendency to avoid social situations. The authors hypothesized that aversive social situations are analogous to the presentation of shock in that subjects would tend to avoid both aversive events. Subjects who have a social skills deficit do not have the skills to terminate aversive social situations efficiently. It should be noted that all subjects in this study were college undergraduates who were assigned to diagnostic groups based on scores received on the Byrne Scale and a short interview rating scale.

In a related vein, Forrest and Hokanson (1975) examined the self-demeaning displays in depressed and nondepressed subjects. The authors hypothesized that these displays are instrumental in controlling aversiveness and threat from others in their environment. Thus, the authors predicted that depressed subjects would display a higher rate of self-punishing behaviors than normals when attacked in an interpersonal situation. Secondly, the authors predicted that depressives would

demonstrate faster autonomic arousal reduction when they used a self-punishing response. Consistent with their hypotheses, results indicated that depressed subjects exhibited greater arousal reduction when they self-shocked than did normal controls. The authors also found that depressed subjects tended to display more self-punishing behaviors than normals in the modified two-person interaction. The authors hypothesized that self-punitive and nonassertive behaviors have both associated autonomic tension-reduction properties in depressives and are instrumental in reducing aversiveness or threat from others. It should be noted that all subjects were male undergraduates who scored in the depressed and nondepressed ranges of the BDI and the MMPI-D.

Golin, Hartman, Klatt, Munz, and Wolfgang (1977) examined the physiological effects of negative and positive feedback and subsequent observations of a sad film in depressed and nondepressed subjects. Spurious positive or negative feedback was given about a previously administered personality test, and GSR recordings were taken after a baseline period. Recordings were also taken at two times while the subjects observed a film that featured two sad, emotional scenes. Results indicated that depressed subjects exhibited greater arousal to negative feedback and in reaction to the film when compared to nondepressed subjects. The researchers suggest that depressed subjects were particularly reactive to a "loss" of self-esteem following the negative feedback. Both male and female undergraduates served as subjects based on scores received on the BDI.

Gatchel, McKinney, and Kobernick (1977) investigated the physiological correlates of learned helplessness types of depression and naturally occurring depression. Each of the experimental groups was comprised of depressed and nondepressed subjects. One experimental group (i.e., learned helplessness group) was pretreated with a series of inescapable tones. A second group was pretreated with escapable aversive tones, and a third control group passively listened to aversive tones. The first and second groups were given instructions that they could do something to stop the aversive tone, whereas the third group received no such instructions. Subjects' subsequent impairment was measured on a solvable anagram. Physiological recordings (GSR) were taken prior to, during, and after aversive tones were presented. Results indicated that depressed subjects in general demonstrated greater skin conductance responding than nondepressed subjects in both inescapable and control group conditions. The authors suggest that electrodermal responding is greater in naturally occurring depression than in learned helplessness (i.e., normals who were in the first group). All subjects in this study were undergraduate males and females diagnosed by scores on the BDI.

Suarez et al. (1978) were interested in investigating physiological arousal differences between depressed and nondepressed subjects in a college and outpatient population. The researchers had all subjects listen to an audiotape that contained neutral statements and BDI statements. GSR (GSR is analagous to skin resistance response or SRR) recordings were taken prior to tape, during tape, and after tape. Both skin resistance level (SRL)and skin resistance response

(SRR) were measured. Results indicated that both student and non-student depressives exhibited higher SRL than nondepressed subjects in both baseline and tape conditions. Depressed subjects also showed a greater number of SRR than nondepressed subjects, and the rate of SRR was higher for depressed subjects during the entire tape period. Non-student depressed subjects exhibited higher SRR's during the negative tape statements when compared to the neutral tape statements. In addition, non-student depressives tended to rate the whole tape as more aversive than the other groups. Suarez et al. (1978) suggested that future studies investigating sensitivity to aversive events should focus more on non-student populations.

Although many studies have examined depressives' sensitivity to aversive events on a physiological level, little has been done to investigate this sensitivity on a behavioral level. Suarez et al. (1978) represent the only study that has examined depressed subjects' responding in reaction to an aversive stimulus. The researchers examined passive and active avoidance responding to a loud buzzer. During the active avoidance task, correct responses to a categorical task led to avoidance of the loud buzzer. During the passive avoidance task, "no response" led to avoidance of the loud buzzer. When depressed and nondepressed subjects were compared on the two tasks, depressed subjects demonstrated superior passive avoidance learning of the task. The only difference between the two groups on the active avoidance task suggested that depressed subjects tended to make more errors than nondepressed subjects. In addition, the authors found that depressed subjects tended to rate the buzzer as more aversive than nondepressed

subjects. These results indicate that depressed subjects are more sensitive to aversive events than normals and demonstrate different behavioral response patterns. These results also support the contention of Carson and Carson (1984) that an excessive reactivity to aversive events may lead to the development of a depression strategy, i.e., increased passive avoidance responding.

Statement of Purpose

Aversive events have been hypothesized as having a central role in many conceptualizations of depression. Paykel and his associates (Paykel, 1982; Paykel et al., 1969) have given stressful life events an etiological role in the development of depression. Similarly, Lewinsohn and his colleagues (Lewinsohn et al., 1969; Lewinsohn & Hoberman, 1982) have proposed that aversive antecedent events lead to a depressive episode due to a low rate of response-contingent reinforcement and a high rate of aversive or unpleasant events. Ferster (1973) views depressive behaviors as aversively-motivated behaviors, i.e., depressive behaviors are a result of aversive stimuli presentation, thereafter producing termination of aversive events. Thus, depressive behaviors are of the escape/avoidance nature. Researchers Biglan (Biglan et al., 1985) and Coyne (1976) have examined the aversive impact of depressive behaviors on the environment in an effort to determine what is maintaining depressive behaviors. Recently, Lewinsohn (Lewinsohn et al., 1985) has proposed an integrative theory of depression in which sensitivity to aversive events may serve as a predisposing factor in the development of a depressive episode. Another recent hypothesis suggests that the experience of a depressive episode somehow changes the

individual so that future episodes of depression are more likely to occur, i.e., the scar hypothesis (Zeiss & Lewinsohn, 1987). Lewinsohn's views are in contrast to previous views that sensitivity to aversive events is a correlate of depression. One methodology by which to separate the correlate and predisposing-scar views is to test both current depressives and remitted depressives on the same task.

Sensitivity to aversive events by depressives has been examined physiologically and behaviorally. The physiological reactions of depressed persons are much greater than control subjects in response to stimuli such as shock (Lewinsohn et al., 1973), loud noises (Suarez et al., 1978), negative feedback (Gatchel et al., 1977), and negative statements (Suarez et al., 1978). GSR recordings indicated greater arousal by depressed subjects in reaction to these aversive stimuli. It has been assumed that this increased sensitivity is a result of the depression phenomenon or another correlate of depression such as negative cognitions. Unlike negative cognitions and social skills deficits, sensitivity to aversive events has not been examined in depressed subjects in symptomatic and asymptomatic conditions (i.e., remitted).

Very little research has been conducted with regard to depressives' sensitivity to aversive events on a behavioral level. Suarez et al. (1978) has examined depressed subjects' passive and active avoidance in response to an aversive stimulus. Depressed subjects demonstrated superior passive avoidance when compared to normal controls. The data suggested that depressed persons respond to aversive stimuli by not

responding, i.e., increased avoidance or escape responses. Since no research has been conducted on depressed subjects in symptomatic and asymptomatic conditions (remitted), it has been assumed that increases in passive avoidance responses are a result of the depression phenomena and are not characteristic of persons at risk for depression.

Research evidence supports the view that depressed persons exhibit greater autonomic arousal to aversive stimuli than nondepressed persons. Clearly, more research needs to be conducted using a clinical population with more stringent diagnostic criteria. Since some researchers view the interpersonal context as critical in understanding depressive phenomena (Biglan et al., 1985; Coyne, 1976; Lewinsohn, 1974), depressed subjects' sensitivity to aversive social situations needs to be examined on a physiological level. Although little research has been conducted on depressives' sensitivity to aversive events on a behavioral level, this area of research may greatly increase our understanding of how depressed persons behave in response to aversive events.

Three main views have emerged regarding depressives' sensitivity to aversive events. The most widely held view proposes that this sensitivity is a correlate of depression. Many may hold this view by default since no studies have examined sensitivity to aversive events in depressed and remitted depressd populations. If sensitivity to aversive events were found in remitted depressives, then the argument could not be made that sensitivity is only a correlate of current depression. A second alternative would be that an episode of depression somehow changes the person's responding in such a way that future episodes of

depression are much more likely to occur, i.e., leaves a "scar" (Zeiss & Lewinsohn, 1987). It should be noted that the scar hypothesis has not been demonstrated empirically. Lewinsohn et al. (1985) have proposed a third view that sensitivity to aversive events represents a predisposing factor in the development of a depressive episode. The predisposing view can only be empirically addressed by longitudinal studies. If sensitivity to aversive events were found in remitted depressives, this finding would not conclusively demonstrate that this sensitivity was a predisposing factor or a "scar." Only prospective studies that followed individuals over time could help untangle the scar hypothesis from the predisposing view of sensitivity to aversive events. It is presumed that increased sensitivity to aversive events is a result of the learning history of the individual. The main issue revolves around when did this learning occur, during a depressive episode or prior to a depressive episode. The first step in addressing these questions might be to examine sensitivity to aversive events in depressed and remitted depressed subjects. This research would allow a separation between the correlation hypothesis on the one hand, and the predisposing-scar hypotheses on the other hand. Since many researchers have suggested that the reason that stressful or aversive life events are instrumental in precipitating a depressive episode is due to an increased sensitivity to aversive events, this differential sensitivity between depressives and normals needs to be examined empirically.

One hypothesis in the present study was that currently depressed individuals would demonstrate greater arousal on GSR recordings than normal controls in response to negative social statements. No differences were expected between depressed subjects and normal controls on positive and neutral social statements. This finding would be supportive of the view that sensitivity to aversive events is a correlate of depression. A second hypothesis was that remitted depressed subjects would not show greater arousal to negative social statements on GSR recordings when compared to normal controls. Similarly, no differences were expected between remitted depressed subjects and controls in reactions to positive and neutral social statements. This finding would be supportive of the view that sensitivity to aversive events was a correlate of depression. If differences were found between remitted depressed and normal control subjects on reactions to negative social stimuli, this finding would be supportive of the predisposing-scar hypotheses.

On a behavioral task involving positive reinforcement, it was hypothesized that depressed subjects and controls would not differ on a measure of subsequent extinction, i.e., both groups would persist in responding equally in this condition (based on results of pilot study, Appendix A). On a behavioral task involving a response cost condition, however, it was predicted that depressed subjects' responding would extinguish more quickly than controls in extinction. The acquisition phase of the response cost condition was similar to the active avoidance task of Suarez et al. (1978). The extinction component of the response cost condition was similar to the passive avoidance task of Suarez et

al. (1978). This prediction was based on the results of this author's pilot study (Appendix A). This finding would have been supportive of the view that sensitivity to aversive events (extinction phase of the response cost condition) was a correlate of depression. No differences were expected between depressed and controls on the acquisition phases of the positive reinforcement or response cost conditions.

A related hypothesis was that remitted depressed subjects and controls would not differ on the acquisition or extinction measures in either the positive reinforcement or response cost conditions. This finding would support the view that sensitivity to aversive events was a correlate of depression. If differences were found between remitted depressed subjects and controls on an extinction measure of the response cost condition, this finding would have been supportive of the predisposing-scar hypotheses.

It was predicted that depressed subjects would report having experienced more life events in the past six months and more unpleasant events in the past thirty days than normal controls and remitted depressed subjects. This finding would corroborate previous findings in the literature. If differences were found between remitted depressed subjects and controls on sensitivity to aversive events, then the relationship between the number of life events and unpleasant events to this sensitivity could be examined.

CHAPTER II

METHOD

Subjects

Subject Selection

Female volunteers were recruited from the surrounding community via mental health professional referrals and through local newspaper and television announcements. Recruitment efforts were targeted toward individuals who were currently depressed, had been depressed in the past, and had never been depressed. Subjects were required to be 18 years of age or older, and not currently taking any psychotropic medications. A total of 127 females contacted the UNCG Psychology Clinic to get more information about the study. After a brief telephone interview screening, 33 subjects did not qualify or were not interested in participating in the experiment.

The remaining 94 subjects signed a consent form (Appendix B) for the assessment phase of the study. Subjects completed the Beck Depression Inventory (BDI; Beck, Mendelson, Mock, & Erbaugh, 1961; Appendix C) and the Depression Scale of the Minnesota Multiphasic Personality Inventory (MMPI-D; Hathaway, 1946; Appendix D). For inclusion into the currently depressed group, subjects had to receive a score of 20 or above on the BDI and obtain a raw score of 29 or above on the MMPI-D. Inclusion criteria for the remitted depressed and control

groups consisted of a score of 10 or below on the BDI with no ceiling score on the MMPI-D. Sixteen subjects did not meet the specified criteria on the BDI for inclusion in the study. These subjects were verbally debriefed, thanked for their participation, and offered a list of referrals for treatment (Appendix E).

Final Sample

The remaining 78 subjects were interviewed with abbreviated formats of the Schedule for Affective Disorders and Schizophrenia (SADS; Endicott & Spitzer, (1978) and the Schedule for Affective Disorders and Schizophrenia-Lifetime (SADS-L; Spitzer & Endicott, 1979). Two trained clinical graduate students conducted the interviews. The SADS interview provided a standard set of questions and probes that enabled the interviewer to elicit information in formulating a DSM III-R (APA, 1987) diagnosis of Major Depression and/or Dysthymic Disorder. The SADS-L interview is very similar to the SADS but enabled the interviewers to probe for past episodes of depression and assess if the depressed symptoms would have warranted a diagnosis of Major Depression and/or Dysthymic Disorder (i.e.,if the depressive symptoms lasted for 2 or more years). Utilizing the combined SADS and SADS-L formats (Appendix F) allowed the interviewers to arrive at a diagnostic label of current depression, remitted depression, or no depression (i.e., no current or past episode of depression that would have met DSM III-R criteria). Eleven subjects did not fall into any of the three diagnostic categories. These subjects were verbally debriefed, given a token fee of $5 for their participation, and offered a referral list for treatment.

The interviews were audiotaped as well as recorded on the forms of the combined SADS and SADS-L format. To check on category agreement, an advanced clinical graduate student listened to 50% of the tapes and categorical reliability of 100% was obtained. The categories consisted of currently depressed, remitted depressed, no diagnosis, and a mixed category (i.e., subjects who might have had some depressive symptoms but not severe enough to warrant a diagnosis of depression). Interviewers also completed the SAD PERSONS scale (Patterson, Dohn, Bird, & Patterson, 1983; Appendix G) to assess for suicide potential. Subjects had to receive a score of 4 or below on this scale to be included in the study. All subjects received a score of 4 or below on this scale.

Sixty-seven subjects began the experimental phase of the study. Seven subjects did not learn the computer task, and their data were not included in subsequent analyses. Three of these subjects were in the currently depressed group, two were in the remitted group, and two were in the control group. A total of 60 subjects completed all phases of the experiment (20 were currently depressed, 20 were remitted, and 20 were controls). Subjects were paid a token fee of $15 for their participation, verbally debriefed, and offered a treatment referral list.

Subject Characteristics

An analysis of variance on subjects' age (Table 1) indicated a nonsignificant main effect for group, $F(2,57)=.240$, $p > .7893$. Currently depressed subjects had a mean age of 38.2, remitted subjects had a mean age of 36.2, and control subjects had a mean age of 36.8. An

analysis of variance on subjects' BDI scores (Table 2) indicated a significant main effect for group, $F(2,57)=125.27$, $p < .0001$. Currently depressed subjects had significantly higher BDI scores ($x=30.30$) than remitted subjects ($x=6.25$) and control subjects ($x=5.40$). There were no significant differences between remitted depressed and control subjects (Table 3) on the BDI. An analysis of variance on subjects' MMPI-D scores (Table 4) indicated a significant main effect for group, $F(2,57)=75.26$, $p < .0001$. Currently depressed subjects had higher depression scores ($x=38.50$) than remitted depressed ($x=22.90$) and control subjects ($x=21.05$). There were no significant differences between remitted and control subjects on the MMPI-D (Table 5). Demographic and diagnostic information for all subjects can be found in Table 6.

Experimenters

The experimenters included the principal investigator and two undergraduate females. The principal investigator was in direct contact with the subjects during the screening process, conducted interviews, trained the two assistant experimenters, assigned subjects randomly to experimental conditions for the learning and social tasks, ran 44 of the subjects, and verbally debriefed all subjects.

The assistants who were blind to the experimental hypotheses ran 16 subjects. S.O. ran 6 depressed, and 4 remitted subjects. L.B. ran 3 remitted, 2 depressed, and 1 control subject. The two assistants were trained by the principal investigator in administering the tasks. Training was provided in two 2-hour sessions. Supervision occurred

during the course of the study via one-way mirrors in the lab rooms. The assistants were directly supervised for the running of each subject in the experiment. The principal investigator ran 13 depressed, 12 remitted, and 19 control subjects.

General Procedure

At the time of the experimental phase, consent for participation (Appendix H) was obtained. Subjects were asked to complete the Unpleasant Events Schedule (UES;Lewinsohn, 1978; Appendix I) and the Social Readjustment Rating Scale (SRRS; Holmes & Rahe, 1967; Appendix J). These measures assessed the frequency and experienced aversiveness of unpleasant events and life events in the lives of subjects prior to this study. Both measures have been used extensively in the literature to assess unpleasant and life events in depressed and normal subjects. The SRSS provided a quantitative measure of stressful life events over the past six months that require or signify change in ongoing adjustments. While the SRRS has a larger representation of discrete, one-time events, the UES provided a measure of events that may represent ongoing sources of distress. In addition, the UES provided a combined measure of the frequency of aversive events as well as subjective experience of those same events for the past 30 days.

The order of the social and learning tasks was counterbalanced across subjects. Subjects completed both tasks in one session. Upon completion of both tasks, subjects were verbally debriefed, given a token fee of $15, and offered a treatment referral list.

Social Task

Design

For the baseline skin resistance level (SRL) measure, a 3(diagnostic group) x 2(occasion) was employed. The first factor is a between-subjects factor and represented the currently depressed, remitted depressed, and control groups. The second factor is a within-subjects and represents SRL occasions, baseline one and baseline two. In this particular study, SRL represents the autonomic arousal level without any explicit stimulus presentation. For the Galvanic Skin Response (GSR) measure, a 3(diagnostic group) x 2(occasion) was employed. The second factor is a within-subjects factor and represents responding to positive and negative social scenes. In this study, GSR represents autonomic arousal level in response to a stimulus presentation. The design for the Depression Adjective Checklist (DACL) and pleasantness rating scale was similar except that the number of occasions varied.

Setting and Apparatus

Subjects were seated in a lounge chair in one of the laboratory rooms on the third floor of the Eberhart Building. Subjects were seated to the left of the apparatus out of visual range of the computer monitor. Electrodermal responding was recorded using the biofeedback module (M160) of the Biotext Autogenic Systems Instrument connected to an IBM personal computer. The M160 allowed the measurement of SRL responding and the measurement of GSR reactions to specific stimuli. The M160 does not allow for the simultaneous recording of SRL and GSR

measurements. It should be noted that generally SRL refers to baseline levels of autonomic arousal levels whereas GSR generally refers to responses over and above that baseline level. The SRL is typically utilized as a measure of skin conductance whereas the GSR is utilized as a measure of skin resistance. Resistance and conductance are defined as reciprocals of each other and represent the same phenomenon regarding the electrical activity of the skin.

During GSR recording, 2.5 volts dc current continuously passed through the sensors. During GSR recording, 5 microamps of current passed through the two sensors. By means of manually adjusting the potentiometer, baseline recordings could be made. The experimenter adjusted the potentiometer in order that the subjects' SRL hovered near 0 at all times within .5 umho. For GSR recordings, the M160 automatically centered each subjects' beginning level and measured any deviation over and above that baseline. In other words, the M160 measured GSR reactions above and beyond each subject's own baseline. In addition, the M160 contained a stimulus marker which was activated at the beginning and end of the presentation of a social scene. During GSR recording, the M160 provided a digital readout measurement every .50 sec at 25 Kohms. Experimenters recorded the highest GSR that occurred 5 sec after stimulus offset. In addition, a digital printout of each session was obtained that graphically displayed the GSR measurements and the onset and offset of each stimulus presentation. The digital printout was utilized as a check on the manual recordings made by the experimenters. The height of the highest GSR recording made within 5 sec of the offset of the stimulus was measured via a ruler to confirm

the recordings made by the experimenters. In the case of conflictual recordings, the digital printout measurement was utilized. The M160 was calibrated prior to the running of each subject. A one-way mirror in the room allowed for observations of the experimenters' execution of the task.

The social scenes were presented via an audiotape. The social interaction scenes (Appendix K) were normed by a group of female volunteers (Appendix L) and rated on positive, neutral, and negative dimensions. There were six positive, six negative, and six neutral social interaction scenes.

Procedure

Subjects were informed of the general nature of the task (Appendix M) The subject's nondominant second and fourth fingers were cleansed with an alcohol solution as well as the two sensors. The sensors were firmly attached with velcro fasteners within approximately 5 cm of the end of the fingers. Subjects were asked to get comfortable in the chair but to avoid unnecessary and excessive movements. A baseline (SRL) recording was obtained for the first ten minutes. Subjects were then asked to complete the DACL (Lubin, 1967; Appendix N) in order to assess their mood.

For the next ten minutes, subjects were asked to listen to an audiotape of social scenes and to imagine themselves in the situation. The social scenes were presented in the following blocks with the order of the positive and negative scenes counterbalanced across subjects: three neutral scenes, six positive scenes, three neutral scenes, six

negative scenes. After each block of scenes, subjects were asked to complete a DACL and a 1-7 pleasantness rating scale (one being very pleasant, four being neutral, and seven being very unpleasant) on the scenes they had heard.

Another SRL recording was obtained for the last ten minutes. At the end of the SRL recording, subjects were asked to complete a DACL and a pleasantness rating of the entire task.

Dependent Variables

For the two baseline (SRL) occasions, the reading on the potentiometer was taken at the end of the ten minute baseline period and recorded. Thus, these readings represented autonomic arousal levels in the absense of any explicit stimulus presentation. The highest GSR recording that occurred within 5 seconds after the presentation of each social scene was recorded. These responses were averaged to get a mean GSR reaction for each block of scenes. For subsequent analyses, the mean GSR reaction for the neutral block of scenes was subtracted from the mean GSR reaction for the positive or negative block of scenes that followed that particular block of neutral scenes. Thus, any increases in autonomic arousal above what was obtained in response to neutral scenes could be determined.

There were six DACL's completed during the task: after the first baseline, after a neutral block of scenes, after a positive block of scenes, after a neutral block of scenes, after a negative block of scenes, and after the second baseline. In short, there were five pleasantness ratings obtained, one after each block of social scenes and

one rating of the entire social task.

Learning Task

Design

The experimental design was a 3(diagnostic group) x 2(condition) between-subjects. The first factor represents the currently depressed, remitted depressed, and control groups. The second factor, also a between-subjects factor, refers to the two acquistion conditions, Positive Reinforcement Only (PRO) and Positive Plus Response Cost (RC). For DACL and pleasantness ratings analyses, a within-subjects factor of occasions was added.

Setting and Apparatus

Subjects were seated in a lab room on the third floor of the Eberhart Building. The apparatus consisted of a computer monitor and two telegraph keys mounted on a small board. The monitor and telegraph keys were connected to a microcomputer in an adjoining room. During the experiment, the computer monitor displayed a 5 x 5 matrix of 4 x 3.5 cm boxes with a small plus (+) sign in one of the boxes. The two adjoining rooms contained a one-way mirror which was used to monitor and observe the subjects.

Procedure

Experimental procedures in this study were very similar to those described in a study by Schneidmiller (1987). The present study represented the following changes in methodology. First, participants completed a run in one 64-minute session. In this respect, subjects were not exposed to a break in sessions which might have signalled a

possible change in contingencies. Secondly, the learning task was shortened from 96 minutes to 64 minutes. The extinction phase remained 32 minutes in length, but the acquisition phase was shortened from 64 minutes to 32 minutes. Most subjects (pilot study, 1988; Schneidmiller, 1987) were able to learn the task (i.e., sensitive to the changing schedules) in 8 minutes or less. The following description of the procedure closely resembles that provided by Schneidmiller (1987).

Subjects were run individually for 64 minutes with no break. At the beginning of the task, subjects were given an instruction sheet (Appendix O) which was read aloud by the experimenter. Subjects were given the same general instructions with subjects in the RC condition receiving the following additional instructions:

> It is important to follow instructions carefully
> since failure to earn any points during a one minute
> period will result in a loss of a half point
> from your total.

Subjects completed a pre-experimental questionnaire (Appendix P) and a DACL to assess their mood.

Acquisition Phase

The first 32 minutes of the learning task comprised the acquisition phase. After reading the instructions, the experimenter left the room and started the session via the microcomputer. At the beginning of the session, the plus sign appeared in the upper left-hand corner of the matrix on the computer monitor. Key presses on the right key moved the

plus sign right one column and presses on the left key moved the plus sign down one row. Movements were scheduled on a MULT DRL 5 sec/FR 18 schedule which alternated every 2 minutes. During the DRL, the first key press after 5 seconds since the previous response would move the plus sign. If a key press was made before 5 seconds had elapsed, the plus sign would not move. During the FR, presses of either key counted towards a single ratio, with the 18th key press effecting the movement of the plus sign. If the key presses moved the plus sign outside the matrix, the plus sign was reset to the upper left-hand box. During the DRL, a 4.5 cm x 1.5 cm yellow box appeared on the lower side of the matrix.

A similar blue box appeared on the lower right side of the matrix during the FR. If subjects did not make a point within the first 2 minutes of the session, the session was stopped and the instrucions were repeated once.

When the plus sign reached the bottom right-hand corner, subjects would receive a message on the monitor instructing them to press both keys to receive a point. When subjects did this, a reinforcer message appeared on the monitor indicating the award of one point and the total number of points accumulated. Subjects in the RC condition who failed to make a point within one minute received an auditory signal and a brief message which indicated the loss of a half point, the number of total points earned, total points lost, and net points earned.

Extinction Phase

After the first 32 minutes of acquistion, the schedule changed to extincion. Subjects were not advised nor signalled of this change in contingencies. During the extincion phase, the schedule lights continued to alternate as they did during the acquistion phase. The plus sign did not move regardless of key press patterns and no points were awarded or lost. If subjects questioned the experimenter, they were instructed that the session was not over and that the computer was not broken. At the end of the task, subjects were asked to complete a DACL, a pleasantness rating of both the acquistion and extinction phases, and a post-experimental questionnaire (Appendix Q). For the pleasantness rating, subjects were asked to rate the first and second halves of the task. The first half corresponded to the acquisition phase and the second half corresponded to the acquisition phase. At the end of the study, two $25 prizes were awarded. One prize was awarded based on a random drawing of all subjects. The other prize was awarded based on the highest number of points earned in the task. Subjects were informed that the two prizes would be awarded after they had completed the learning task.

Dependent Variables

To measure subjects' schedule acquisition, the ratio of ND/ND+D during the last half of acquisition was used where ND=the number of nondominant schedule responses and D=the number of dominant schedule responses. For all subjects, the dominant schedule was the FR and the nondominant schedule was the DRL. Utilizing the ratio measure, schedule

acquisition scores can vary from 0 to .5. Arbitrary criteria were used to define differential responding. Differential responding to the schedules was defined by a ratio value of < .15 and nondifferential responding was defined by a ratio value > .35. For example, suppose a subject made 218 responses on the DRL schedule (nondominant) during the last half of acquisition. This sum would be divided by the 218 DRL responses plus 4,581 responses made on the FR schedule (dominant). This would yield an acquisition ratio of .045. To measure subjects' extinction effects, the ratio of D (last half of extinction) / D (last half of acquisition) was used. The greater the resistance to extinction, the closer this ratio will be to 1.0; the less the resistance to extinction, the closer this ratio will be to zero. These ratio measures have been used in other human operant studies to make the comparisons between the two types of schedules more comparable (Hayes, Brownstein, Haas, & Greenway, 1988; Schneidmiller, 1987). The criteria for differential and nondifferential responding in acquistion and for the extinction effects are those used in previous studies (e.g.,Hayes et al., 1988; Schneidmiller, 1987).

DACL scores were obtained for mood assessment prior to and immediately after the completion of the task. At the end of the task, a pleasantness rating was obtained for the first (acquisition) and last half of the session (extinction).

CHAPTER III

RESULTS

Overview

The social task addressed the question of differential responsiveness to positive, negative, and neutral social stimuli among the three experimental groups (currently depressed, remitted depressed, and controls). The learning task addressed the question of differential responding to a Positive Reinforcement only (PRO) and Positive Plus Response Cost (RC) task during acquistion and extinction among the three experimental groups.

The data from this study are presented in sections corresponding to each of the two experimental tasks. The statistical analyses and dependent variables for each task are described in that particular section. Means for each subject group can be found in corresponding tables. Summaries of all analyses and means appear in Appendix R. Figures appear in Appendix S.

Social Task

Each analysis of the social task utilized a 3 x 2 factorial design. The first factor (between) represents the three experimental groups (currently depressed, remitted depressed, and controls) and the second factor (within) represents the number of measurement occasions. Order was included as a factor in initial analyses. Order refers to the

presentation of positive or negative social scenes first and to their respective Depression Adjective Checklist (DACL) and pleasantness ratings. Since there were no significant order or order interaction effects, order was not included as a factor in these final analyses.

Baseline

Baseline levels of autonomic arousal (skin resistance level or SRL) were obtained prior to the presentation of any social scenes and again after all social scenes had been presented. Suarez et al. (1978) found that depressed subjects had higher SRL baseline levels when compared to control subjects. To determine if the three experimental groups differed on the first and second SRL occasions, an analysis of variance was conducted. The analysis of variance on the SRL scores (Table 7) indicated no significant main effects nor interaction effect. Means are presented in Table 8. Thus, there were no significant differences among the three groups on the first and second baseline SRL.

GSR

The galvanic skin response (GSR) measurement indicates an increase in autonomic arousal above subjects' own baseline levels in response to a specific stimulus. Since subjects would be expected to have higher arousal to any type of scene presented, the GSR reactions to neutral scenes were utilized as the covariate in subsequent analyses. In this respect, any increases in GSR above what was obtained in reaction to neutral scenes could be used to detect differences among the three groups on their reactions to positive and negative scenes. For the analysis of covariance, the covariate was the averaged GSR reactions to

the three neutral social scenes preceding either the positive or negative scenes that it preceded. Thus, each difference score (described below) had its own covariate, the averaged GSR to the neutral scenes that preceded that particular block of scenes, positive or negative. The analysis of covariance was conducted on the difference scores for two occasions. The first occasion represented the averaged GSR reactions to positive social scenes minus the averaged GSR reactions to the previous neutral scenes. The second occasion represented the averaged GSR reactions to the negative social scenes minus the averaged GSR reactions to the preceding neutral scenes. It was hypothesized that depressed subjects would have higher GSR reactions to the negative scenes when compared to the other two groups.

The analysis of covariance on the difference scores (Table 9) indicated a significant main effect for the covariate $F(1,56)=7.52$, $p < .01$. The main effect for occasion was significant, $F(1,56)=22.25$, $p < .001$, as well as the group x occasion interaction, $F(2,56)=8.23$, $p < .001$. The main effect for group was not significant. Means are presented in Table 10.

A Newman-Keuls analysis of the group x occasion interaction (Table 11;Figure 1) revealed that both currently ($x=1.95$) and remitted depressed subjects ($x=2.72$) had higher reactions to the negative social scenes when compared to control subjects ($x=.765$). Currently and remitted depressed subjects did not differ significantly on their reactions to negative scenes. There were no significant differences between the three groups on their GSR reactions to positive social

scenes.

DACL

To assess mood, the Depression Adjective Checklist (DACL) was administered after the first baseline, after the presentation of each of the two neutral scene blocks, after the negative and positive scene blocks, and after the second baseline recording for a total of 6 occasions. The analysis of variance on the DACL scores (Table 12) indicated a significant main effect for group, $F(2,57)=33.25$, $p < .0001$ and a significant main effect for occasion, $F(5,285)=31.66$, $p < .0001$. The group x occasion interaction was not significant. Means are presented in Table 13.

A Newman-Keuls analysis of the group main effect (Table 14;Figure 2) revealed that currently depressed subjects (x=13.81) had more depressed mood than remitted or control subjects. In addition, remitted subjects (x=8.72) had significantly more depressed mood than control subjects (x=6.84). A Newman-Keuls analysis of the occasion main effect (Table 14; Figure 3) revealed that all subjects had more depressed mood (x=14.10) after the presentation of negative social scenes. In addition, all subjects reported less depressed mood (x=7.12) after the presentation of positive social scenes. There were no significant differences among the three groups on reports of depressed mood after the presentation of neutral scenes or after baseline occasions.

Ratings

A Likert-type pleasantness rating scale (where 1=very pleasant, 4=neutral, 7=very unpleasant) was administered after the presentation of two blocks of neutral social scenes, and after positive and negative social scene blocks for a total of four occasions. The analysis of variance on the pleasantness rating (Table 15) indicated a significant main effect for occasion, $F(3,171)=243.54$, $p < .00001$. The main effect for group was marginally significant, $F(2,57)=3.03$, $p < .056$. The group x occasion interaction was significant, $F(6,171)=3.02$, $p < .0079$. Means are presented in Table 16.

A Newman-Keuls analysis of the group x occasion interaction (Table 17;Figure 4) revealed that currently depressed subjects (x=6.70) and remitted subjects (6.80) rated the negative social scene presentation as more unpleasant when compared to the ratings by controls (x=5.70). There was no significant difference between currently and remitted depressed subjects' ratings of the negative scenes. There were no significant differences among the three groups on their ratings of neutral and positive social scenes.

Overall Rating

At the completion of the social task, subjects were asked to rate the entire task on a Likert-type 1-7 pleasantness scale (where 1=very pleasant, 4=neutral, and 7=very unpleasant). The analysis of variance on the pleasantness rating of the entire task (Table 18) indicated a main effect for group, $F(2,57)=5.40$, $p < .01$.

A Newman-Keuls analysis of the pleasantness rating (Table 19;Figure 5) revealed that both currently (x=3.6) and remitted depressed subjects (x=3.2) rated the task as more unpleasant when compared to control subjects (x=2.4). Currently and remitted depressed subjects did not significantly differ in their ratings of the entire task.

Learning Task

The design for each analysis of the learning task consisted of a 3 x 2 factorial design in which the first factor (between) represents the three experimental groups and the second factor (between) represents the two conditions (Positive Reinforcement Only and Positive Plus Response Cost). The design for the DACL and pleasantness rating analyses consisted of a 3 x 2 x2 factorial design. The additional third factor (within) of occasions represents administrations times before and after the task. It was hypothesized that currently depressed subjects' responding in the response cost condition would extinguish earlier as indicated by the ratio measure of extinction effects.

Acquisition

The analysis of variance on schedule acquistion (Table 20) indicated a main effect for group, $F(2,54)=3.01$, $p < .06$ and a significant main effect for condition, $F(1,54)=9.14$, $p < .05$. The group x condition interaction was not significant. Means are presented in Table 21.

A Newman-Keuls analysis of the group main effect (Table 22;Figure 6) revealed that currently depressed subjects (x=.079) were less responsive to the changing schedules when compared to control subjects (x=.056). There were no significant differences between currently and remitted depressed subjects (x=.065) on the acquisition measure nor were there any significant differences between remitted and control subjects on schedule acquisition. A Newman-Keuls analysis of the condition main effect (Table 23;Figure 7) revealed that subjects in the PRO condition (x=.078) were less responsive to schedule changes than subjects in the RC condition (x=.055).

Due to differences among the three groups on acquisition, further analyses were conducted to ascertain where the differences occurred. Three analyses were conducted examining the total responses made during acquisition, the total number of points earned during acquisition, and the number of resets that occurred during acquisition.

Total Responses. An analysis of variance on the total number of responses made during acquisition (Table 24) indicated no significant main effect for group or condition nor was the group x condition interaction significant. Thus, the three groups did not differ significantly in the total number of responses made during acquisition.

Points. An analysis of variance on the points earned during acquisition (Table 25) indicated no significant main effect for group or condition nor was the group x condition interaction significant. Thus, the three groups did not differ significantly in the number of points earned during the acquisition phase.

Resets. An analysis of variance on the number of resets during acquisition (Table 26) indicated a significant main effect for group, $F(2,54)=4.90$, $p < .01$. The main effect for condition and the group x condition interaction were not significant. A Newman-Keuls analysis of the group main effect (Table 27;Figure 8) revealed that currently depressed subjects had more resets ($x=3.55$) when compared to remitted depressed ($x=1.35$) and control subjects ($x=1.30$). Remitted and control subjects did not significantly differ in the number of resets during acquistion.

Extinction

The analysis of variance on the extinction measure (Table 28) indicated a significant main effect for group, $F(2,54)=5.61$, $p < .05$ and a significant main effect for condition, $F(1,54)=26.06$, $p < .0001$. The group x condition interaction did not reach statistical significance. Means are found in Table 29.

A planned Newman-Keuls analysis of the group x condition interaction (Table 30;Figure 9) revealed that depressed ($x=.053$) and remitted depressed subjects ($x=.123$) were less resistant to extinction in the RC condition when compared to control subjects ($x=.501$). Currently depressed and remitted subjects did not differ significantly on the RC extinction measure. There were no significant differences between the three groups on the sensitivity to extinction measure in the PRO condition.

A graph of the raw data for the PRO and RC extinction phases (Figure 15 and 16) shows similar results to the above ratio analyses.

DACL

To assess mood, the DACL was administered before and after the learning task for a total of two occasions. The analysis of variance on the DACL scores (Table 31) indicated a significant main effect for group, $F(2,54)=68.88$, $p < .0001$; condition, $F(1,54)=5.35$, $p < .05$; and occasion, $F(1,54)=133.77$, $p < .0001$. There was a significant group x condition interaction, $F(2,54)=8.10$, $p < .0008$; a significant occasion x condition interaction, $F(1,54)=4.19$, $p < .05$; and a significant group x occasion interaction, $F(2,54)=4.15$, $p < .05$. The triple interaction of group x occasion x condition was not significant. Means are presented in Table 32.

A Newman-Keuls analysis of the group x occasion interaction (Table 33;Figure 10) revealed that prior to the task, currently depressed ($x=13.40$) and remitted depressed subjects ($x=7.40$) reported more depressed mood than control subjects ($x=4.35$). In addition, currently depressed subjects reported significantly more depressed mood than remitted depressed subjects. At the completion of the task, currently depressed subjects ($x=23.10$) had higher reports of depressed when compared to remitted depressed ($x=12.80$) and control subjects ($x=11.00$). Remitted and control subjects did not differ significantly in their reports of depressed mood at the end of the task.

A Newman-Keuls analysis of the group x condition interaction (Table 34;Figure 11) revealed that in the PRO condition, currently depressed subjects (x=18.10) reported more depressed mood than remitted depressed (x=7.05) and control subjects (x=8.20). There were no significant differences between the remitted depressed and control subjects' reports of depressed mood. In the RC condition, both currently (x=18.40) and remitted depressed subjects (x=13.15) had more depressed mood when compared to control subjects (x=7.15). In addition, currently depressed subjects reported more depressed mood than remitted depressed subjects in the RC condition.

A Newman-Keuls analysis of the occasion x condition interaction (Table 35;Figure 12) revealed that the subjects reported more depressed mood after the completion of both the PRO and RC conditions.

Ratings

At the end of the learning task, subjects were asked to rate the first part of the task (acquistion) and second part of the task (extinction) on a 1-7 pleasantness scale (where 1=very pleasant, 4=neutral, and 7=very unpleasant). Thus, the two occasions represent the ratings of acquisition and extinction. The analysis of variance on the pleasantness rating (Table 36) indicated a significant main effect for occasion, $F(1,54)=268.82$, $p < .0001$. No other main effects or interactions attained statistical significance. Means are presented in Table 37.

A Newman-Keuls analysis of the occasion main effect (Table 38;Figure 13) revealed that subjects regardless of which group or condition they were in, rated the extinction phase (x=6.18) as more unpleasant than the acquisition phase (x=2.77).

Ancillary Measures

UES

The Unpleasant Events Schedule (UES) was given to subjects to assess their experienced aversiveness of more common unpleasant events that had occurred 30 days prior to this study. The analysis of variance on the UES scores (Table 39) indicated a significant main effect for group, $F(2,57)= 5.25$, $p < .01$.

A Newman-Keuls analysis of the group main effect for UES scores (Table 40;Figure 14) revealed that depressed subjects (x=3.53) experienced and rated more events as aversive when compared to remitted (x=3.09) and control subjects (x=2.89). There was no significant difference between remitted and control subjects on UES scores.

SRRS

Subjects completed the Social Readjustment Rating Scale to assess the number of life events they had experienced in the last six months. The analysis of variance on the SRRS (Table 41) did not reveal any significant main effect for group. Thus, the three groups did not significantly differ on the number of life events experienced in the past six months.

Correlations

An additional correlational analysis was conducted to assess the relationship between subjects' scores on the two hypothesized aversive components of the two tasks. These were the difference scores for the social task (GSR responses to negative scenes minus GSR responses to neutral scenes) and the ratio extinction measure for the RC extinction phase. A high correlation between these two variables would indicate cross-task sensitivity to aversive events and a low correlation would indicate that sensitivity to aversive events is more task-specific. The Pearson product-moment correlational analysis indicated no significant correlations across individuals or among groups (Table 42). Thus, it would appear that responding to one type of task (social) is not highly associated or predictive of responding on the other task (learning).

CHAPTER IV

DISCUSSION

The present study was designed to assess sensitivity to aversive events in currently depressed and remitted depressed subjects. The two tasks utilized (social and learning tasks) contained an aversive component to measure sensitivity on physiological and behavioral levels. The social task consisted of the presentation of neutral, positive, and negative social interaction scenes. Galvanic skin response (GSR) recordings were taken to assess differential responding among the three experimental groups in reaction to the social scenes. The learning task consisted of acquisition under two operant conditions, positive reinforcement only (PRO), and positive plus response cost (RC) followed by extinction. The RC condition consisted of an additional aversive component involving a time contingency to make points and was considered to be more aversive than the PRO condition.

According to the correlate view of sensitivity to aversive events, depressed subjects were predicted to have higher GSR reactions to negative scenes. No differences were expected between remitted depressed and control subjects in reactions to negative social scenes. The predisposing-scar hypotheses predicted that remitted depressives would have GSR reactions similar to currently depressed subjects to negative social scenes. With regard to the learning task, the correlate

view predicted that only currently depressed subjects would show greater extinction effects in the RC condition. No differences would be expected between remitted depressed and control subjects according to the correlate view. The predisposing-scar hypotheses would predict that both currently depressed and remitted depressed subjects would show greater extinction effects in the RC condition when compared to control subjects. In general, if the results of remitted depressed subjects' on the two tasks were similar to controls, then the correlate view of sensitivity to aversive events would receive more support. If remitted depressed and currently depressed subjects had similar results, then the predisposing-scar hypotheses would receive more support. Overall, results of the present study tended to support the predisposing-scar hypotheses. In addition, the passive avoidance model of depression offers a framework to understand how this greater sensitivity to aversive events may develop.

Social Task

Results of the social task indicated that currently depressed and remitted depressed subjects had higher GSR reactions to negative social scenes when compared to control subjects. This finding replicates higher GSR reactions to aversive events by depressed subjects when compared to control subjects in previous studies (Golin et al., 1977; Lewinsohn et al., 1973; Suarez et al., 1978). The present study represents the first experimental demonstration of greater physiological sensitivity to aversive events in remitted depressed subjects.

The baseline skin resistance level (SRL) analysis failed to find any differences among the three experimental groups. In contrast, Suarez et al. (1978) found that depressed subjects had higher SRL during two ten-minute baseline periods. The present study utilized a somewhat different methodology from that used by Suarez et al. (1978). The present study utilized a biofeedback module with separate SRL and GSR capacity while Suarez et al. (1978) used a Grass polygraph. The present study's finding is similar to the results of the Lewinsohn et al. (1973) study which found that depressed subjects did not differ significantly from controls in autonomic arousal prior to and immediately after shock administration. In addition, Zuckerman et al. (1968) did not find any differences between subjects with depressed affect and subjects with hostile or anxious affect on SRL. The lack of differences among the three groups on baseline SRL in the present study suggests that subjects' autonomic arousal is specific to experimental stimuli presentation and does not represent an overall, heightened autonomic arousal level.

The results using the Depression Adjective Checklist (DACL) revealed that depressed subjects reported more depressed mood than remitted depressed and control subjects across all administrations. In addition, remitted depressed subjects had significantly more depressed mood than control subjects. For the social task in general, currently and remitted depressed subjects tended to report more depressed mood. All subjects reported more depressed mood after the presentation of negative social scenes. These results suggest that elements of the social task did differentially affect mood ratings for all subjects and

produced more depressed mood in currently and remitted depressed subjects. However, only currently and remitted depressed subjects' mood data corresponded with higher GSR reactions to negative social scenes. Although control subjects reported more depressed mood after the presentation of negative social scenes, their GSR reactions to those scenes were significantly lower than depressed and remitted subjects. Thus, there may be a relationship between the experience of listening to negative social scenes, exhibiting higher GSR reactions, and subsequent reporting of depressed mood. The present study represents the first attempt to assess both mood changes and physiological reactions to negative social events.

On the pleasantness rating, currently and remitted depressed subjects rated the negative social scene presentation as more unpleasant when compared to control subjects. These results are similar to the findings of Suarez et al. (1978) which indicated that currently depressed subjects rated the taped statements as more aversive than control subjects. In the present study, there were no differences among the three groups on their pleasantness rating of neutral and positive social scenes. These results suggest that both currently and remitted depressed subjects experienced the negative social scenes as more aversive than control subjects.

The question arises as to why currently depressed and remitted depressed subjects exhibited more autonomic arousal and reported less pleasant ratings in reaction to negative scenes. The reactions of currently depressed subjects are addressed first. For currently

depressed subjects, greater physiological sensitivity has been demonstrated using various types of aversive stimuli (shock, negative feedback, and Beck Depression Inventory statements). It is not surprising that currently depressed subjects also show reactions to negative social situations given the importance of social context to depression. The importance of social contexts to depression has been posited by many theorists. Lewisohn proposed in earlier writings (1969, 1973) that depressed individuals had deficits in social skills. Coyne (1976) has demonstrated that the behavior of depressed individuals affects others in adverse ways. Klerman (1974) views depression in an interpersonal and psychosocial context. Certainly, the social context of depression remains an important consideration in the maintenance, if not the etiology, of depression. Many therapies have developed that address the social context of depression (social skills training, pleasant events scheduling, and interpersonal therapy).

The disruption of social behavior in depressed individuals is often one of the first signs of a depressive episode. Avoidance of and withdrawal from socially-related events is one of the hallmarks of depressive behavior. The exact cause of these processes in depression is not clear since it has been demonstrated that depressed individuals do not have easily identifiable social skills deficits when compared to other psychiatric groups. At least in a current episode of depression, these individuals do show marked changes in their social interactions.

Given that depressed individuals often avoid socially-related events, the passive avoidance model of depression (Suarez et al., 1978) may aid in understanding how a greater physiological sensitivity to negative social scenes may develop. The passive avoidance model of depression proposes both classical and operant conditioning processes. Suarez et al. (1978) have proposed that aversive stimuli may elicit greater physiological arousal in currently depressed subjects when compared to normal controls. In the passive avoidance model, aversive stimuli are conditioned to external situational cues in addition to internal response-produced cues (e.g., anxious feelings). In this model, depressives demonstrating passive avoidant or behavioral suppression response patterns (operant conditioning) may successfully terminate response-produced cues for increased arousal associated with aversive stimulation. However, this response strategy does not remove the individual from other environmental stimuli (i.e., the original situation in which aversive stimulation occurred) which has been associated with aversive stimuli. In passive avoidance conditioning, aversive stimuli cannot be completely avoided as is possible in active avoidance. Using this model, it could be hypothesized that depressed individuals may not respond in social situations (e.g. may not engage in conversation) but still experience increased arousal by remaining in the social setting where aversive consequences occurred. For example, a depressed person has to attend an office party. At this party, there is an individual that has often made sarcastic comments to the depressed person. In the past, the depressed person has been able to withdraw from the situation which reduced the aversiveness of the interaction.

At the party, the depressed person cannot withdraw physically from the situation but can terminate their conversation with this aversive person. However, the depressed person is still in their presence which may elicit greater autonomic arousal. In the present study, the negative social scenes may have elicited conditioned emotional responses that are similar to ones they have experienced in the past.

Since in this study, remitted depressed subjects demonstrated greater physiological sensitivity to negative social scenes than control subjects, the case cannot be made that this greater sensitivity is a correlate of current depression only. If this sensitivity was a correlate of current depression only, then remitted depressed subjects would not have responded similarly to currently depressed subjects. These results suggest support for the predisposing-scar hypotheses. However, neither the predisposing nor the scar hypotheses can be completely supported alone nor ruled out by this study. It cannot be determined if the remitted depressed subjects exhibited greater physiological sensitivity to aversive events prior to developing an episode of depression (predisposing) or developed this sensitivity during a depressive episode (scar). In the predisposing view, it could be speculated that this greater physiological sensitivity is due to biological and/or early learning history factors. The autonomic nervous system of these individuals could be predisposed to greater arousal in general which would affect their conditioning histories. Perhaps early experiences involving aversive stimulation in a social relations context might predispose an individual to acquire conditioned emotional responses and passive avoidant behavior patterns commonly observed in

depressed individuals. This type of learning history could accumulate until the person experiences a clinical episode of depression. With regard to the scar hypothesis, a similar conditioning process could occur during a depressive episode. Depressed individuals may demonstrate behavioral suppression responses (i.e., passive avoidance) in reaction to aversive social situations, but may still acquire conditioned emotional responses (i.e., increased arousal or anxiety) since they remain in the social situation. To distinguish between the predisposing and scar hypotheses, subjects would have to demonstrate this sensitivity prior to a depressive episode (predisposing) or to not demonstrate this sensitivity until a depressive episode occurred (scar). Even with the latter outcome, a biological and/or earlier learning history explanation could not be ruled out if the depressive episode activated the greater sensitivity. The processes involved in the predisposing and scar hypotheses may be similar but necessarily involve different time frames for activation.

The question remains as to why a past episode of depression produces the present greater physiological sensitivity to aversive events in remitted depressed subjects. Similar aversive stimuli to those responsible for the initial conditioning experience may evoke similar physiological reactions in the remitted depressed. These aversive social stimuli may not be salient enough to influence the development of a depressive episode but certainly affect reports of depressed mood in remitted depressed subjects.

Learning Task

The results of the acquisition phase revealed that currently depressed subjects were less responsive to the changing reinforcement schedule when compared to remitted depressed and control subjects across conditions. Further analyses were conducted to discover what depressed subjects did differently. The analysis of the total responses made during acquisition analysis indicated that all subjects made similar numbers of responses during acquisition. Similarly, no differences were found among the three groups on number of points received during acquisition. However, the resets analysis indicated that currently depressed subjects had more resets when compared to remitted depressed and control subjects. Resets are very similar to errors made since the plus sign moves to the beginning of the maze again. In this respect, these results are very similar to those of Suarez et al. (1978) who found that currently depressed subjects exhibited more errors in the active avoidance condition when compared to control subjects. In addition, Suarez et al. (1978) found that depressed subjects learned the active avoidance task, the only difference being the greater number of errors. Similarly, in the present study, currently depressed subjects did learn the task, but evidenced significantly more errors than the other two groups. Impairments in learning new tasks have been demonstrated in currently depressed individuals (Miller, 1975). Mechanisms for this impairment have ranged from motivational to biological factors. In fact, difficulties in concentration and attention are one of the diagnostic criteria for depression. However, the higher number of errors by depressed subjects in the present study

did not affect total responses made or points received when compared to the other two groups.

Results of the acquisition phase indicated that in general, all subjects were less responsive to changing reinforcement schedules in the PRO condition than in the RC condition. These findings are similar to the results of Schneidmiller (1987) who found that the PRO condition generated less responsivity to changing schedules. Although the total points analysis did not reach statistical significance, subjects in the PRO condition tended to make fewer responses than subjects in the RC condition. The RC condition may generate greater responsivity to changing schedules due to the aversive component (i.e., make a point within one minute or lose a half point). The PRO condition places no time contingency on subjects. Thus, subjects were under no additional contingency to acquire the task.

In the extinction phase analysis, both currently depressed and remitted depressed subjects demonstrated greater extinction effects in the RC condition when compared to control subjects. These results are similar to those obtained in a pilot study (1988) which examined extinction effects in depressed and nondepressed subjects. In the present study, all three groups demonstrated similar resistance to extinction in the PRO condition. The results of the PRO extinction analysis help rule out a fatigue or motivational explantation for the greater extinction effects in the RC condition for currently and remitted depressed subjects. All three groups were equally resistant to extinction in the PRO condition when compared to the RC condition. The

raw data (Figure 15) grphically depicted, show the same trends.

In the present study, both currently and remitted depressed subjects exhibited greater extinction effects in the RC condition. The extinction phase of the RC condition is similar to the passive avoidance task of the Suarez et al. (1978) study. The authors speculated that not responding may reduce the aversiveness of a situation. Responding on any task involves some degree of effort which may lead to frustration or fatigue. When currently and remitted depressed subjects are sensitized by a previous aversive experience (RC acquisition), then exposure to a following aversive event (RC extinction) may lead much more quickly to passive avoidance behavior (i.e., not responding) than would be expected in the other extinction phase (PRO). The exact aversive nature of the RC condition is difficult to ascertain. Both PRO and RC conditions have extinction phases which are presumed to be aversive; however, what precedes RC extinction is different. The RC acquistion phase involves an aversive component as well as positive reinforcement for making points. The aversive component of RC acquisition was speculated to be either the time contingency (make a point within a minute) and/or the actual loss of a half point for not meeting the time contingency. An alternative explanation for the greater extinction effects observed for currently depressed and remitted subjects in the RC extinction phase would be that these subjects were more sensitive to the change from acquisition to extinction. In addition, the RC acquisition phase is a more complicated task involving a time contingency for making points. For currently and remitted depressed subjects, if the acquisition phase contained an aversive

component, then greater extinction effects were demonstrated. The exact aversive nature of the RC condition remains to be explained.

DACL results indicated that currently and remitted depressed subjects reported more depressed mood than control subjects at the beginning of the task. The finding that remitted subjects reported more depressed mood at the beginning of the task was unexpected. It may be that the reading of the initial instructions affected depressed mood differentially for remitted and depressed subjects. At the completion of the task, however, only depressed subjects had significantly more depressed mood when compared to the other two groups. This finding probably addresses the transient effect on mood that experimental tasks may have. For the PRO condition (pre and post), only currently depressed subjects reported more depressed mood when compared to the other two groups. For the RC condition (pre and post), both currently and remitted depressed subjects had more depressed mood when compared to control subjects. These results suggest that only the RC condition differentially affected depressed mood reports in currently and remitted depressed subjects. All subjects reported more depressed mood after extinction when compared to reports of depressed mood prior to starting the task. In addition, the pleasantness rating analysis indicated that all subjects rated the extinction phase as more unpleasant than the acquistion phase. These results suggest that the extinction phase of the learning task was experienced as aversive on all self-report measures by all subjects. Extinction may function in a similar way to events that produce depressed mood or reports of unpleasantness in these individuals in their natural environments. While all subjects rated

extinction as more unpleasant, only the RC condition differentially affected depressed mood for currently and remitted depressed subjects. The RC condition may be similar to aversive events in the lives of these subjects that influence the development of depressed mood. It should be noted that the experimental manipulations in the present study may only induce transient mood. For remitted depressed subjects, more salient aversive events would probably need to occur to influence the development of more stable depressive mood or the development of a depressive episode.

The results of the learning task are similar to those of Suarez et al. (1978). These authors proposed a passive avoidance model of depression to account for depressed subjects' superior performance on a passive avoidance task. The control of aversive stimuli by not responding may help explain the greater extinction effects for currently and remitted depressed subjects, especially given experience with a task involving response contingent aversive stimulation. Behavioral suppression in response to aversive situations corresponds to many of the behaviors observed in clinical depression. Examples would include the withdrawal from socially-related events and inabilities to complete normal household duties.

The question arises as to why remitted depressed subjects demonstrate behavioral suppression in response to aversive situations when not depressed. The type of aversive events that lead to behavioral suppression in the daily lives of depressives may be similar to aversive events utilized in this study. Through their particular learning

histories, remitted subjects' behavioral suppression may be evoked given similar aversive situations.

With regard to the predisposing hypothesis, it could be speculated that a history of behavioral suppression in response to aversive events impacts the development of a depressive episode. Suarez et al. (1978) have speculated that depressed individuals also engage in active avoidant behaviors in response to aversive events when behavioral suppression is unsuccessful. Individuals whose responses could be characterized as behavioral suppression in reaction to aversive events in the past, may be more likely to develop depressive episodes. It is not clear what type(s) of aversive events would need to occur to produce the two types of avoidant responding and how this might impact a depressive episode. If an individual is more sensitive to aversive events (e.g., engages in passive avoidant behaviors), active responses which could result in positive reinforcement are precluded. Therefore, that individual may be receiving less positive reinforcement and their depressive symptoms may intensify, or reach clinical levels. With regard to the scar hypothesis, a depressive episode may lead to an increase in passive avoidant responding. When a depressive episode begins, individuals tend to reduce their activity level. These individuals may learn very quickly that not responding reduces aversiveness in their environments. Then, when similar aversive events occur after the depression has remitted, passive avoidant behaviors are more likely to occur. The aversive stimuli in the present study may not be salient enough to affect a clinical episode of depression, but certainly can affect reports of transient depressed mood. The processes

involved in the predisposing and scar hypotheses may be similar but may occur along different time lines.

Overall Findings

The results of the social and learning tasks indicate that the responding of remitted depressed subjects is very similar to that of currently depressed subjects. In general, this study does not support the correlate view of sensitivity to aversive events. Both currently and remitted depressed subjects exhibited higher GSR reactions to negative social scenes when compared to control subjects. Similarly, currently and remitted depressed subjects demonstrated greater extinction effects in the RC condition. Thus, the greater sensitivity to aversive events in remitted depressed subjects when compared to controls provides evidence that this sensitivity is not specific to a current episode of depression.

The greater sensitivity to aversive events in remitted subjects when compared to controls cannot be explained by an increase in unpleasant or life events. Results of the Unpleasant Events Schedule (UES) analysis indicated that currently depressed subjects had higher total experienced aversive events over the past thirty days when compared to remitted and control subjects. There were no significant differences between remitted and control subjects on the UES. The results of the Social Readjustment Rating Scale (SRRS) indicated that all three groups experienced a similar number of life events in the past six months. Thus, the greater sensitivity of remitted subjects cannot be explained by a greater number of stressful life events or by a higher

total of experienced aversive events. It would seem that remitted subjects' performance in this study is not related to an increase in stressful or life events occurring in their present environment.

The screening measures did not detect any differences between remitted and control subjects. There were no significant differences between remitted and control subjects on the Beck Depression Inventory (BDI) nor on the Minnesota Multiphasic Personality Inventory - Depression Scale (MMPI-D). The interview data revealed that remitted and control subjects only differed with respect to previous episodes of depression in the remitted group. Thus, the greater sensitivity to aversive events evidenced by remitted subjects cannot be explained by the presence of current depressive symptoms. In addition, there were no differences between remitted and control subjects on age or education level. The main difference between the remitted and control subjects appears to be a history of depression for the remitted group.

Components of the social and learning tasks did affect mood and pleasantness ratings differentially. In general, currently depressed and remitted subjects tended to report more depressed mood in reaction to negative social scenes and extinction. All subjects rated negative social scenes and extinction as more unpleasant. These results provide some validation for the experimental manipulations and aversiveness of the two tasks. Thus, the self-report measures of experienced aversiveness mirror the behavioral differences obtained in this study, particularly for the remitted and depressed subjects.

The results of the correlational analysis indicated that there was not a significant relationship between responses made to the two hypothesized aversive components (negative social scenes and RC extinction). This finding suggests that the two tasks are quite different and that responding on one task is not predictive of responding on the other task. In this study, sensitivity to aversive events appears to be task-specific. This may be a result of the differential requirements of the two tasks. The social task assessed physiological responding and the learning task measured behavioral responding. Thus, sensitivity to aversive events was measured in two different response modes. If sensitivity was assessed via two tasks in the physiological response mode, then significant correlations might be obtained. Similarly, a high correlation might be expected across tasks assessing the behavioral response mode. In addition, there may be different subtypes of depression that are responsive to different types of aversive events. For example, one subtype of depressives may react more strongly to social losses and another subtype may be more responsive to achievement losses.

The present study lends support for the predisposing-scar hypotheses, Remitted subjects responded in similar ways to depressed subjects on physiological and behavioral measures. Remitted subjects did not differ significantly from controls on experienced aversive events or in depressive symptoms. There does seem to be something about those persons' behavior who have had a depressive episode that discriminates their behavior from the behavior of control subjects who have not experienced a depressive episode. Possibly, the difference

lies in the learning histories of these individuals. The question is whether this learning occurs primarily prior to the first depressive episode (predisposing) or during a depressive episode (scar).

The passive avoidance model of depression may provide a framework for understanding the development of greater sensitivity to aversive events in currently and remitted depressed individuals. Since this model can help address both the predisposing and scar hypotheses, only longitudinal studies can address the time component. The development of this sensitivity has not been adequately studied. It is unclear whether this sensitivity comes about as a result of depressive phenomena, represents a developmental predispostion, or a combination of the two. In addition, it is unclear how greater sensitivity to aversive events would contribute to the development of a depressive episode. Although it probably involves multiple factors, the exact process has not been hypothesized. The cognitive component of this sensitivity has not been addressed. Although Beck has hypothesized that dysfunctional beliefs predispose an individual to depression, the process of "latent" dysfunctional beliefs has not been empirically demonstrated in remitted depressed subjects. The contributing nature of cognitions on sensitivity to aversive events needs to be examined.

Limitations of the Present Study

One limitation of the present study concerns the aversive component of the RC condition of the learning task. Both the PRO and RC conditions contained an extinction component which rules out extinction alone as the primary aversive event. Although the aversive stimulation

component of the RC condition differentiated it from the PRO, the exact nature of the component which contributed to the aversiveness of the task remains elusive. Speculating, it could be the time contingency component and/or the feedback received at the loss of a half point. In addition, the saliency of the change from acquisition to extinction may have been responsible for the greater extinction effects demonstrated by the currently depressed and remitted subjects. Functionally, it appears that the RC condition was more aversive for currently and remitted depressed subjects.

Another limitation of the present study concerns the generalizability of the results. This is the first study that has demonstrated that remitted individuals respond similarly to currently depressed subjects on these tasks. Clearly, these findings need to be replicated. It is unclear if greater sensitivity to aversive events occurs only to certain types of stimuli or only on certain tasks. In addition, the number of previous episodes for both currently and remitted depressed subjects needs to be examined to ascertain if this factor influences sensitivity. Also, the population in this study consisted entirely of females. Greater sensitivity to aversive events in currently and remitted depressed males cannot be addressed. The present study does not address the possibility of a continuum of this sensitivity which may vary according to severity of past and/or present depression, time since last episode, type of treatment received, or a host of other factors. Finally, the causes of this greater sensitivity cannot be addressed in the present study. Only longitudinal studies that followed individuals over time could begin to address etiological

and process issues.

Directions for Future Research

Longitudinal research needs to be conducted to address the issue of whether sensitivity to aversive events represents a predisposition for depressive episodes, or a scar, the result of a depressive episode. If individuals who were followed over time (and were sensitive) later developed depression, research could help determine experimental tasks that could identify this sensitivity in younger populations. This type of research may lead to preventive measures in the development of depression. Familial sensitivity to aversive events could be examined to ascertain if this sensitivity represents a biological and/or early learning history predisposition. Since the recurrence of depression is extremely high regardless of type of treatment, sensitivity and reactions to aversive events may need to be examined for treatment implications.

Sensitivity to aversive events needs to be examined empirically with other tasks and with other levels of analysis (e.g., cognitions). Replications which expand upon the present study are needed. It is not clear if this greater sensitivity to aversive events is also found in other psychiatric populations. Research using other psychiatric groups could help address the question of sensitivity as a predisposition or scar for psychopathology in general or is it specific to depression. Initial comparisons might involve the anxiety disorders, particularly, posttraumatic stress disorder. Another area of research might focus on subtypes of depression to ascertain if certain types are more sensitive

on various dimensions (e.g., success vs. failure tasks, social vs. instrumental tasks). It might prove useful to take physiological measures while subjects complete an aversive task. In general, these types of studies may help in the development of a cohesive theory of how this sensitivity develops, as well as how this may contribute to the precipitation of a depressive episode or result from a depressive episode.

In a recent review, Barnett and Gotlib (1988) attempted to distinguish between antecedents, concomitants, and consequences of depression. The authors identified disturbances in interpersonal functioning as an antecedent and concomitant of depression. With regard to enduring personality abnormalities in remitted depressives, introversion and interpersonal dependency were identified as areas to pursue in future research. The two latter variables could be addressed in future research regarding sensitivity to aversive events. In particular, covariations with introversion and interpersonal dependency measures and sensitivity to aversive events could be examined.

Conclusions

The results of the present study provide some support for the predisposing-scar hypotheses and do not support the correlate view of sensitivity to aversive events. The present study represents the first experimental demonstration of similarities in responding by remitted depressed and currently depressed subjects. Therefore, this study should be considered exploratory in nature and be replicated. It is clear that only longitudional studies can begin to address and tease

apart the predisposing and scar hypotheses. The present results indicate that the passive avoidance model of depression may represent a framework that could be integrated with the two hypotheses of greater sensitivity to aversive events.

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Appendix A

Pilot Study

Introductory psychology students served as subjects. Subjects in the depressed group (N = 8) scored 16 or above on the BDI and received a T score of 70 or above on the MMPI-D. Subjects in the nondepressed group (N = 10) scored 9 or below on the BDI and received a T score of 50 or below on the MMPI-D.

The experiment consisted of a computer task involving either a positive reinforcement only or a response cost condition. Subjects made points on the task by moving a marker through a grid. The first 64 minutes of the task constituted the acquisition phase. The last 32 minutes of the task constituted the extinction phase (no points could be earned or lost). Subjects in the positive reinforcement only condition made points by moving the marker through the grid. Subjects in the response cost condition also made points in a similar way but were required to make a point within a minute or lose 1/2 point from their total.

The following means were obtained for a measure of sensitivity to extinction:

Positive Reinforcement Only

Depressed Mean = .587 (N =4)

Nondepressed Mean = .701 (N =5)

Appendix A Continued

Response Cost

Depressed Mean = .048 (N = 4)

Nondepressed Mean = .395 (N = 5)

T test comparisons revealed that only the depressed subjects' mean differed significantly from the nondepressed subjects' mean on a measure of sensitivity to extinction in the response cost condition.

The following means were obtained for a measure of schedule sensitivity:

Positive Reinforcement Only

Depressed Mean = .09

Nondepressed Mean = .07

Response Cost

Depressed Mean = .05

Nondepressed Mean = .05

No differences were found between groups or conditions for the measure of schedule sensitivity.

Appendix B

Consent Form for the Assessment Phase

I understand that I am answering questions (by completing questionnaires and/or being interviewed) to be used in selecting subjects for an investigation involving the assessment of individuals' reactions to two tasks. One task involves listening to a tape while painless physiological measures are taken. The other task involves my interacting with a computer. I have been informed that information obtained about me as an individual will remain confidential and be available to the principal investigator and the investigator's supervisor. In addition, I have been informed that I am participating in research that does not involve treatment of any kind. I have been informed that if I desire treatment for any reason, a referral list will be provided to me. I have also been informed that I may withdraw from this screening session at any time without penalty.

I understand that if I am asked to participate in the experimental phase of the study, I will be asked to return at a later date to complete this portion of the study. I understand that if I am asked to participate in the next phase of the study that the procedures will be explained to me in more detail. I understand that I may withdraw at any time from participating in this study.

Signed: _____

Witness: _____

Date: _____

Appendix O

Learning Task Instructions

"Please read these instructions with me as I say them out loud. This is an experiment in learning, not a psychological test. We are interested in certain aspects of the learning process which are common to all people. During the session you will be alone in this room until the end of the session. The session will begin when a 5 x 5 grid appears on the monitor. When the session is over, the monitor will say so. When the grid appears there will be a plus (+) sign in the upper left-hand corner. To make points, move the plus sign to the lower right-hand corner; then when the monitor says to, press both buttons to receive your point. When the yellow square is lit, the best way to push the buttons is slowly with several seconds between each push. When the blue square is lit, the best way to push the buttons is rapidly."

"Try to see how many points you can get. Each point is worth a chance at a $25 prize to be awarded at the end of the study. Moving the plus sign to the lower right-hand corner involves the buttons and the lights. If you have any questions ask them now because during the session, the experimenter will not be able to answer any questions.

Additional Instruction for Response Cost

"It is important to follow instructions carefully since failure to earn any points during a one-minute period will result in a loss of ½ point from your total."

Appendix P

PRE-EXPERIMENTAL QUESTIONNAIRE

1. How interesting does this task sound to you?

1	2	3	4	5	6	7
not at all interesting			somewhat interesting			very interesting

2. The following list contains various reasons why people might be motivated to do well on this task. Pleas rank in order these reasons according to their relative importance to you (1 - 4).

___ the challenge of mastering the task

___ pleasing the experimenter

___ earning as many points as possible

___ winning the $25 jackpot

___ other _____(describe)

Appendix Q

POST-EXPERIMENTAL QUESTIONNAIRE

1. In the first part of the session, what did you have to do to earn points on this task?

2. In the first part of the session, what did you have to do to earn points while the square was blue?

3. In the first part of the session, what did you have to do to earn points when the square was yellow?

4. In the last half of the session, what did you have to do to earn points on this task?

5. In the last half of the session, what did you have to do to earn points when the square was blue?

6. In the last half of the session, what did you have to do to earn points when the square was yellow?

7. To what extent did you find the instructions given at the beginning of the experimental session to be helpful?

8. How important was it to you to master the task?

1	2	3	4	5	6	7
not at all			somewhat			very important

9. How important was it to you to make a good impression upon the experimenter?

1	2	3	4	5	6	7
not at all			somewhat			very important

10. How important was it to you to earn as many points as possible in this experiment?

1	2	3	4	5	6	7
not at all			somewhat			very important

11. How important was the opportunity to win the $25 jackpot?

1	2	3	4	5	6	7
not at all			somewhat			very important

12. How important was it to you not to lose any points during the task?

1	2	3	4	5	6	7
not at all			somewhat			very important

13. The following list contains various reasons why people might be motivated to do well on this task. Please rank order these reasons according to their relative importance to you (1 = most important of these reasons, 2 = second most important, etc...).

___ the challenge of mastering the task
___ pleasing the experimenter
___ earning as many points as possible
___ opportunity to win the $25 jackpot
___ other: _____ (describe)

14. Why did you stop responding in the last half of the session?

15. Even though no additional instructions were given in the last half of the session, did you come up with your own instructions? If so, what were they?

16. Please rate the <u>first</u> <u>half</u> of the session on the following scale.

Rating ___

1	4	7
very pleasant	neutral	very unpleasant

17. Please rate the last half of the session on the following scale.

Rating ___

1	4	7
very pleasant	neutral	very unpleasant

Appendix R

Tables

Table 1

Summary of the Analysis of Variance
on Subjects' Ages

Source	df	Sum of Squares	F	Pr>F
Group	2	42.1333	0.24	.7893
Error	57	5053.60		

Table 2

Summary Table of the Analysis of Variance
on Beck Depression Inventory Scores

Source	df	Sum of Squares	F	Pr>F
Group	2	7994.2333	125.27	.0001
Error	57	1818.75		

Table 3

Neman-Keuls Analysis of the
Beck Depression Inventory Scores

	(Control) 5.40	(Remitted) 6.25	(Depressed) 30.30
(Control) 5.40	---	.850	24.90**
(Remitted) 6.25		---	24.05**
(Depressed) 30.30			---

* $p<.05$

** $p<.01$

Table 4

Summary Table of the Analysis of Variance
on the MMPI-D Scores

Source	df	Sum of Squares	F	Pr>F
Group	2	3675.2333	75.26	.0001
Error	57	1391.7500		

Table 5

Newman-Keuls Analysis of the
MMPI-D Scores

	(Normal) 21.05	(Remitted) 22.90	(Depressed) 38.50
(Normal) 21.05	---	1.85	17.45**
(Remitted) 22.90		---	15.60**
(Depressed) 38.50			---

* $p < .05$
** $p < .01$

Table 6

Subject Characteristics

DEPRESSED SUBJECTS

BDI	MMPI-D	Age	Diagnosis	# Past Episodes of Major Depression
22	35	53	DYS[1]	0
29	36	25	MD/DYS[2]	0
38	41	37	MD/DYS	4
45	30	30	MD[3]	2
40	35	45	MD/DYS	1
24	47	26	MD/DYS	1
36	37	34	MD	2
28	43	39	MD	3
21	43	40	DYS	0
27	40	42	DYS	0
51	53	47	MD/DYS	2
32	35	41	DYS	0
25	37	33	DYS	0
38	47	51	DYS	1
20	37	34	DYS	0
37	38	41	MD	1
21	32	21	DYS	3
29	39	41	MD	1
20	29	42	DYS	0
23	36	42	MD	2

[1] = Dysthymia only

[2] = Major Depression/Dysthymia

[3] = Major Depression only

Table 6 Continued

REMITTED SUBJECTS

BDI	MMPI-D	Age	Past Diagnosis	# Past Episodes of Major Depression
5	19	31	MD[1]	2
3	29	38	MD	1
4	30	20	MD	2
9	32	25	MD	1
3	21	46	MD	2
6	21	28	MD	1
4	19	41	MD	2
9	24	31	MD	1
9	24	53	MD	3
3	17	27	MD	1
9	18	18	MD	1
9	21	39	MD	1
2	23	39	MD/DYS[2]	6
9	23	47	MD	5
9	30	31	MD	1
8	26	34	MD	8
6	23	33	MD	5
9	14	60	MD	5
5	22	40	MD	2
4	22	43	MD	3

[1] = Major Depression only

[2] = Major Depression/Dysthymia

Table 6 Continued

NORMAL CONTROL SUBJECTS

BDI	MMPI-D	Age
3	22	37
2	21	23
7	19	42
0	17	21
8	16	26
7	19	32
4	27	27
7	24	29
7	18	50
6	22	52
5	21	45
6	33	40
0	17	41
8	18	40
9	18	36
3	20	49
2	21	43
9	24	31
8	25	29
7	19	43

Table 7

Summary Table of the Analysis of Variance on Baseline SRL

Source	df	Sum of Squares	F	Pr>F
Group	2	996.6500	0.99	.3769
Sub (Group)	57	28611.0500		
Occasion	1	258.1333	3.21	.0786
Group x Occasion	2	270.3167	1.68	.1955
Error	57	4585.5500		

Table 8

Means of Baseline SRL

Group	Occasion	Baseline SRL
Depressed	1	17.95
	2	17.15
Remitted	1	14.15
	2	20.70
Normal	1	9.85
	2	12.90

Table 9

Summary Table of the Analysis of
Covariance on the GSR Difference Scores

Source	df	Sum of Squares	F	Pr>F
Neutral	1	9.5153	7.52	.0082
Group	2	0.2969	0.05	.9475
Sub (Group)	57	156.7668		
Occasion	1	28.1422	22.25	.0001
Group x Occasion	2	20.8265	8.23	.0007
Error	56	70.8187		

Table 10

Means of the GSR Difference Scores for
Positive and Negative Scenes

Group	Occasion	GSR Difference Score	Neutral
Depressed	Positive	0.8030	3.4185
	Negative	1.9490	3.2380
Remitted	Positive	0.8415	4.3115
	Negative	2.7155	4.3220
Normals	Positive	1.0535	2.1180
	Negative	0.7650	1.6230

Table 11

Newman-Keuls Analysis of the GSR
Difference Scores for the Group x Occasion Interaction

Occasion 1 (Positive)

	(Depressed) .803	(Remitted) .842	(Control) 1.054
(Depressed) .803	---	.039	.251
(Remitted) .842		---	.212
(Control) 1.054			---

Occasion 2 (Negative)

	(Control) .765	(Depressed) 1.95	(Remitted) 2.72
(Control) .765	---	1.185**	1.955**
(Depressed) 1.95		---	.77
(Remitted) 2.72			---

* $p < .05$
** $p < .01$

Table 12

Summary of the Analysis of Variance for DACL Scores

Source	df	Sum of Squares	F	Pr>F
Group	2	3119.0056	33.25	.0001
Sub (Group)	57	2673.2833		
Occasion	5	1623.2889	31.66	.0001
Group x Occasion	10	163.5611	1.59	.1075
Error	285	10501.9556		

Table 13

Means for the DACL

Group	Occasion	DACL
Depressed	baseline 1	14.45
	neutral	13.85
	positive	10.00
	neutral	14.00
	negative	17.65
	baseline 2	12.90
Remitted	baseline 1	7.95
	neutral	8.10
	positive	6.55
	neutral	8.25
	negative	14.55
	baseline 2	6.90
Normals	baseline 1	6.45
	neutral	7.10
	positive	4.80
	neutral	6.35
	negative	10.10
	baseline 2	6.25

Table 14

Newman-Keuls Analysis of DACL Scores

Group Main Effect

		(Controls) 6.84	(Remitted) 8.72	(Depressed) 13.81
(Controls)	6.84	---	1.88*	6.97**
(Remitted)	8.72		---	5.09**
(Depressed)	13.81			---

Occasion Main Effect

	7.12 (positive)	8.68 (baseline 2)	9.53 (neutral)	9.62 (baseline 1)	9.68 (neutral)	14.10 (negative)
(positive) 7.12	—	1.56**	2.41**	2.50**	2.56**	6.98**
(baseline 2) 8.68		—	0.85	0.94	1.00	5.42**
(neutral) 9.53			—	0.09	0.15	4.57**
(baseline 1) 9.62				—	0.06	4.48**
(neutral) 9.68					—	4.42**
(negative) 14.10						—

* $p < .05$

** $p < .01$

Table 15

Summary Table of the Analysis of Variance on the Pleasantness Rating of the Social Scenes

Source	df	Sum of Squares	F	Pr>F
Group	2	7.7583	3.03	.0561
Sub (Group)	57	72.9250		
Occasion	3	689.9167	243.54	.0000
Group x Occasion	6	17.1083	3.02	.0079
Error	171	161.4750		

Table 16

Mean Ratings of the Social Scenes

Group	Type of Scene	Rating
Depressed	neutral	3.20
	positive	2.00
	neutral	4.15
	negative	6.70
Remitted	neutral	3.25
	positive	1.60
	neutral	3.70
	negative	6.80
Controls	neutral	3.65
	positive	1.40
	neutral	3.55
	negative	5.70

Table 17

Newman-Keuls Analysis of the Pleasantness Ratings for the Social Scenes for the Group x Occasion Interaction

Group x Occasion 2 (Neutral)

	(Depressed) 3.2	(Remitted) 3.25	(Controls) 3.65
(Depressed) 3.2	---	.05	.45
(Remitted) 3.25		---	.40
(Controls) 3.65			---

Group x Occasion 3 (Positive)

	(Controls) 1.40	(Remitted) 1.60	(Depressed) 2.00
(Controls) 1.40	---	.20	.60
(Remitted) 1.60		---	.40
(Depressed) 2.00			---

Group x Occasion 4 (Neutral)

	(Control) 3.55	(Remitted) 3.70	(Depressed) 4.15
(Control) 3.55	---	.15	.60
(Remitted) 3.70		---	.45
(Depressed) 4.15			---

Table 17 Continued

Group x Occasion 5 (Negative)

		(Control) 5.70	(Depressed) 6.70	(Remitted) 6.80
(Control)	5.70	---	1.00**	1.10**
(Depressed)	6.70		---	.10
(Remitted)	6.80			---

* $p < .05$
** $p < .01$

Table 18

Summary Table of the Analysis of Variance of the Pleasantness Rating of the Entire Social Task

Source	df	Sum of Squares	F	Pr>F
Group	2	14.9333	5.40	.0071
Error	57	78.8000		

Table 19

Newman-Keuls Analysis of the Group Main Effect
for the Pleasantness Rating of the Entire Social Task

	(Controls) 2.40	(Remitted) 3.2	(Depressed) 3.6
(Control) 2.40	---	.80*	1.2**
(Remitted) 3.2		---	.40
(Depressed) 3.6			---

* $p < .05$
** $p < .01$

Table 20

Summary Table of the Analysis of Variance
of Ratio Acquisition Scores for the Learning Task

Source	df	Sum of Squares	F	Pr>F
Group	2	0.0054	3.01	.0579
Condition	1	0.0082	9.14	.0038
Group x Condition	2	0.0036	2.00	.1454
Error	54	0.0485		

Table 21

Means of Schedule Sensitivity Scores During Acquisition

Group	Condition	Schedule Sensitivity
Depressed	Positive Only	.0804
	Response Cost	.0782
Remitted	Positive Only	.0840
	Response Cost	.0453
Controls	Positive Only	.0710
	Response Cost	.0417

Table 22

Newman-Keuls Analysis of the Group Main Effect
for the Ratio Acquisition Scores

	(Controls) .056	(Remitted) .065	(Depressed) .079
(Controls) .056	---	.009	.023*
(Remitted) .065		---	.014
(Depressed) .079			---

*$p < .05$

Table 23

Newman-Keuls Analysis of the Condition Main Effect
for the Ratio Acquisition Scores

	(Response Cost) .055	(Positive Reinforcement Only) .078
(Response Cost) .055	---	.023*
(Positive Reinforcement Only) .078		---

*$p < .05$

Table 24

Summary Table of the Analysis of Variance on Total Responses During Acquisition

Source	df	Sum of Squares	F	Pr>F
Group	2	843908.1333	0.38	.6859
Condition	1	2430496.2667	2.19	.1450
Group x Condition	2	4450606.5333	2.00	.1449
Error	54	60011086.4000		

Table 25

Summary Table of the Analysis of Variance on Points Earned During Acquisition

Source	df	Sum of Squares	F	Pr>F
Group	2	456.3000	2.37	.1030
Condition	1	123.2667	1.28	.2627
Group x Condition	2	313.0333	1.63	.2061
Error	54	5196.0000		

Table 26

Summary Table of the Analysis of Variance on Resets in Acquisition

Source	df	Sum of Squares	F	Pr>F
Group	2	66.03333	4.90	.0111
Condition	1	4.2667	0.63	.4299
Group x Condition	2	25.2333	1.87	.1639
Error	54	364.2000		

Table 27

Newman-Keuls Analysis of the Resets
During Acquisition

		(Controls) 1.30	(Remitted) 1.35	(Depressed) 3.55
(Controls)	1.30	---	.05	2.25*
(Remitted)	1.35		---	2.20**
(Depressed)	3.55			---

* $p < .05$
** $p < .01$

Table 28

Summary Table of the Analysis of Variance of Ratio Extinction Scores for the Learning Task

Source	df	Sum of Squares	F	Pr>F
Group	2	0.9819	5.61	.0061
Condition	1	2.2787	26.06	.0001
Group x Condition	2	0.3116	1.78	.1782
Error	54	4.7227		

Table 29

Means of Ratio Extinction Scores

Group	Condition	Extinction Score
Depressed	PRO	.6051
	RC	.0534
Remitted	PRO	.5390
	RC	.1230
Controls	PRO	.7023
	RC	.5007

Table 30

Newman-Keuls Planned Comparison of the Group x Condition Interaction for the Ratio Extinction Scores

Groups at Condition 1 (PRO)

	(Remitted) .539	(Depressed) .605	(Controls) .702
(Remitted) .539	---	.066	.163
(Depressed) .605		---	.097
(Controls) .702			---

Groups at Condition 2 (RC)

	(Depressed) .053	(Remitted) .123	(Controls) .501
(Depressed) .053	---	.07	.448**
(Remitted) .123		---	.378**
(Controls) .501			---

* $p < .05$

** $p < .01$

Table 31

Summary Table of the Analysis of Variance on DACL Scores in the Learning Task

Source	df	Sum of Squares	F	Pr>F
Group	2	2455.1167	68.88	.0001
Condition	1	95.4083	5.35	.0245
Group x Condition	2	288.6166	8.10	.0008
Sub (Group x Condition)	54	962.3500		
Occasion	1	1576.8750	133.77	.0001
Occasion x Condition	1	49.4083	4.19	.0455
Group x Occasion	2	97.8500	4.15	.0211
Group x Occasion x Condition	2	42.8167	1.82	.1725
Error	54	636.5500		

Table 32

Means of DACL Scores for the Learning Task

Group	Occasion	Condition	DACL Scores
Depressed	Pre	PRO	13.70
	Post		22.50
	Pre	RC	13.10
	Post		23.70
Remitted	Pre	PRO	5.80
	Post		8.30
	Pre	RC	9.00
	Post		17.30
Controls	Pre	PRO	4.90
	Post		11.50
	Pre	RC	3.80
	Post		10.50

Table 33

Newman-Keuls Analysis of the Group x Occasion Interaction of DACL Scores

Groups at Occasion 1 (Pre)

	(Controls) 4.35	(Remitted) 7.40	(Depressed) 13.40
(Controls) 4.35	---	3.05*	9.05**
(Remitted) 7.40		---	6.00**
(Depressed) 13.40			---

Groups at Occasion 2 (Post)

	(Controls) 11.00	(Remitted) 12.80	(Depressed) 23.10
(Controls) 11.00	---	1.80	12.10**
(Remitted) 12.80		---	10.30**
(Depressed) 23.10			---

* $p < .05$

** $p < .01$

Table 34

Newman-Keuls Analysis of the Group x Condition Interaction of DACL Scores

Groups at Positive Reinforcement Only (PRO)

	(Remitted) 7.05	(Controls) 8.20	(Depressed) 18.10
(Remitted) 7.05	---	1.15	11.05**
(Controls) 8.20		---	9.90**
(Depressed) 18.10			---

Groups at Response Cost (RC)

	(Controls) 7.15	(Remitted) 13.15	(Depressed) 18.40
(Controls) 7.15	---	6.00**	11.25**
(Remitted) 13.15		---	5.25**
(Depressed) 18.40			---

* $p < .05$

** $p < .01$

Table 35

Newman-Keuls Analysis of the Occasion x Condition Interaction of DACL Scores

Occasion at PRO

	(Pre) 8.13	(Post) 14.10
(Pre) 8.13	---	5.97**
(Post) 14.10		---

Occasion at RC

	(Pre) 8.63	(Post) 17.17
(Pre) 8.63	---	8.54**
(Post) 17.17		---

* $p < .05$

** $p < .01$

Table 36

Summary Table of the Analysis of Variance for the Pleasantness Rating of the Learning Task

Source	df	Sum of Squares	F	Pr>F
Group	2	4.2000	1.51	.2294
Condition	1	4.4083	3.18	.0803
Group x Condition	2	4.8667	1.75	.1829
Sub (Group x Condition)	54	74.9500		
Occasion	1	350.2083	268.82	.0001
Group x Occasion	1	1.2667	0.49	.6177
Condition x Occasion	1	0.4083	0.31	.5779
Group x Condition x Occasion	2	1.2667	0.49	.6177
Error	54	70.3500		

Table 37

Mean Pleasantness Ratings of the Learning Task

Group	Occasion	Condition	Rating
Depressed	Acquisition	PRO	3.30
	Extinction		6.10
	Acquisition	RC	3.00
	Extinction		6.50
Remitted	Acquisition	PRO	2.20
	Extinction		5.70
	Acquisition	RC	3.00
	Extinction		6.80
Controls	Acquisition	PRO	2.40
	Extinction		2.70
	Acquisition	RC	2.40
	Extinction		6.00

Table 38

Newman-Keuls Analysis of the Pleasantness Rating
for the Occasion Main Effect

		(Acquisition) 2.767	(Extinction) 6.1833
(Acquisition)	2.767	---	3.4163**
(Extinction)	6.1833		---

* $p < .05$
** $p < .01$

Table 39

Summary Table of the Analysis of Variance on the Unpleasant Events Schedule

Source	df	Sum of Squares	F	Pr>F
Group	2	4.2434	5.25	.0081
Error	57	23.0228		

Table 40

Newman-Keuls Analysis of the
Unpleasant Events Schedule Scores

		(Controls) 2.89	(Remitted) 3.09	(Depressed) 3.53
(Controls)	2.89	---	.20	.640**
(Remitted)	3.09		---	.440*
(Depressed)	3.53			---

* $p < .05$
** $p < .01$

Table 41

Summary Table of the Analysis of Variance
on the Social Readjustment Rating Scale Scores

Source	df	Sum of Squares	F	Pr>F
Group	2	18904.2333	0.62	.5405
Error	57	866129.5000		

Table 42

Correlations of Difference Scores (Negative GSR - Neutral GSR) for the Social Task and Ratio Extinction Scores for RC Extinction

	Extinction Scores
Difference Scores	-0.18225

Correlations of Difference Scores and Ratio Extinction Scores for the RC Condition by Group

		Extinction Scores
Depressed	Difference Scores	.22525
Remitted	Difference Scores	.25770
Controls	Difference Scores	.02596

* $p < .05$

** $p < .01$

Appendix S

Figures

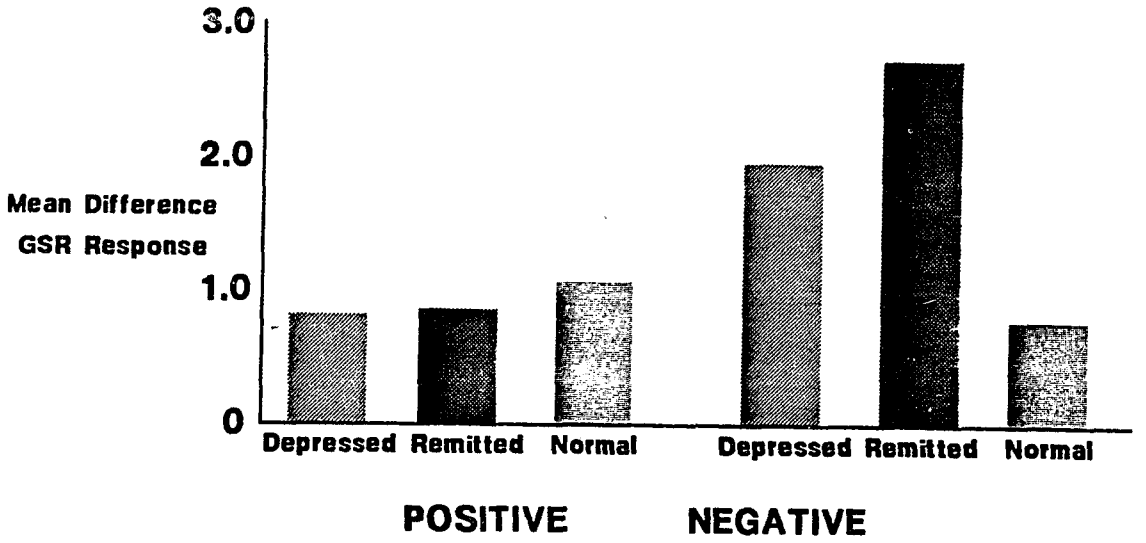

Figure 1: Mean Difference Scores for the GSR in Response to Positive and Negative Social Scenes

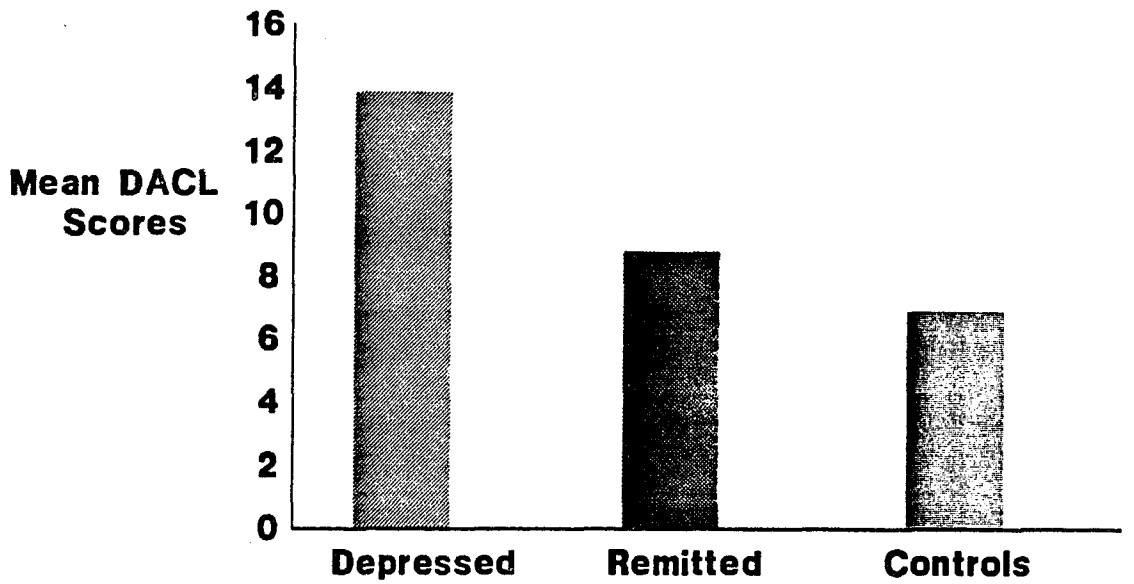

Figure 2: Mean DACL Scores for Groups in the Social Task

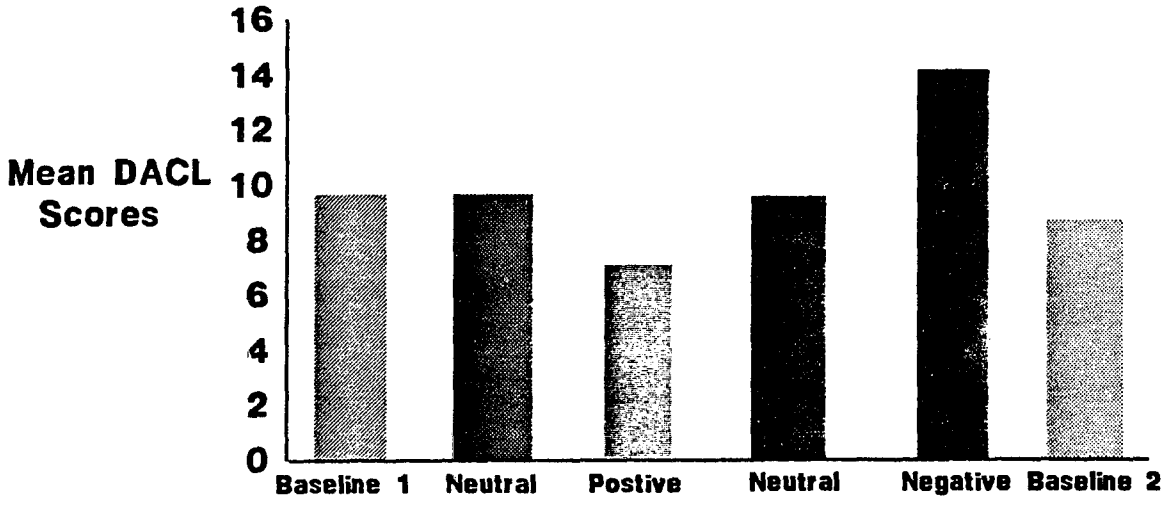

Figure 3: Mean DACL Scores for Occasions in the Social Task

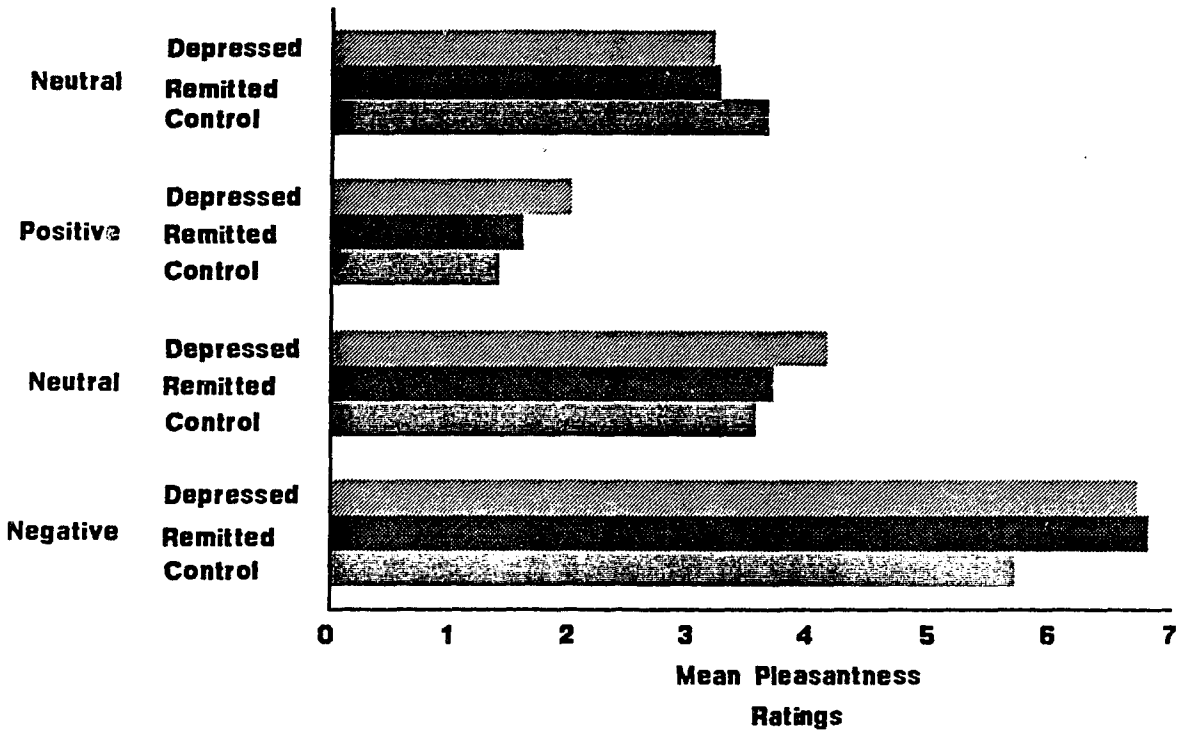

Figure 4: Mean Pleasantness Ratings for the Social Scenes

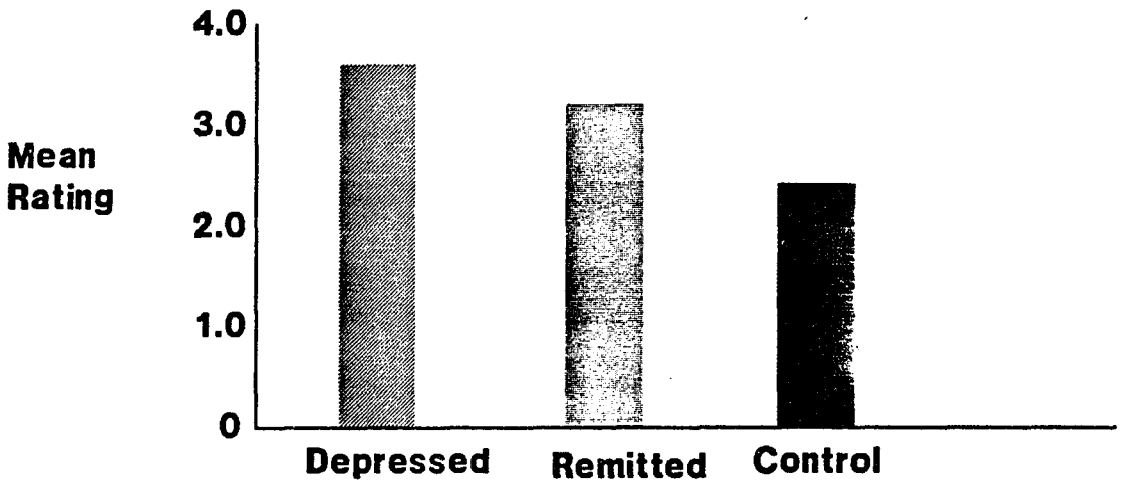

Figure 5: Mean Pleasantness Rating of the Entire Social Task

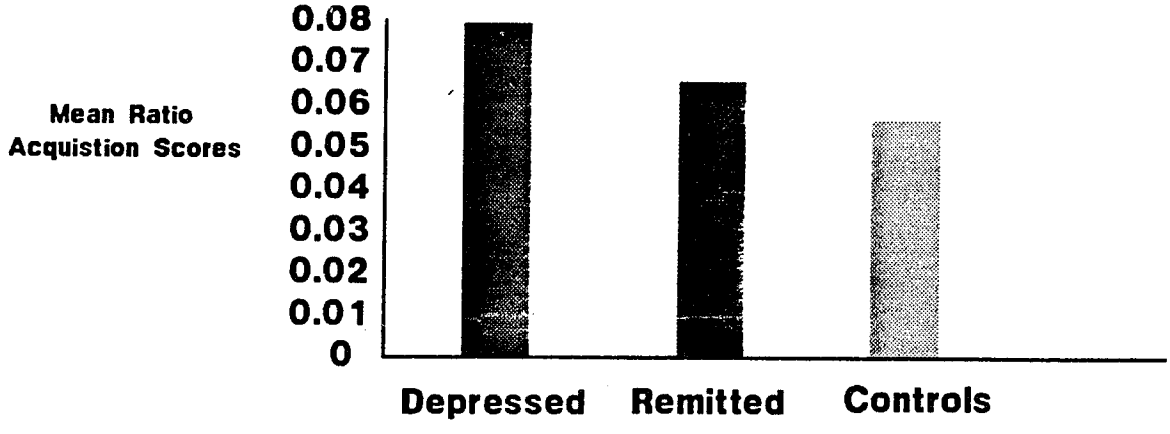

Figure 6: Mean Ratio Acquisition Scores for Groups in the Learning Task

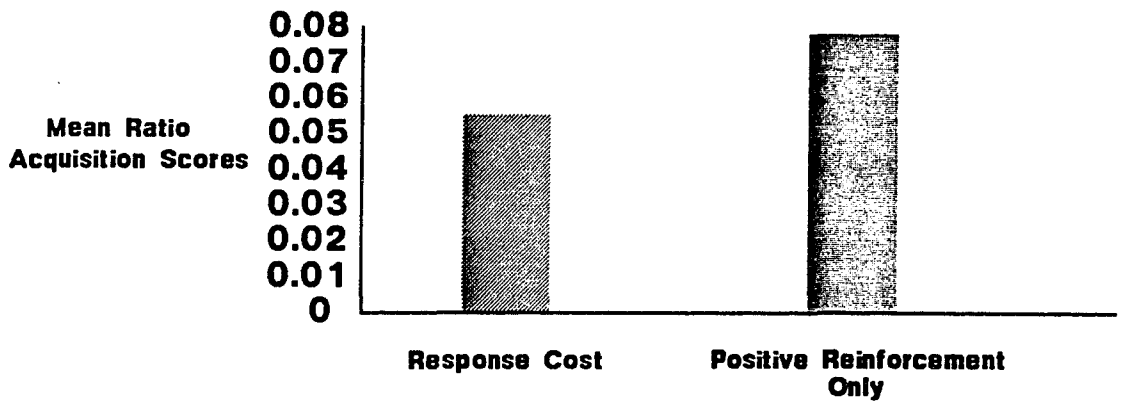

Figure 7: Mean Ratio Acquisition Scores by Condition in the Learning Task

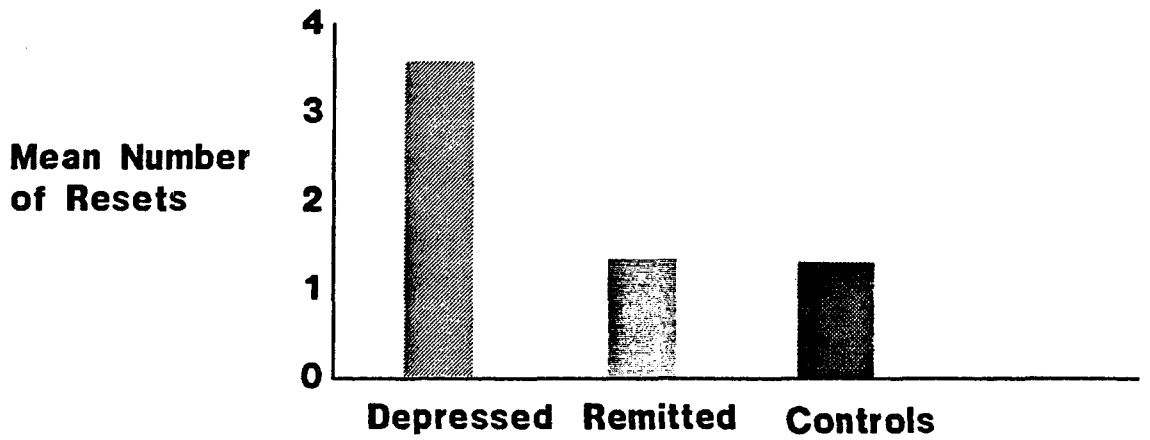

Figure 8: Mean Number of Resets During Acquisition

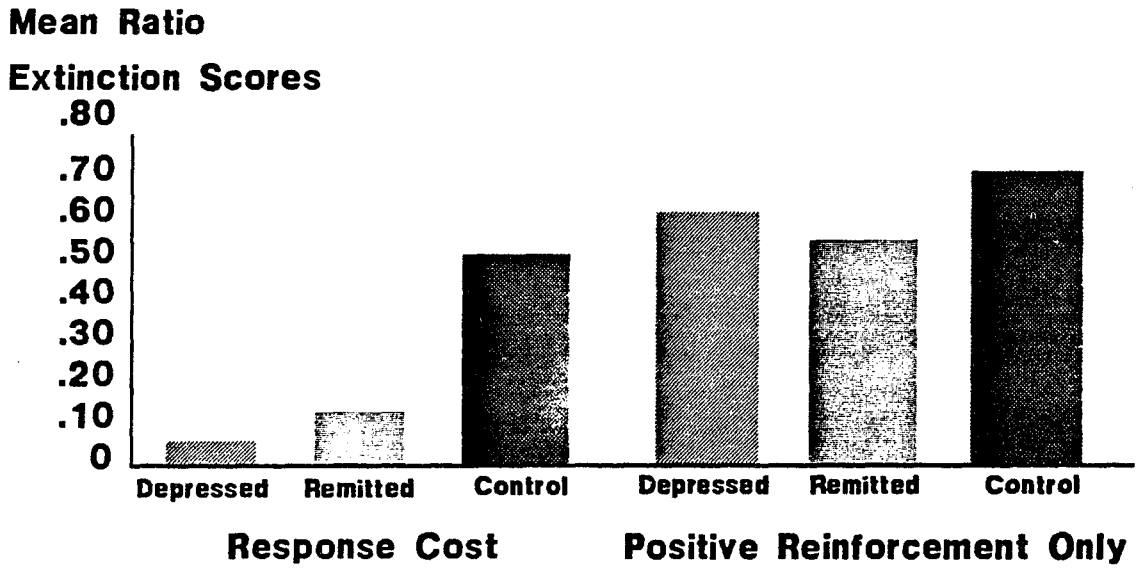

Figure 9: Mean Ratio Extinction Scores of the Learning Task

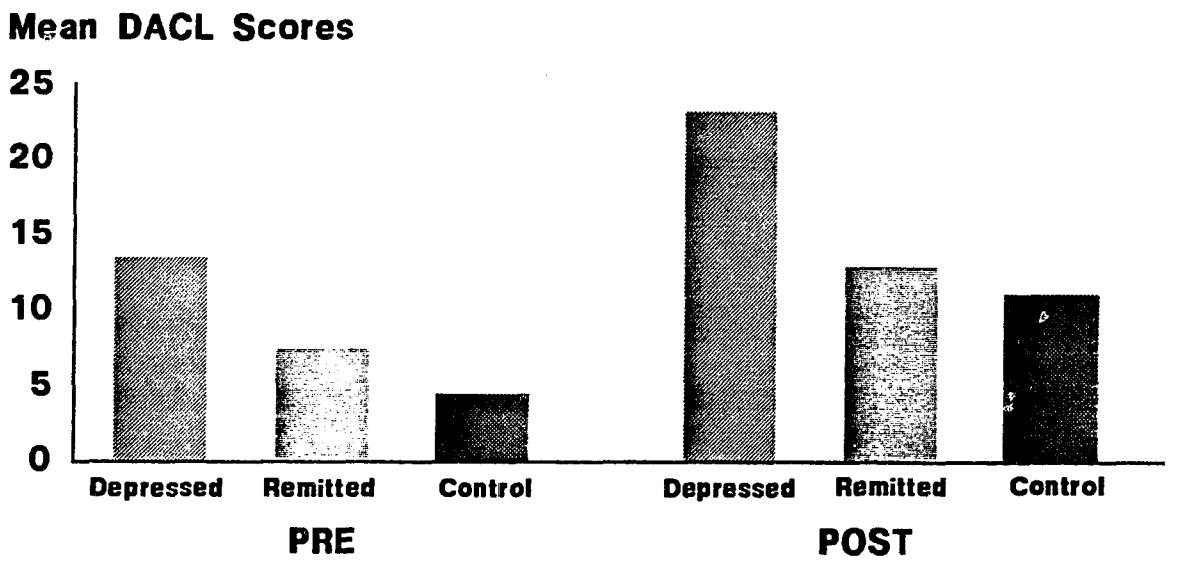

Figure 10: Mean DACL Scores for the Group x Occasion Interaction

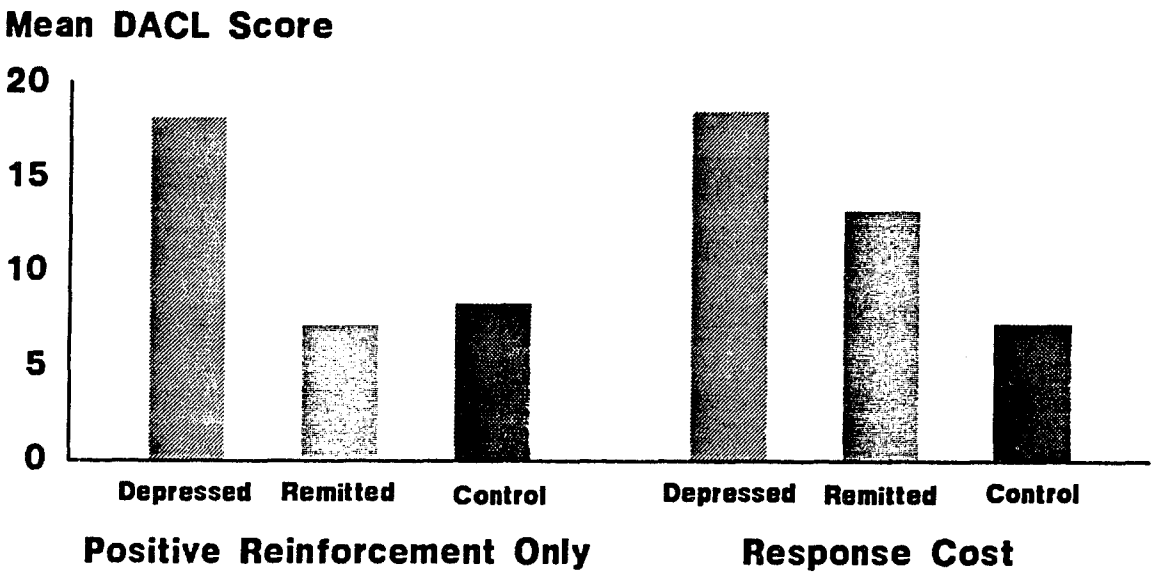

FIgure 11: Mean DACL Scores for the Group x Condition Interaction

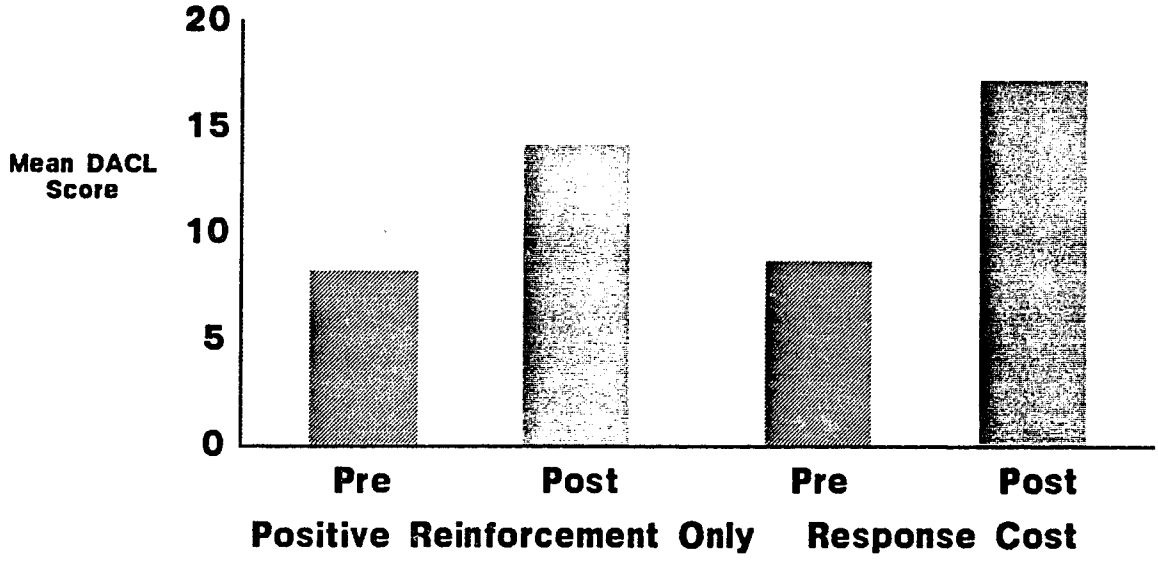

Figure 12: Mean DACL Scores for the Occasion x Condition Interaction

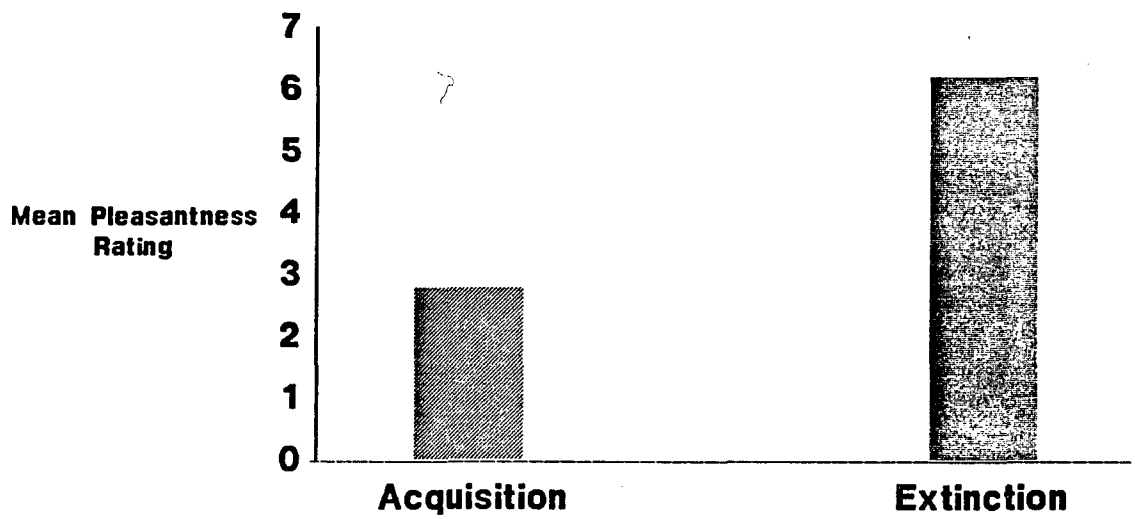

Figure 13: Mean Pleasantness Rating for Occasions of the Learning Task

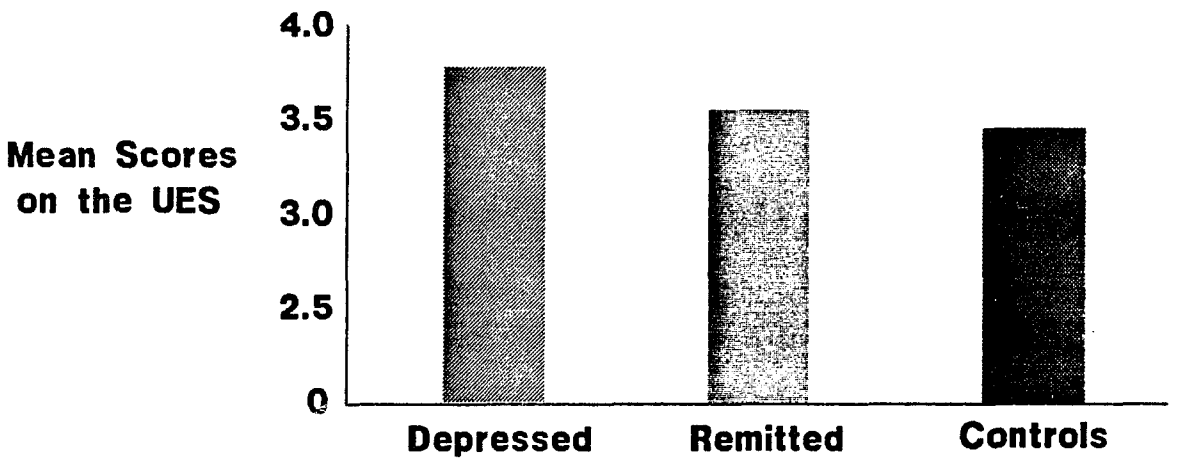

Figure 14: Mean Scores on the Unpleasant Events Schedule

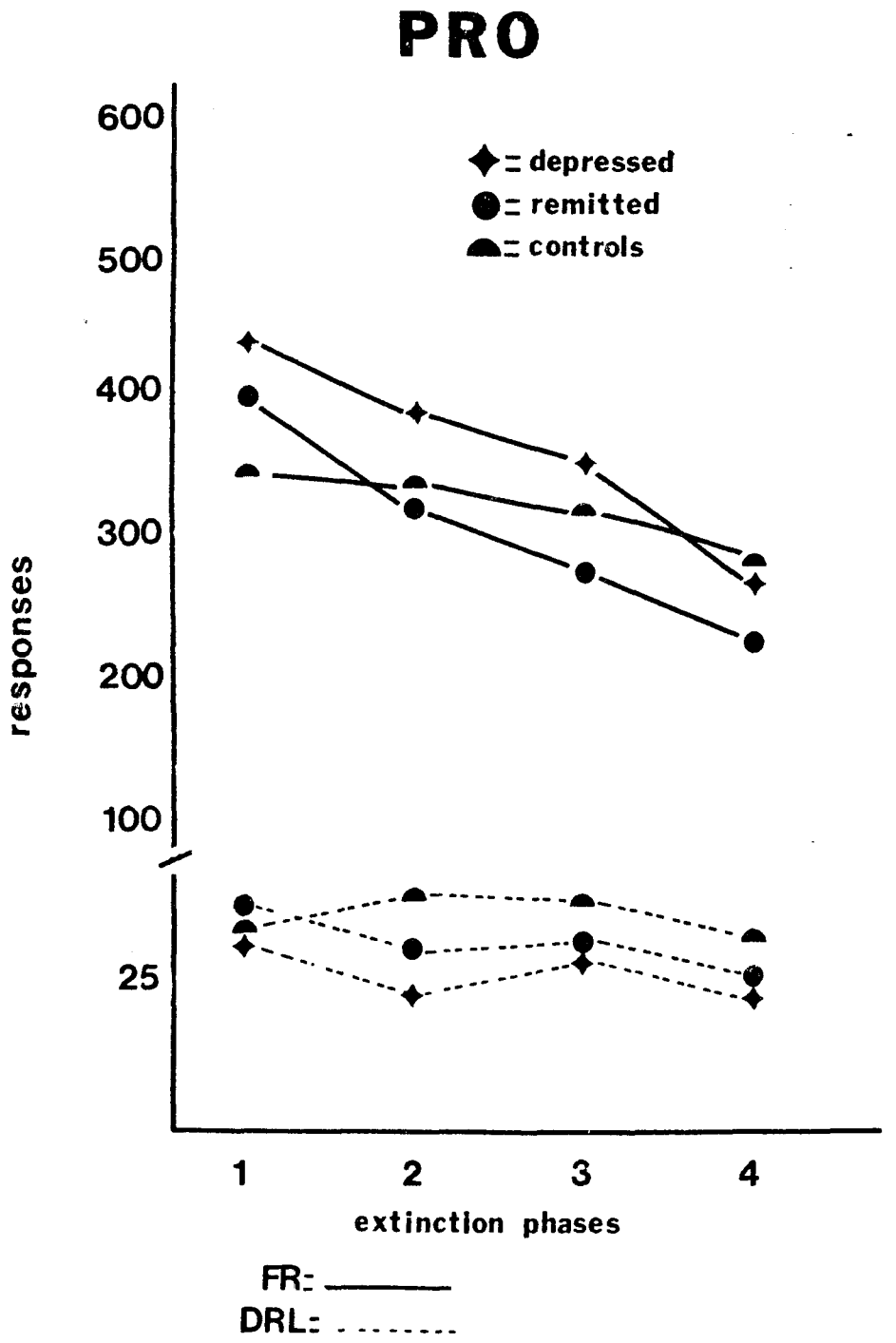

Figure 15: Number of Responses Made During PRO Extinction

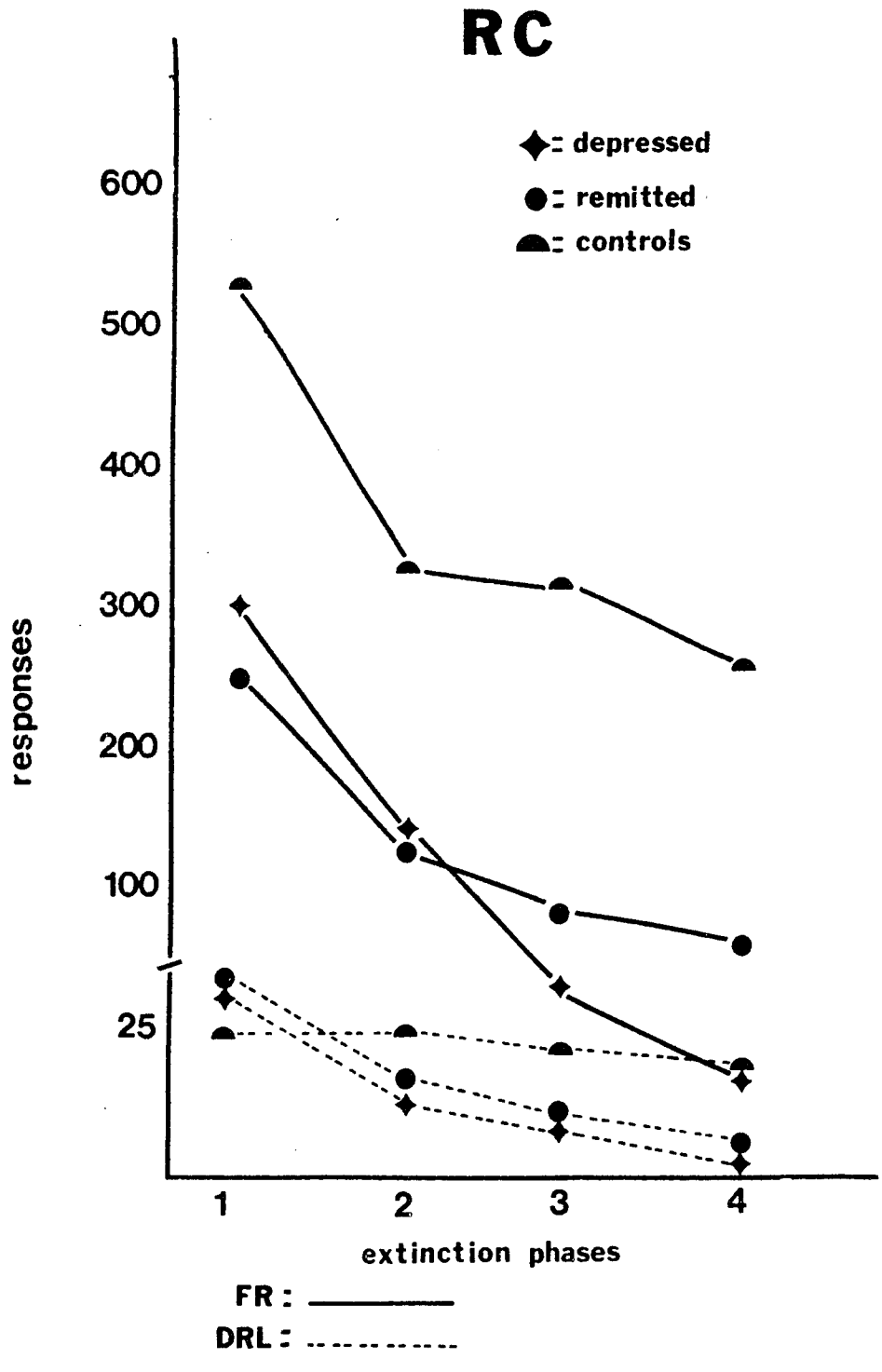

Figure 16: Number of Responses Made During RC Extinction