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# Depression And Vulnerability: The Role Of Mood And Depression History On Cognitive Processing

Scott Bradley McCabe

# Depression and vulnerability:

# The role of mood and depression history on cognitive processing.

by

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## Abstract

Cognitive theorists hypothesize the existence of a causal cognitive vulnerability for depression that exists as either a continuously observable trait-like difference (i.e., the main-effects model) or a latent factor observable only in interaction with life events or mood (i.e., the interaction effects model). The current investigation examined the main-effects model and one form of the interaction-effects model that emphasizes current mood as the activator of latent cognitive vulnerability, the Differential Activation Hypothesis (DAH). When primed by sad mood, vulnerable individuals purportedly process environmental information in a manner similar to currently depressed individuals, making them more vulnerable for depression.

Studies of cognition in depressed, remitted and nondepressed subjects have been criticized for not priming subjects at test times or for using state-like symptom descriptor stimuli to assess trait-like differences. In the current investigation, depressed, remitted and never depressed women completed self-report questionnaires and two computerized tasks, a Stroop task and a deployment-of-attention task (DOAT). Care was taken to evaluate both state-like and trait-like stimuli, as well as priming individuals, through mood inductions, before cognitive tasks.

Results indicated that subjects' self-reports were predicted only by main effects of mood or diagnostic history, thereby supporting the main-effects hypothesis. When the Stroop task was presented following the DOAT, further support for the main-effects hypothesis was obtained. A weighted reaction time analysis using subjects' self-referent ratings of stimuli was able to differentiate depressed and never depressed subjects' performance, but not previously depressed subjects' performance on the Stroop. Subjects' responses to the DOAT conformed to predictions made from both the main-effects model and the DAH for trait-like but not for state-like stimuli. Never depressed subjects and unprimed remitted subjects evidenced a protective bias by focusing attention away from trait-like negative-content stimuli, while primed previously depressed subjects and currently depressed subjects were unbiased.

Overall, modest support for the DAH was obtained while studies more consistently pointed towards support for the main-effects hypothesis. Important stimulus characteristics were identified, implications for understanding depression and limitations of the current investigation were discussed.

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I am grateful to London Psychiatric Hospital, University Hospital and Victoria Hospital for allowing me access to patients at their facilities. Special thanks are offered for the assistance provided by Dr. Shahé Kazarian, Chief Psychologist at London Psychiatric Hospital. Dr. Kazarian ensured that a room for testing was permanently available for my use, made photocopying available, and also provided employment for which I and my family are forever grateful. The staff on the Mood Disorders Unit of London Psychiatric Hospital have been helpful by allowing me to sit in on rounds to identify appropriate participants and later by providing economic support during my employment as the unit psychologist.

A very special thanks goes to all those individuals who participated in the research. As any parent of a child between 3 and 6 years old is well aware, time is very valuable. These women all gave up at least 3 to 4 hours of their precious time,

in the evenings or on weekends, to assist me with their participation.

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## Chapter I -- General Introduction

### Depression and vulnerability: The role of mood and depression history on cognitive processing.

According to recent American epidemiological surveys, overall, depression is the most common single mental illness reported (Kessler, McGonagle, Zhao, Nelson, Hughs, Eshleman, et al., 1994). In fact, depression is sometimes described as the 'common cold' of mental health (Burns, 1980). Lay persons' definition and understanding of depression is typically limited to the symptom of dysphoria or sad mood. Diagnostic descriptions however, have much greater specificity and breadth. For example, in the most commonly used North American system, the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R; American Psychiatric Association, 1987), depression is identified as either a pervasive depressed mood or inability to experience pleasure, either of which must be accompanied by at least four of the following symptoms for a minimum two-week period: sleep disturbance, weight fluctuation, fatigue, feelings of worthlessness or guilt, suicidal ideation, impaired concentration or indecisiveness, and psychomotor agitation/retardation.

Depression is a serious problem in our society, expected to occur in approximately 25 percent of the general population in their lifetime (Weissman, Myers, & Harding, 1978). Not only is depression a relatively common phenomenon, but complications of suicide make it a potentially lethal disorder as well (American Psychiatric Association, 1987). The National Institute of Mental Health in the United States estimates that upwards of 80% of annual suicides can be traced to precipitating depressive episodes (Gotlib & Colby, 1987). With such life threatening consequences, it is little wonder that in the last two decades we have witnessed major advances in both research and treatment efforts directed at the complex syndrome of depression. For example, investigations of intrapsychic and interpersonal factors,

biological predispositions, and environmental characteristics have all been conducted in order to understand their unique and combined effects contributing to the development of depression.

Thus far, the best predictor identified for experiencing an episode of clinical depression is a past history of depression (Belsher & Costello, 1988). In fact, it has been estimated that as many as 50% of people who have a depressive episode are likely to relapse in the two years following recovery (Belsher & Costello, 1988). Given that point prevalence estimates of depression usually fall around 10 percent, it is obvious that previously depressed individuals are at much greater risk for experiencing depression (indeed, these estimates suggest that they are at five times greater risk). Clearly, the prevention of depression is an important goal. It appears that the most appropriate focus for prevention efforts would be with individuals having a history of depressive episodes, due to their increased risk for future depression. Thus, in order for prevention efforts to succeed, it is necessary that we begin to examine those individuals who have experienced a depression, but are currently nonsymptomatic, in order to determine what factors might contribute to increased vulnerability.

In order to explore the potential factors that make an individual vulnerable to depression, two theoretical approaches are presented and evaluated. First, Beck's cognitive theory of depression and depressive vulnerability is presented and the evidence for and against this model is discussed. Following this, the Differential Activation Hypothesis (DAH; Teasdale, 1983, 1988) is presented and the research examining this theory is evaluated.

Beck' Cognitive Theory of Depression

Beck and colleagues (1967; 1976; Beck, Rush, Shaw, & Emery, 1979) have delineated a causal theory of depression and have specified a treatment approach based on this cognitive formulation (Beck et al., 1979). Essentially this is a tri-partite model which encompasses the "cognitive triad", cognitive distortions and negative self-schemata. The cognitive triad is defined as negative perceptions regarding self, world, and future. Depressed individuals have negative views of these three components which purportedly maintain their depression. The process whereby these

negative views are hypothesized to become potent, involves the characteristic styles of dysfunctional thought patterns or cognitive distortions. It is theorized that depressed individuals have entrenched negative dysfunctional opinions about themselves and their environment. In order to have normal levels of self-esteem, these individuals must satisfy highly rigid and often inappropriate contingencies in their daily life (see Olinger, Kuiper, & Shaw, 1987). For example, a depressed individual might believe that, "I must be outstanding at something to be a worthwhile person," or "I am nothing if someone I love doesn't love me." In fact, one of the main components of cognitive therapy (Beck et al., 1979) involves the regular challenging of such dysfunctional thoughts. It is thought that the depressed individual is unable to meet such irrational contingencies and, therefore, suffers from depressed mood and other associated symptomatology of the depressive syndrome.

In order for dysfunctional attitudes to remain potent, and thereby maintain a depression, an individual must sustain a constant vigilance for negative environmental or personal information and concurrently discount positive information. Beck described negative cognitive schemata to account for such an information processing style. Schemata, according to Beck, are stable cognitive patterns that influence the encoding, evaluation, storage and recall of stimuli (Sacco & Beck, 1985). Negative schemata are purportedly developed early in life as a consequence of negative experiences (Kovacs & Beck, 1978; Sacco & Beck, 1985). Beck's theory suggests that the negative schemata guide depressed individuals' information processing such that they focus on negative characteristics and discount positive characteristics of their environment. This faulty information processing results in a negative view of self, world, and future (i.e., the cognitive triad), causing the current depression to be maintained, all driven by negative cognitive schemata. Beck's theory places heavy emphasis on negative schematic processing, suggesting that it is such schemata-guided information processing that ensures the stability of cognitive distortions and the cognitive triad, consequently maintaining depressive symptomatology. As schematic functioning is central to Beck's theory, the current research examined information processing tasks that are purportedly affected by such schemata. Given such importance, a more extended description of schemata is presented.

Schemata: Definitions and Functions

Originally described by Bartlett (1932), the concept of schemata has subsequently been altered in so many ways that there is no longer any single definition for this construct. However, Williams, Watts, MacLeod, and Mathews (1988) have described four criteria for defining schemata in order of increasing specificity. First, virtually all definitions of schemata indicate that a schema is a stored body of knowledge that affects encoding, comprehension and retrieval of new information. Schemata exert this effect by guiding attention, expectancies, interpretations, and memory searches. Clearly, Beck's definition fits within this first criterion outlined by Williams et al (1988). Second, schemata should have consistent internal structure that is imposed on new information. Thus, processing of information results in the stimulus situation becoming stereotyped. Third, schemata are also capable of being generic, having prototypical representations of environmental regularities. Finally, schemata function as wholes whereby the activation of any part of a schema would activate the whole.

Evidence for Beck's Theory

Numerous studies have been conducted testing Beck's cognitive model of depression. Overall, the results of these studies have provided mixed support. According to Beck's model, compared with their nondepressed counterparts, depressed individuals perceive and recall negative stimuli as more negative, neutral stimuli as negative, and positive stimuli as less positive. Although the results of many studies support these predictions, a number of others have failed. In an extensive review, Alloy and Abramson (1988) found that group differences were as often the result of cognitive biases in the control group as they were biases in the depressed group (see also Coyne & Gotlib, 1983, 1986, for detailed evaluations).

More recently, investigators have begun to focus on the more molecular aspects of depressive information processing in order to determine why equivocal evidence for the cognitive model has been found in currently depressed individuals. In fact, most studies have relied on individuals' self-reports as evidence for or against the cognitive model. Unfortunately, individuals seldom have access to the processes underlying their cognitions, and their self-reports can be subject to very diverse

whims and motivations (Ingram & Reed, 1986; Zuroff, Colussy, & Wielgus, 1983). Indeed, some researchers have suggested that in examining information processing between depressed and control groups, the most relevant factors to assess include speed of processing and biases in attention to categories of stimuli (e.g., Gotlib, 1990). However, such research is more difficult and time consuming to conduct than are studies that rely on questionnaires to measure cognitive functioning, which may account for their relative absence.

Research designs that do not rely on such self-report methodologies might elucidate reasons for the equivocal state of affairs (Gotlib & Cane, 1987). Indeed, a number of studies have appeared in the literature that have used paradigms from cognitive psychology and that support negative schemata functioning in depression. For example, Gotlib and McCann (1984) found that, whereas mildly depressed individuals took longer to name colours of negative-content words than either positive- or neutral-content words on a tachistoscopic colour-naming task, nondepressed individuals took the same time across the three content categories. Gotlib and Cane (1987) replicated these results in depressed psychiatric patients. Further, in a study of clinically depressed university students, McCabe and Gotlib (1993) used a dichotic listening task and again found that depressed individuals were more likely to be distracted by negative words in the unattended channel than were nondepressed individuals. Thus, using such cognitive paradigms, consistent evidence for the existence of negative schematic processing during periods of depression has been found in recent studies assessing both mildly and clinically depressed university students, and psychiatric patients.

One aspect of the cognitive model that has received considerable research attention in recent years is the hypothesis that schematic processing is responsible for the development of a depressive episode, in addition to being a factor in maintaining a depressive episode. Kovacs and Beck (1978) and Beck et al. (1979) suggest that negative schematic processing causes individuals to focus on negative aspects of their world, giving rise to the cognitive triad. In turn, the cognitive triad is purported to cause depressive symptoms. Thus, not only is schematic processing involved in the

maintenance of a depressive episode, but in the cognitive model it is given even greater significance by implicating it as one of the causal factors.

Schemata are proposed to develop through repeated early life events of an individual and, therefore, take on idiosyncratic characteristics. Unfortunately, Beck and colleagues have not consistently specified how schemata might be activated and involved in depression onset. For example, critiques by Coyne and Gotlib (1983) and Teasdale (1983) have pointed out that cognitive theorists have written inconsistently about the method of 'activation' of schemata. As one example, Kovacs and Beck (1978) suggest that "certain cognitive processes seem chronically atypical among depressed patients and may represent a stable characteristic of their personality" (p. 530). However, both within the same article and in Beck et al. (1979), it is also suggested that schemata remain latent until activated by certain external events. Thus, schemata have been proposed both to represent ongoing stable vulnerability characteristics, and to be latent characteristics that are activated by certain life events or external stressors. Hammen and colleagues have referred to the ongoing vulnerability notion as a "main-effects" model (Hammen, Marks, deMayo, & Mayol, 1985), in which it is suggested that schemata function as vulnerability factors for depressive episodes by existing as trait-like factors that persist in periods of remission. The main-effects model implies that individuals whose depression has remitted should show more depressogenic cognitive styles than individuals who have never had a depressive episode, that is, these styles should be present both while the individual is depressed and later when they have recovered. In contrast, in the "interaction-effects" model (Hammen et al., 1985) the interaction of a stressor (i.e., a negative life event) and negative cognitive schemata produce depressive cognitive processing styles, purportedly leading to depression. The implication of the interaction-effects model is that depressogenic cognitive style is not present in individuals whose depression has remitted unless they have experienced a recent life event that activates their particular negative schema.

Research assessing the main-effects model has suggested that this form of schemata hypothesis is largely untenable. For example, studies that have been conducted assessing Dysfunctional Attitudes Scale scores (DAS; Weissman & Beck,

1978) (a measure of beliefs that are excessively rigid and unrealistic and that, according to Beck's theory are believed to be stable traits providing a vulnerability for depression) failed to demonstrate differences between remitted and nondepressed groups. That is, research indicates that, as depression remits, DAS scores become equivalent to normal groups (Hamilton & Abramson, 1983; Hollon, Kendall, & Lumry, 1986; Persons & Rao, 1985; Silverman, Silverman, & Eardley, 1984--for an exception see Eaves & Rush, 1984).

Researchers using cognitive tasks in longitudinal studies have also been unable to document differences between remitted and nondepressed control groups. For example, using a self-referent encoding task, Dobson and Shaw (1987), found that remitted subjects' performance approximated that of nondepressed control subjects from whom they differed when symptomatic. Further, in the study of tachistoscopic Stroop colour naming mentioned earlier, Gotlib and Cane (1987), found that remitted depressed psychiatric patients were also equivalent to controls on the reaction-time task. Utilizing a dichotic shadowing paradigm, McCabe and Gotlib (1993) also found that upon remission, previously depressed subjects' performance was equivalent to that of a nondepressed control group, from whom they had differed while depressed.

Thus, consistent accumulating evidence suggests that the main-effects schemata hypothesis of the cognitive model is inaccurate. It appears that schemata alone may not actually be causal factors in depression. Consistent with this suggestion, Miranda and Persons (1988) used a mood induction paradigm to demonstrate that DAS elevations are tied to current mood. Indeed, these investigators found that DAS scores were lower when an individual was in an induced-elevated mood. More recently, Miranda, Persons, and Byers (1990)obtained similar findings when they observed that depressed subjects' DAS scores varied with natural diurnal variations in their mood. Specifically, during their best periods, subjects' DAS scores were lower than in their worst periods. In a second study, Miranda et al. found that whereas the interaction of current mood and history of depression was a significant predictor of DAS scores in previously depressed subjects, no such relationship existed in never-depressed controls. Differences between control and vulnerable subjects were apparent only in the presence of more negative affective states. Therefore, although a

main-effects model appears to be an inappropriate estimation of how schemata may cause depression, it does not preclude their involvement in interaction with other variables to cause depression. Specifically, schemata may not be continuously potent in a vulnerable individual; rather, they may be activated by certain life events, or stressors. Such a process corresponds to the interaction effects model described earlier (Hammen et al., 1985).

The interaction-effects model has been studied less frequently than the main-effects model. Nevertheless, important studies assessing this hypothesis have been conducted. As one example, Hammen et al. (1985) conducted a comprehensive prospective study assessing both a main-effects and interaction-effects model of schematic processing and risk for depression. Individuals were categorized according to schema status (i.e., those with a "depressive schemata" and those without) and followed over time. Results indicated that schemata status was not a vulnerability factor for experiencing depression either as a symptom or a syndrome. Initial depression status was the only significant predictor of future depression. More importantly, the design allowed for the assessment of the interaction of negative life events with schemata status, thereby assessing the interaction-effects hypothesis of the cognitive model. This finding too, was contrary to predictions made by the cognitive model. That is, the interaction of negative life events with negative schemata was not predictive of future depression.

Other studies have demonstrated some association between the interaction of cognitive measures, stressful life events and depression level. For example, Metalsky, Abramson, Seligman, Semmel and Peterson (1982) assessed attributions for negative events along dimensions of globality, stability, and internality (Learned Helplessness Model attribution dimensions) and found that internal or global attributional style for negative outcomes interacting with a negative event predicted depressed mood. However, in another prospective study, Barnett and Gotlib (1988) assessed subjects on two occasions, three months apart. The results of this study indicated that the DAS by life events interaction did not predict depression at the second testing. It might be important to note that the two prospective designs used different measures of depressive vulnerability (i.e., attributions versus DAS scores),

making their results difficult to compare directly. A number of cross-sectional studies have found associations between depression and the life events by cognition measures interactions, although the findings are not entirely consistent (e.g., Gong-Guy & Hammen, 1980; Olinger, Kuiper, & Shaw, 1987; Persons & Rao, 1985; Robins & Block, 1988).

Thus, the findings of interactions of depressive schematic processing (as measured by self-report; including attributions and dysfunctional attitudes) and life events predicting depression is not as clear or as robust as one would predict from the cognitive model. However, in contrast to the main effects model, some support for the interaction effects model exists and this is a promising avenue for future research. There are at least two possible reasons for the equivocal findings of the interaction studies: the idiosyncratic nature of schemata, and the emotional status of remitted individuals during follow-up testing in longitudinal studies.

With respect to the idiosyncratic nature of schemata, Sacco and Beck (1985) point out that the cognitive model is a stress-diathesis model of psychopathology. Individuals acquire idiosyncratic schemata as a consequence of <u>different</u> early life experiences. Because of these idiosyncratic schemata, one type of negative event may affect one individual (i.e., activate a depressive schema) that would not affect another individual. Such specificity would provide 'noise' in an assessment of the interaction of negative life events and schemata status in predicting depression. For example, whereas the break-up of a romantic relationship might activate a latent negative schema in one individual, another person might not be adversely affected by such an experience. In contrast, an individual who experiences a childhood marked by extreme parental demands for success may experience activation of a negative schema and subsequent depression by the loss of employment as an adult (these two examples correspond to Beck's, 1983, sociotropic and autonomous personality styles). Therefore, it may be that existing research has not tapped the idiosyncratic nature of the interaction between schematic processing and life events postulated by Beck and colleagues. The difficulty with such specific predictions is that, in addition to determining schematic vulnerability and life events, further specification of what type of life event is important for each individual is a formidable task in a longitudinal

study, although a number of studies are appearing in recent publications that have taken this strategy (e.g., Hammen, Ellicott, & Gitlin, 1989; Robbins, 1990; Robbins & Block, 1988; Segal, Shaw, & Vella, 1989; Segal, Shaw, Vella, & Katz, 1992).

The second reason for failure of longitudinal research to demonstrate differences between remitted and control groups may involve the emotional status of the individual at follow-up testing (when the person has recovered from the episode of depression). Teasdale (1983, 1988) suggests that the cognitive processing of vulnerable individuals would not be expected to differ from controls while both were in normal or happy moods. He suggests, however, that once vulnerable individuals are in a sad mood, differences between vulnerable and nonvulnerable individuals would become apparent on cognitive tasks. Because this theory relies heavily upon Bower's (1981) work, a brief description of the associative model of mood and memory is presented before a detailed discussion of Teasdale's model.

Bower's Model of Mood and Memory

Bower (1981) was concerned with examining the effects of mood on cognitive processes such as memory, thinking, daydreaming, and social inferences (Bower, 1987). He described state-dependent memory, in which recall of material is facilitated by congruent psychic states at both learning and recall times. That is, if an individual was in a particular psychic state when learning material, later recall of that material would be facilitated if the individual was in the same state as when the material was originally learned. However, if the individual was in a different psychic state, recall of material would be impaired.

Bower (1981) attempted to produce such state-dependent learning effects by using different affective conditions (e.g., joy, fear, anger and sadness). He hypothesized that understanding the influence of mood on memory functioning might facilitate comprehension of clinical disorders (e.g., depression and anxiety). In this report he described a number of studies conducted in his laboratory, in which hypnotically-induced mood produced state-dependent learning effects. For example, Bower (1981, pp. 132-133) asked subjects to keep a diary of events over a one-week period. One week after completing this diary, subjects participated in a hypnotically-induced mood manipulation (i.e., subjects were put into a pleasant or unpleasant

mood) and asked to recall the events described in their diary. Consistent with the state-dependent hypothesis, whereas subjects in an induced-pleasant mood recalled more pleasant than unpleasant events, subjects in an induced-unpleasant mood recalled more unpleasant than pleasant events.

In order to ensure that findings were not a consequence of sensitization to pleasant and unpleasant events and experimenter demand, Bower conducted a second study asking subjects to describe a series of childhood events. In this study, subjects were placed in a hypnotically-induced mood (either happy or sad) and were asked to recall childhood incidents from before age 15 for about 10 minutes. They were instructed to describe each incident in one or two sentences, and to move on to another unrelated incident. On the subsequent day, subjects were asked to categorize each of the events recalled on the previous day as pleasant, unpleasant, or neutral while they were in a neutral mood. Again, a state-dependent bias was found; whereas subjects who had been in a happy mood recalled more pleasant memories than unpleasant, subjects in a sad mood recalled slightly more unpleasant than pleasant memories.

Similar effects have also been reported by Teasdale and Fogarty (1979), who used the Velten mood-induction procedure (Velten, 1968). Teasdale and Fogarty prompted subjects who were in induced happy or sad moods to recall either a happy or sad event from memory when prompted by a neutral stimulus word. They found that, whereas subjects in the happy mood condition recalled happy memories faster than sad memories, subjects in the sad mood condition retrieved sad memories faster than happy memories.

Bower (1981) explained these findings in terms of network theories of semantic memory (Anderson, 1976; Anderson & Bower, 1973; Collins & Loftus, 1975; Collins & Quillian, 1969). In network theory, memories are hypothesized to be stored in an associative network of semantic concepts, which are used to describe events. Each event is represented by a cluster of descriptive propositions. New events are said to be recorded in memory by the association of the current concepts used in describing the events and the existing concepts. This theory proposes that the basic unit of thought is a proposition and its related concepts. Thoughts become

conscious through the activation of a proposition and its concept above some threshold level. The activation of related concepts is proposed to occur as a consequence of activation through the associative links. A frequently used analogy of this memory process is the spread of electrical current through a series of circuits. Once electricity is introduced at a circuit (activation of a proposition and concept), the electrical current passes through to connected circuits (associated concepts) and activates them when the level of current exceeds the resistance of the particular circuit (activation above the threshold level). Thus, in memory, activation of a particular node can be accomplished by presentation of a corresponding stimulus pattern or by activation of an associated node or concept that would, in turn, activate the associated node.

Emotions are proposed to hold unique status as nodes in themselves. Bower (1981) suggests that each of the basic emotions (e.g., fear, joy, anger, sadness, etc.) has a specific node or unit in memory. These special memory nodes result in clusters of associated aspects of the emotion. For each emotion node, Bower suggests that there are associated autonomic patterns, expressive behaviours, evoking appraisals, verbal labels and events (p. 135). Bower submits that emotions can be activated by many stimuli and, when activated above a certain threshold, emotions transmit this excitation to those associated nodes around it. The emotion-node activation spreads through associated memory structures, resulting in a sub-threshold level of excitation at related nodes. Moreover, in the original thesis, Bower suggests that emotional nodes may, in fact, inhibit each other. Thus, opposite emotions, for example, happiness and sadness, would be expected to inhibit each other. This appears to be a reasonable postulation: people are not typically happy and sad at the same time. One important caveat, however, is that although opposite emotion nodes might be inhibited, the concepts associated to the opposite emotion node might be excited to a subthreshold level by an 'opposite' excitation (see Small & Robbins, 1988). Because this has implications for the present research, it will be discussed in greater detail in a later section.

Teasdale's Differential Activation Hypothesis

Teasdale and colleagues (Clark & Teasdale, 1982; Teasdale & Dent, 1987; Teasdale & Fogarty, 1979; Teasdale & Russell, 1983; Teasdale, Taylor, & Fogarty, 1980) have conducted considerable research in the area of depressed mood and memory. As described in Teasdale's (1983) treatise, Teasdale and Fogarty (1979) set out to replicate the correlational findings of Lloyd and Lishman (1975) in a normal sample in which mood was manipulated. In this study, normal subjects were exposed to either an elation or depression mood induction. In each condition, subjects were given a neutral cue word and were asked to recall memories of real-life experiences that were either pleasant or unpleasant. A significant interaction of mood induction and memory type was found. Whereas subjects in the elation condition recalled pleasant memories much faster than did subjects in the depression condition, subjects in the two conditions recalled unpleasant memories equally quickly. Two other studies examining recall of life events followed a similar pattern: mood-congruent events were more likely to be recalled to a neutral cue word than were mood-incongruent events (Teasdale & Taylor, 1981; Teasdale, Taylor, & Fogarty, 1980).

In an extension to a clinical population, Clark and Teasdale (1982) examined the same depressed patients on two occasions, but took advantage of the natural diurnal variation in severity of depressed mood. When subjects were in a more severely depressed mood they recalled a greater percentage of unhappy memories and fewer happy memories in response to a neutral cue word. When these same subjects were in a less depressed mood, the opposite pattern of findings was observed: subjects recalled more happy than unhappy memories in response to the neutral cue words. Through these studies assessing both clinically depressed patients and normal subjects who received sad mood inductions, Teasdale has outlined the "Differential Activation Hypothesis" (DAH; Teasdale, 1983, 1988) based on Bower's (1981) associative theory of memory and emotion.

Teasdale (1983, 1988) proposes that the DAH explains both the vulnerability of some individuals to experience depression, which he refers to as "onset" vulnerability, and the persistence of depression, referred to as "persistence" vulnerability. It is important to note that Teasdale does not distinguish between

vulnerability to initial onset and subsequent relapse; rather, he combines these two concepts as onset vulnerability. Basically, Teasdale suggests that everyone experiences some life events that would be expected to produce mild dysphoria in the majority of individuals, and depression in a minority. After the individual is in a dysphoric mood, differences between vulnerable and nonvulnerable individuals emerge. In those individuals who are nonvulnerable (the majority), self-soothing functions occur, allowing those individuals to cope with their current affect and proceed through a course of remission and recovery from its effects (Teasdale, 1985). However, once dysphoric, those individuals who are vulnerable to experience clinical levels of depression evidence negative cognitive functioning that may lead to depression. That is, once in a dysphoric state, vulnerable individuals would exhibit specific patterns of thinking that may result in clinical levels of depression through the persistence of the dysfunctional cognitive styles. Therefore, cognitive patterns that are apparent once an individual is in a sad mood determine whether the mood is relatively transient, or whether it will develop into more severe depression. Further, Teasdale suggests that the original source of the depression may not matter; rather, "the crucial factor that determines whether the initial depression will intensify and persist is the pattern of thinking that exists, once depressed" (1988, p. 251).

Comparisons and Contrasts of the DAH and Beck's Theory

As previously noted, Teasdale's theory was developed utilizing Bower's (1981) concepts of mood and semantic memory. Teasdale suggests that once in a dysphoric mood, sad memories would be more available to the individual as a consequence of activation of the concepts through the emotion node for sadness. This facilitated memory would allow the retrieval of memories that are associated with the current mood. Thus, individuals would be better able to recall other events when they have experienced similar feelings. Moreover, this increased activation would be expected to negatively bias a whole range of cognitive processes. Teasdale therefore predicts that encoding, evaluations, and expectations concerning future events would all be negatively biased. A resultant vicious cycle of negativity might result and, consequently, an individual might be vulnerable not only to the onset of depression, but also to persistence of the depression. At this juncture, it is important to highlight

that both Beck and Sacco (1985) and Teasdale (1988) indicated that a number of processing functions (e.g., selection, encoding, categorizations, evaluations and expectations) will be biased as a result of cognitive processing. Neither invokes a model or structure of information processing; rather, they highlight the functions that will be affected.

The DAH differs from Beck's cognitive theory in at least three important ways. In the interaction-effects model of Beck's theory, schemata play an important role in the development of depression. These schemata are based on early life experiences that become activated only when environmental situations (i.e., life events) are similar to those that were present when the schemata were first being developed. Thus, inherent in this view is a specificity or high degree of situational congruence between current and past events that would allow the activation of a particular depressogenic schema. In contrast, Teasdale's DAH does not require such a high degree of matching between the activating event and a particular schema. Using differential activation theory one would suggest that the current sad mood would increase the accessibility of any related negative constructs that have been most frequently associated with previous experiences of depression and sadness in general. Thus, the particular event that caused the current dysphoria does not have to specifically resemble an original event; rather, a wide range of negative constructs is activated as a result of the depressed mood. Hence, the current event may not necessarily have to resemble the past event that caused the original depression. In addition, Teasdale's model is only an interaction-effects model (although for Teasdale the interaction is with mood rather than Beck's suggestion that the interaction is with life events) whereas Beck's model also has a main-effects version that posits continued differences between remitted and never depressed individuals.

Second, Teasdale (1988) recognizes that constructs that are activated through the depressed mood could be relatively mild (e.g., thoughtless, inconsiderate, or rude). He suggests that such constructs would be unlikely to result in more severe levels of depression. However, if the constructs activated by the depressed mood were more severe (e.g., worthless, pathetic, or useless), then it would be more likely that the vicious cycle would begin, resulting in greater depression (clinical levels), or

greater persistence of current depression. Teasdale suggests, then, that one of the most important factors in determining whether the vicious cycle is set up is whether the constructs that become accessible as a result of the depressed mood lead to interpretations of experience that are perceived as highly aversive and uncontrollable (see the Learned Helplessness model--Abramson, Seligman, & Teasdale, 1978). Beck's theory is silent as to the types or severity of associations that would ensue upon activation of a negative schema. In fact the mechanism whereby schemata become activated and influence information processing has been previously criticized (e.g., Coyne & Gotlib, 1983, 1986; Teasdale, 1988).

Third, Beck's theory suggests that upon activation of the schemata through congruent life events, one subsequently develops the cognitive triad and later depressive affect. Thus, the causal sequence outlined by the cognitive model suggests that, first, an event activates a particular schema. This leads to a negative view of self, world, and future. Depressive symptoms (such as depressed mood) develop as a result of this temporal sequence of events. However, Teasdale's (1983; 1988) theory proposes a different temporal order; first, individuals become dysphoric and <u>then</u> they develop negative cognitive patterns or activated schemata. Therefore, according to the DAH, it follows that any vulnerable individual who is placed in a dysphoric mood would demonstrate cognitive functioning similar to a depressed individual. In contrast, Beck's theory makes no such predictions. Indeed, using Beck's theory one would predict that sad mood should not affect information processing as sad mood is a consequence of the activation of schemata by life events. Sad mood, in itself, holds no special status in the cognitive theory outlined by Beck.

<u>Evidence for the DAH</u>

As previously described, a great deal of evidence supporting the DAH has been provided by Teasdale and colleagues. However, these studies were not undertaken to assess this hypothesis; rather, the results of these studies led to the development of the DAH. Teasdale and Dent (1987) designed one study that specifically assessed the DAH and Clark, Teasdale, Broadbent, and Martin (1983) presented another study that has direct bearing on methods of studying the DAH.

First, the study by Clarke et al. will be presented and the important limitations will be identified, followed by the Teasdale and Dent study.

Clark et al. (1983) examined lexical decisions in normal subjects in happy and sad induced-mood conditions. Subjects were presented with lists of positive, negative, and neutral words, as well as nonwords. The researchers predicted that reaction time to make decisions about whether the presented stimulus was or was not a word would be faster for positive words when subjects were in the happy-mood condition. Subjects in the sad-mood condition were expected to have faster reaction times when the words presented were negative. The predictions were not supported by the results. There was no interaction of mood condition and word type, nor were there main effects for word type.

Subsequent to the experimental task, subjects also completed an incidental recall task. In this case, the obtained results were the opposite of what might have been predicted from the DAH. A main effect of word pleasantness was found: subjects recalled more positive and negative words than neutral words. A trend toward an interaction was also found: more negative than positive words were recalled in the happy mood condition and more positive than negative words were recalled in the depressed mood condition. The reaction-time results and recall results stand in direct contradiction to the previous findings of Teasdale and colleagues reviewed above.

There are several important limitations in this study that must be addressed before establishing final conclusions. First, Bower (1987) has recently noted a number of failures to support the model of mood and memory. It seems that when stimuli are not personally relevant, effects are often not apparent. In the previous studies by Teasdale, it might be that findings consistent with the DAH were obtained because recall was for actual events in the subjects' lives. In the Clark et al. (1983) study, subjects were not accessing self-referential events from memory; rather, they were accessing memory in order to determine if the presented stimulus was a word. In fact, the word itself, as a personal concept in memory, may have had little or no meaning to the particular individual. The choice of negative and positive words appears to have been poor and, in fact, the authors suggest "that the personality trait

words used in the present experiment were insufficiently strong associates of their congruent mood states for a facilitation effect to be observed" (Clark et al., 1983, p. 178).

Clark et al. (1983) also suggest that lexical decisions might be an overlearned task, so automatic that mood would not influence decision times. Given that many studies have found semantic priming effects in lexical decision tasks (e.g., Neely, 1977), this appears to be an unlikely explanation. The authors also note that subjects were already in the induced mood when encoding of the words took place and suggest that subjects may have been reviewing the words which had just been presented to them to see if they had made the correct decisions. Words that were mood congruent would possibly be checked more quickly than incongruent words. Thus, subjects would be aware of incongruent words longer than congruent words and, in recall tasks, would recall the words that had been in active rehearsal longer.

Finally, subjects in this study were all nondepressed individuals who underwent a mood-induction procedure. A more effective test of the DAH would be to assess a group who was vulnerable to experiencing clinical depression. As a result of mood induction, the vulnerable group would be expected to differ from nonvulnerable controls within the sad mood condition. Clearly, these limitations must be addressed in order to effectively evaluate the DAH using lexical decision tasks.

A second study directly assessing the DAH and onset vulnerability has more favourable results for the DAH (Teasdale & Dent, 1987). In this study, previously depressed (according to Research Diagnostic Criteria) and never depressed women were identified using the Schedule for Affective Disorders and Schizophrenia-Lifetime interview (SADS-L; Endicott & Spitzer, 1978). All women were currently nondepressed as evaluated by SADS-L interview and all had BDI scores of less than 10. Subjects completed a number of questionnaires and the SADS-L interview, followed by a sad mood musical induction procedure. In order to assess cognitive processing, subjects rated a series of positive and negative adjectives in terms of how self-descriptive they were (therefore self-descriptive words would be personally relevant). Following this task, which was modeled on Kuiper's level-of-processing incidental recall procedure (e.g., Derry & Kuiper, 1981), subjects were asked to

recall as many of the adjectives as they could. Teasdale and Dent found that never-depressed subjects recalled a greater percentage of positive-content words than did recovered-depressed subjects. Moreover, recall for depressed-content words that subjects endorsed as self-descriptive was greater for the recovered-depressed group than for the never-depressed group. These results clearly support the DAH. Additionally, these results cannot be attributed to differences in mood alone, as both groups were equivalent on visual analogue mood scales administered immediately after mood induction procedures. Thus, equivocal evidence exists for the DAH. However, due to the limitations discussed, further research must be conducted that allows evaluation with different and more appropriate stimuli and subjects. Also, the only support garnered for the DAH's 'depression onset theory' concerns memory processes. Further research is also required to assess other aspects of information processing (e.g., attention). Finally, the robustness of Teasdale and Dent's findings must be assessed using other experimental paradigms.

It appears that there are some differences between vulnerable and normal controls when in a sad mood, as predicted by the DAH. However, it is important to consider the failures of the DAH. First, subjects apparently must be involved in some task in which the personal relevance of the stimuli is taken into consideration. The early studies by Teasdale and colleagues revealed differences that would be expected following the DAH; these studies however, were all concerned with personal memories of past events. When assessing other stimuli (i.e., non-self-relevant stimuli), expected differences were not observed. Thus, the stimuli may need to be personally relevant in order to demonstrate vulnerable group differences; this dimension therefore should be assessed.

The type of information processing that is being assessed may also account for the null findings. Clearly, Bower's (1981) model and Teasdale's (1988) formulation based on this model are clear about expectations regarding recall of material. However, the DAH is vague with respect to the mechanism whereby other types of information processing would be affected. For example, should the selection of stimuli to be attended be affected by mood? Beck's theory certainly suggests that schemata influence perceptual selection processes; although Teasdale's theory suggests

that this is the case, the exact mechanism is as yet unspecified. Indeed, Williams et al. (1988) reviewed a large number of studies that used information processing paradigms. They suggested that, whereas retrieval processes are more adversely affected in depression, encoding processes are most affected in anxiety disorders. Therefore, it is not yet clear from the research on the DAH which specific types of information processing are affected by dysphoric mood.

Although Bower's (1981) research primarily examined memory, extending this theory to other information processing functions seems reasonable. If an emotion node, sadness for example, were activated, the related concepts are also activated and available. In determining what aspects of the environment will receive further attention, those concepts that are similar to the activated concepts would be expected to draw attention first, and also to receive further elaboration. In summary, although there are some cognitive differences between vulnerable individuals and controls while in a dysphoric mood, it remains for further research to specify what other functions or processes of information processing would be affected by dysphoric mood and what types of stimuli would reveal these differences.

Outstanding Issues: Vulnerable Individuals, Stimulus Variables Including State-trait, Severity, & Content Comparisons

The preceding review of the literature suggests a number of important issues that need to be addressed in research on cognitive vulnerability to depression. The issues that will be addressed in this research are described in the following paragraphs.

Identification of Vulnerable Individuals. One important issue to be drawn from the literature concerns the identification of vulnerable individuals in the current investigation. A number of methods of defining individuals who are vulnerable to experiencing a future depression have been used in the literature, including comparing remitted depressives and control subjects (e.g., Altman & Wittenborn, 1980; Cofer & Wittenborn, 1980; Dobson & Shaw, 1986; Hammen et al., 1985), conducting longitudinal studies comparing individuals during periods of depression and following remission (e.g., Bothwell & Weissman, 1977; Dobson & Shaw, 1987; Gotlib & Cane, 1987; McCabe & Gotlib, 1993), and using performance on cognitive tasks to

identify vulnerable but currently nondepressed individuals (e.g., Hammen et al., 1985; Kuiper, Olinger, MacDonald, & Shaw 1985; Kuiper & Olinger, 1986; Kuiper & McCabe, 1985). The first strategy was adopted in the present study to identify vulnerable individuals.

Assessment of past depression is likely the most expeditious and reliable method of identifying vulnerable individuals. Approximately 50 percent of individuals who experience a clinical depression will be expected to relapse within two years of recovery (see Belsher & Costello, 1988). Indeed, several investigators have identified past depressive episodes as a vulnerability factor for relapse or new episodes (e.g., Gonzales, Lewinsohn, & Clark, 1985; Lewinsohn, Hoberman, & Rosenbaum, 1988; O'Hara, Neunaber, & Zekoski, 1984). From a somewhat different perspective, 85 to 90 percent of depressed patients have more than one depressive episode; in fact, the average number of episodes is between five and six (Clayton, 1983). Concurrent methods may not have the same validity and longitudinal methods are inefficient as they are too time consuming and require large sample sizes to ensure a remitted group is available in suitable numbers.

Thus, an appropriate vulnerable group with which to assess the DAH would be composed of individuals who have been depressed in the past but who are currently nondepressed. An appropriate comparison group would be composed of those individuals who have never experienced an episode of clinical depression. Although these criteria for subject selection are inappropriate for the first episode of depression (i.e., initial onset), they do assess a vulnerability for future depression once an initial episode has been experienced.

Operationalization of Trait Vulnerability Utilizing State-Descriptive Stimuli. Accumulating evidence suggests that the schema concept is useful in helping us understand the ways in which depressed individuals process information when they are depressed. Although this helps us understand why depressive reactions might be maintained or persist, it says nothing about the cognitive patterns of those individuals who are vulnerable to experience depression. In other words, these studies speak to concurrent schema functioning, or episodic schematic processing. The nature of schematic functioning before individuals become depressed remains more elusive.

This type of schematic processing has been referred to as onset vulnerability (Teasdale, 1988; similar distinctions have been described by Kuiper and colleagues in vulnerability versus episodic cognitions; see Kuiper, Olinger, & MacDonald, 1988; Kuiper, Olinger, & Martin, 1990). Longitudinal prospective studies designed to determine the existence of vulnerability cognitions or onset vulnerability have not found remitted versus control group differences. Gotlib and colleagues (Coyne & Gotlib, 1983, 1986; Gotlib & Cane, 1987; McCabe & Gotlib, 1993) have suggested that these results suggest a need to revise the cognitive model of depressive vulnerability. Others have pointed to the limitations in research as the reason for failure to demonstrate vulnerability (e.g., Kuiper et al., 1988, 1990; Spielman & Bargh, 1990).

At least one limitation in the design of such studies lies in the selection of stimuli designed to operationalize the schematic functioning of the remitted-depressed individual. As one example, in much of the research, experimenters use both depressed- and nondepressed-content adjectives. In examining the self-schemata notion of Beck's model, investigators are attempting to discover stable traits that make an individual vulnerable to experience a depression. Unfortunately, they have chosen to operationalize these traits in terms of symptoms, or state characteristics of depression. Exemplars of negative-content words that have frequently been used include: depressed, blue, unhappy, sad, etc. Clearly, these represent symptom patterns of a depressed individual that are state-dependent. Therefore, it is unremarkable that such self-referent adjectives fail to demonstrate remitted versus control group differences when the remitted group no longer holds a self-representation consistent with these terms (cf. Spielman & Bargh, 1990). In fact, Spielman and Bargh's examination of the adjectives that were used in much of the incidental recall research conducted by Kuiper and colleagues revealed that, whereas the majority of depression adjectives described temporary symptoms, the positive adjectives represented traits that were relatively stable. Thus, it may be important to use trait words when conducting research on potentially long-standing individual differences in order to identify differences between previously depressed individuals and control subjects.

Severity of Stimuli Descriptors. An important dimension in assessing onset vulnerability, according to Teasdale (1988), concerns the severity of negative cognitions that arise for individuals once they are in a depressed mood. For example, as previously described, individuals may have extremely negative feelings about themselves once they are in a negative mood (e.g., worthless, pathetic, no good) or may have only mildly negative feelings (e.g., thoughtless, inconsiderate, rude). It is suggested that those individuals who experience extremely negative cognitions once they are in a depressed mood would be more likely to develop clinical levels of depression. In contrast, those individuals whose cognitions are marked by only mildly negative self-referent adjectives (e.g., thoughtless) would more likely be expected to recover from their current negative affectivity. To date, there has not been a direct examination of this hypothesis.

Affective- versus Neutral-Content Comparisons. Small and Robbins (1988) have suggested that when assessing associationist models like the DAH, it is important to consider the affective content of experimental stimuli. If we accept that related concepts are connected to emotion nodes (e.g., negative-content self-descriptors connected to sad emotion nodes), we might also posit that positive-content self-descriptors are also connected, albeit more weakly, to sad emotion nodes. In this regard, if one examines free-association, often one of the first concepts to spring to mind is an opposite of the stimulus word (i.e., an antonym). Thus, it is reasonable, as pointed out by Small and Robbins, that we would expect positive concepts to be activated by a sad node excitation, if not completely, possibly to some subthreshold level of activation. Because the positive-content concepts would be expected to reach subthreshold levels of excitation, we would predict that the magnitude of dependent measures would fall between the extremes for neutral- and negative-content stimuli. Therefore, when considering reaction-time experiments, appropriate comparisons to the reaction times of negative-content stimuli might not be reaction times to positive-content stimuli, as they would also be expected to be somewhat activated by association. Rather, the most appropriate comparison to make to negative-content stimuli reaction time is the reaction time to neutral-content stimuli.

Thus, stimulus dimensions considered important to the measurement of depressive vulnerability have been outlined and include the following: state versus trait; mild versus severe; negative-, positive-, and neutral-content words.

Summary and Overview of the Current Investigation

Clearly, there exists some vulnerability in individuals who have previously experienced a clinical depression to experience further episodes. Beck's model posits a cognitive vulnerability. There have been two forms of vulnerability delineated in this theoretical position, a main-effects model and an interaction-effects model. Although research to date has generally been unable to verify that such a vulnerability exists in an enduring trait-like difference (i.e., the main-effects model), some differences between remitted and never depressed groups have been demonstrated (e.g., Altman & Wittenborn, 1980; Bothwell & Weissman, 1974; see also review by Belsher & Costello, 1988). If there is some form of cognitive vulnerability that exists as a consistent difference (i.e., a main-effects model), it might be that current research has failed to demonstrate this vulnerability because the stimuli used to represent dimensions that might be important to depressive vulnerability have been too crudely defined in previous research. In contrast some support for the interaction-effects model of Beck's cognitive theory has been obtained, although the results are inconsistent, possibly due to the high degree of specificity required between life events and the idiosyncratic negative schema.

However, Teasdale (1983, 1988) suggests that the cognitive pattern evident once an individual becomes dysphoric might identify those individuals who are vulnerable to experience clinical levels of depression. Thus, the negative schemata may not have been consistently active during longitudinal experimental testing. That is, in examining vulnerable groups, researchers may have failed to adequately test cognitive models because the schemata may not have been primed or activated during the experimental manipulations. Limited support for this proposal has been observed and the shortcomings of this research have been identified.

Beck and colleagues (Beck et al., 1979; Beck & Sacco, 1985) suggest that schemata affect many types of information processing, including selection, categorization or coding, evaluation, and recall. In this regard, Williams et al. (1988)

have reviewed the literature and found that in anxiety disorders cognitive differences exist at an encoding or vigilance stage of cognitive processing, whereas in depression, it appears that cognitive differences become apparent predominantly in memory, that is, at a recall stage of information processing. Thus, it is important to examine on what types of information processing tasks depressive schemata (if they exist outside the depressive episode) have their effect. Therefore, the current study attempted to examine this issue by soliciting subjects' self-reports, measuring attention to emotionally-laden stimuli, and finally, assessing recall for affective-content stimuli.

It is important to recognize that Teasdale's and Beck's models are both interaction-effects models. Beck posits that an interaction of a specific type of life event and negative schemata results in depressogenic cognition leading to depression. Teasdale suggests in his model that the interaction of mood and a negative schemata results in depressogenic cognition leading to depression. In order to assess Beck's interaction-effects model one must conduct longitudinal research with large subject samples in order to assess the impact of various life events, if they occur, and resultant depression (one cannot ethically cause certain classes of negative events to happen in a person's life). Using Teasdale's model one would not have to conduct longitudinal studies as mood could be induced at any time. In addition to the interaction-effects model of Beck's theory, a main-effects model also exists. Research assessing a main-effects model also does not necessarily require a longitudinal investigation to evaluate its explanatory power. The current investigation was not a longitudinal one, therefore, it was only possible to examine Teasdale's interactional model (i.e., the Differential Activation Hypothesis) and Beck's main-effects model. Again, although a great deal of research has not provided support for Beck's main-effects model, a number of important stimulus characteristics may have negatively influenced the outcome of such research, and therefore it is important to assess the main-effects model with such stimuli. Additionally, past longitudinal research has generally used individuals in the control groups who were simply nondepressed at both testing times and cross-sectional research usually used a nondepressed group. If trait-like differences exist for remitted individuals, as the main-effects model implies, simply being nondepressed at both testing times would be an inadequate way of

control group assignment as they may have experienced a depression at some point in life predating the experiment. Such individuals would influence a greater similarity between the control group and the previously depressed group. Consequently, the main-effects model should be assessed when using a control group of never depressed subjects as was done in the current investigation.

In the current investigation attention and recall processes in previously depressed and never depressed women were examined while in induced negative moods in order to assess Teasdale's DAH. As well, the main-effects model of Beck's cognitive theory of depression was assessed using more carefully selected stimuli in order to maximize potential group differences. Subjects completed self-report questionnaires, experimental information-processing tasks and incidental recall tasks.

The following hypotheses were tested: According to the DAH, 1) Previously depressed subjects in a sad mood perform tasks in a manner similar to currently depressed subjects, 2) Never depressed subjects are unresponsive to mood inductions in terms of their information processing, 3) Previously depressed subjects in a normal mood perform tasks in a manner similar to the never depressed subjects. Using the main-effects model of Beck's theory it is hypothesized that previously depressed subjects perform tasks in a similar manner as currently depressed subjects and that both of these groups of subjects perform tasks differently from the never depressed subjects.

More specific assessment of the DAH took the form of assessing the differential processing of high- and low-emotional-intensity stimuli on the information-processing tasks. Based on the DAH, it was hypothesized that previously depressed subjects in a sad mood attend more to high-intensity negative-content stimuli than by low-intensity negative-content stimuli. As well, it was hypothesized that never depressed subjects demonstrate no differential performance for high- and low-intensity stimuli.

Finally, an assessment of whether the state or trait nature of experimental stimuli affects the results of information-processing tasks was undertaken. According to recent postulates (e.g., Spielman & Bargh, 1988), it was hypothesized that trait-like

stimuli reveal information-processing differences between previously depressed and never depressed groups, while state-like stimuli have no such discriminatory power.

Subjects completed self-reports on questionnaires on their own previous to attending an individually scheduled laboratory appointment. At the laboratory appointment, subjects completed an emotional Stroop task, a deployment-of-attention task, recall tasks and a diagnostic interview. All subjects completed all components of this investigation, with the two experimental information processing tasks completed in a counterbalanced order. The data and results are presented as two separate studies (i.e., a self-report, and information processing tasks with the Stroop as phase 1 and the deployment-of-attention task as phase 2). Brief introductions of the information relevant to each task are presented, followed by the results and discussion of that particular task.

## Chapter II--Study 1, Self-reports

In the first study, 95 women completed a number of self-report questionnaires in their homes in order to investigate the relationship between depression history, current naturally-occurring mood and responses to self-report measures. A total of 50 previously depressed and 45 never depressed women completed the questionnaire data reported in this study.

The Dysfunctional Attitude Scale (DAS) is, perhaps, the questionnaire most frequently used in examining both the main-effects and the interaction-effects models of Beck's (1967, 1976) cognitive theory of depression. Because this literature has already been reviewed, only the central findings will be reiterated here. First, studies have consistently revealed that currently depressed subjects (both dysphoric and clinically depressed) have elevated DAS scores when compared with nondepressed control subjects. Longitudinal studies assessing the main-effects hypothesis of the cognitive theory have demonstrated in all but one published study (Eaves & Rush, 1984) that it is only during the depressed episode that DAS scores are elevated. Indeed, upon remission, DAS scores of previously depressed subjects are statistically equivalent to those of control subjects. Finally, prospective studies examining the interaction-effects hypothesis have been unable to demonstrate a consistent association between DAS scores and stressful life events in predicting subsequent levels of depression.

Given such consistently negative evidence for the hypothesis that schematic functioning provides a diathesis for depression when examining subjects' responses to the DAS, it seems unlikely that Beck's (1967, 1976) cognitive theory can adequately explain vulnerability for future depression. Indeed, some have argued that negative schemata may be more appropriately viewed as being similar to symptoms of depression that are only evident during the depressive episode and that play no causal role in the development of depression (e.g., Gotlib & Cane, 1987). However, using the DAH, these previous studies can be criticized as inadequate in accurately assessing both the main-effects and the interaction-effects hypotheses of cognitive theory. First, studies using longitudinal methods to assess DAS data may be

insufficient because they do not 'prime' the schemata of previously depressed subjects at follow-up testing. Recall that using the DAH, Teasdale (1983, 1988) specifically suggests that in order to assess cognitive processing that might lead to a depressive episode, individuals must be in a sad mood during the assessment. Therefore, in order to determine whether the DAS can discriminate between subjects who were previously depressed and control subjects, each group would have to be assessed when in a sad mood. Similar criticisms can be levelled against the prospective designs with respect to mood at the Time 1 assessment. Specifically, if subjects are in a neutral or happy mood when they are assessed, the type of negative cognitive processing associated with depression, and perhaps depressive vulnerability, would not be evident. Consequently, if the dysfunctional attitudes resulting from negative schemata are not identified at the initial testing, one could not expect to obtain a DAS by stressful life event interaction predicting depressive mood at the subsequent measurement. It may be that researchers need to activate or prime the schemata in order to determine the efficacy of cognitive theory with respect to negative cognitive schemata. Alternatively, current dysphoric mood should also result in activated negative schemata. As will be seen in reviewing the following two studies, both of these methods (activation of schemata through experimenter manipulation and activation through naturally occurring dysphoric mood) have been used to study responses to the DAS (although only naturally occurring mood is used in this study).

Considering priming, there are at least two important studies, using the DAS, that speak directly to the issue of depressive vulnerability resulting from negative schematic processing. Miranda and Persons (1988) determined subjects' lifetime history for depression using a self-report measure, and exposed subjects to either an elation or depression mood induction, after completing baseline measures of a modified version of the Multiple Affect Adjective Checklist (MAACL; Zuckerman & Lubin, 1965) and the DAS. Post-induction scores on the DAS revealed that subjects in the elation condition had significantly lowered DAS scores, while subjects in the depression condition had increased DAS scores, although the change in the depression condition was not significant. More importantly, a regression analysis examining pre-manipulation mood, history of depression and DAS scores revealed a significant

interaction of history of depression and mood in predicting DAS scores. Specifically, as naturally occurring mood became increasingly negative for subjects with a history of depression, DAS scores became increasingly elevated; mood had no effect on DAS elevations for subjects who had no history of depression. This effect was replicated by Miranda and colleagues in a separate study two years later (Miranda, Persons, & Byers, 1990).

These two studies represent an important first step in assessing the interaction-effects model of schemata processing with the DAS. However, these studies are limited in that they have only examined the interaction of mood and depression history using the DAS. In addition to dysfunctional attitudes, it is well established that depressed individuals have considerable interpersonal difficulties (e.g., Coyne, 1976; Gotlib & Robinson, 1982; Kuiper & McCabe, 1985). Therefore, a previously depressed individual's perception of interpersonal relationships might also be subject to the influence of current mood. As one example, an important relationship that has been extensively studied in relation to maternal depression concerns the mother-child dyad. Indeed, many investigations examining the relationship between maternal depression and mothers' perception of stress associated with parenting have found depressed mothers to perceive their children to be more difficult to care for and more temperamental than do nondepressed mothers (e.g., Cutrona, 1983; Fergusson, Horwood, & Shannon, 1989; O'Hara, Neunaber, & Zekoski, 1984, Whiffen & Gotlib, 1989). It would be important to determine if such perceptions are influenced by depression level, as DAS scores appear to be, and if they are susceptible to negative cognitive schematic processing. That is, would a mother's current perceptions of child temperament be negatively influenced by current mood if she had a history of depression as suggested by the stress-diathesis models, or would such perceptions be more trait-like, irrespective of current mood influence? Such parental stress perceptions were measured in the current investigation using a modified version of the Parenting Stress Index (PSI; Abidin, 1983)

Finally, given that Miranda and colleagues (Miranda & Persons, 1988; Miranda et al., 1990) have established that brief transient mood changes result in differential item endorsement on the DAS, it is also important to establish that longer

lasting changes in affect also have the same effect. That is, in order for the influence of mood to be the key to understanding the method whereby cognitive schemata exert their influence on depressive vulnerability, one would have to demonstrate that increasing levels of less transient dysphoria (i.e., mild depression) also result in similar findings. For example, one could also predict that high scores on depression measures (e.g., BDI or CES-D) in interaction with history of depression should similarly predict DAS scores, but only for those individuals with a history of depression.

In order to assess how robust the findings concerning depression history and current mood in the prediction of DAS scores are, and to examine the possible impact of these variables on perceptions of parental stress, currently nondepressed women, some with a history of depression and some with no lifetime history of depression, completed measures of dysfunctional attitudes (i.e., the DAS), depression severity (i.e., the CES-D) and parenting stress (i.e., the PSI). In accord with the findings of Miranda and her colleagues (e.g., Miranda & Persons, 1988; Miranda et al., 1990), it was hypothesized that the interaction of history of depression and mood predict DAS scores; analogous predictions were made for PSI scores, the interaction of history of depression and mood predict the PSI Parent and Child subscale scores.

# Method

## Subjects

Recruitment. All subjects in the current investigation were recruited by telephone from the group of over 2000 women who participated in an earlier study of the childbirth experience (Gotlib, Whiffen, Mount, Milne & Cordy, 1989). Subjects were informed of the nature of the study and the possibility that they may have to participate in a sad mood induction procedure at an individually arranged appointment. After subjects agreed to participate in the study they were mailed a questionnaire package containing a consent sheet, instructions for completion of questionnaires and the questionnaires themselves and consent forms (see Appendix A for the consent and instruction forms). An individual laboratory appointment was also arranged at this time.

Assignment to Groups. It was not until the conclusion of the individually arranged experimental session that the final assignment to groups was established. In order to assign subjects to groups, information regarding diagnostic history from Gotlib et al. (1989) was used in conjunction with current CES-D scores, and a current diagnostic interview covering lifetime history of depression. In this study, two groups of subjects were formed, a previously depressed (PD) group ($n$ = 50) that consisted of those women who received a prepartum diagnosis of depression in the Gotlib et al. (1989) study (according to Research Diagnostic Criteria, Endicott & Spitzer, 1978), who were not currently diagnosable as depressed (DSM-III-R) as determined by SCID interview (Spitzer, Williams, Gibbons, & First, 1988); and second, a never depressed (ND) group ($n$ = 45) who never obtained elevated BDI scores in the Gotlib et al. (1989) study, nor were currently diagnosable according to SCID interview and who reported no lifetime diagnosis according to SCID interview. (Note that the SCID interview described is not the full interview. Rather, it establishes DSM-III-R depressive diagnoses utilizing only relevant sections of the interview.)

Subjects in each group were equated as closely as possible on a number of demographic variables including: age, marital status, socioeconomic status, age of children, and education level in order to ensure group homogeneity on each of these

characteristics except for depression history. Women who lived outside the city of London, Ontario were compensated either $5.00 or $10.00 for travelling costs, depending on the distance from their home. Everyone inside the city volunteered to participate without receiving direct compensation. Each participant was eligible for one of two $100.00 draws completed at the conclusion of the study.

Materials

Questionnaires. All subjects completed the following questionnaires during the week previous to the experimental session: the CES-D (Radloff, 1977); the Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978); and the Parental Stress Index (PSI; Abidin, 1983; see Appendix B -- PSI for modified version used in the current study). Subjects also completed a number of other questionnaires not relevant to this study that will be reported later in the relevant chapters.

Centre for Epidemiological Studies - Depression Scale (CES-D). The CES-D is probably the most commonly used measure of depression in the general population (i.e., nonpsychiatric). It was developed by Radloff (1977) and contains 20 items derived from other previously validated scales. The CES-D assesses depressed mood, feelings of guilt and worthlessness, helplessness and hopelessness, psychomotor retardation, concentration problems, appetite disturbance and sleep problems. Although the CES-D was developed to measure depressive symptomatology, the primary emphasis is on depressed mood (Radloff, 1977). For each item, subjects indicate on a 4-point scale (range 0 to 3), how frequently they have experienced that symptom during the past week. Thus, scores range from 0 to 60 with a recommended cutoff of 16 or greater to identify a significant level of depression, while scores of 15 and below are considered nondepressed.

Radloff (1977) reports good estimates of reliability; coefficient alphas range from .85 to .90. Concurrent validity estimates are also acceptable: correlations of .81 with the Beck Depression Inventory (BDI; Beck et al., 1961) and of .90 with the Zung self-rating depression scale (Zung, 1965) have been reported (Weissman, Prusoff, & Newberry, 1975).

Dysfunctional Attitude Scale (DAS). The DAS (Weissman & Beck, 1978) was designed to assess depressive schemata functioning or cognitive distortions drawing

upon the theories of Albert Ellis and Aaron T. Beck. Items include statements like, "I am nothing if a person I love doesn't love me", or, "If I do not do well all the time, people will not respect me." The DAS has 40 items and subjects indicate, on a 7-point scale (range 1 to 7), the extent of their agreement with each item. Scores can therefore range from 40 to 280. Mean scores in an unselected university population are frequently in the range of 100 to 115 (e.g., Kuiper & McCabe, 1985).

The DAS has high levels of internal consistency, with coefficient alphas ranging from .89 to .92 (Weissman, 1979). Weissman and Beck (1978) report concurrent validity estimates in the form of correlations with the BDI of .36 to .47. The DAS has been found to be highly influenced by current depressed mood (e.g., Hamilton & Abramson, 1983, Miranda & Persons, 1988; Miranda, Persons, & Byers, 1990; and Weissman, 1978).

Parental Stress Index (PSI). The PSI (Abidin, 1983) consists of 101 items designed to measure the magnitude of perceived stress associated with the parent-child system. The PSI provides two subscale scores, one reflecting parental characteristics and the other reflecting child characteristics. The parental subscale reflects things like feeling trapped by parental responsibility, social isolation, attachment to the child and social support from spouse and others (e.g., "Being a parent is harder than I thought it would be"). The child subscale reflects the parent's perception of the child's adaptability, demandingness and activity (e.g., "My child seems to cry or fuss more often than most children.") Due to the excessive length of the PSI, a 42-item version was developed for use in the Gotlib et al. (1989) postpartum depression study. This shortened version was developed by selecting items with the highest factor loadings on the two subscales (i.e., parental and child subscales). It was this shortened version that was used in the present investigation. Internal reliability estimates for this version of the PSI were .90 for the parental subscale and .85 for the child subscale in the current investigation (see Appendix B for this shortened version).

In terms of reliability estimates, Lloyd and Abidin (1985) report excellent internal reliability for child, parent and total scores (coefficient alphas of .89, .93 and .95, respectively). With regard to construct validity, the PSI has been shown to discriminate between families with a handicapped child and those with a non-

challenged child on all three dimensions (i.e., child, parent and total; Kazak & Marvin, 1984).

Diagnostic Interview

At the completion of the individual lab session, subjects completed the diagnostic SCID interview. As the SCID is arranged such that one can use certain sections to diagnose particular disorders, only the section related to depression was used in the current investigation. Others have also used this method and reliability for diagnoses of depression is high with Kappas ranging from .72 to .93 (Onstad, Torgersen, & Kringlen, 1991; Riskind, Beck, Berchick, Brown & Steer, 1987).

In addition to the SCID interview, subjects were screened for a number of additional diagnoses using the procedures developed by Othmer & Othmer (1989, pp. 196-199; see Appendix C for the interview for the SCID depression section modified to allow potential RDC diagnoses of minor depression and additional screening interview). Disorders that were screened for included past and current alcohol/drug abuse, schizophrenia, mania, panic disorder, phobic disorder, generalized anxiety disorder, and anorexia and bulimia nervosa. In this method, only symptoms that must be present for a diagnosis are initially queried. If a subject responds positively to the vital symptom query, a series of eight social impact questions are asked. These eight questions determine if the vital symptom has interfered with areas of occupational, social or family functioning, necessitated medical intervention or interfered with health, or caused problems for the individual with legal agencies like the police (see Appendix C). Othmer, Penick, and Powell (1981) found that if subjects answered yes to any of the eight areas queried they were 90% likely to obtain diagnosis if a complete diagnostic interview were conducted. Therefore, in the current investigation if subjects responded positively to the critical symptom and at least one of the eight social impact questions, the subject was further questioned to determine whether this was a past or current problem (see Appendix D for complete diagnostic information).

Reliability of Past and Present Diagnoses of Subjects. A random sample of 25 diagnostic interviews, taken from the entire subject sample, was independently rated by a second rater (senior level Doctoral Candidate familiar with diagnosis of MDD) and this resulted in agreement on 24 of 25 interviews of diagnostic status (Kappa =

.92). With respect to past diagnosis of depression, agreement on 23 of 25 interviews was obtained, yielding a Kappa of .84. Clearly, diagnostic decisions for depression were highly reliable for both current and past depression.

Procedure

As noted previously, subjects were mailed packages of questionnaires to their homes with instructions regarding how and when to complete them. In this regard, subjects were informed to complete all questionnaires except the CES-D one week before the experimental session. They were instructed to complete the CES-D the night before the experimental session. All questionnaires were to be dated when completed to ensure subjects followed instructions.

## Results

Subjects were compared on basic demographic characteristics including: age, years married, number of children and socioeconomic status (as assessed with the Blishen scales, Blishen, Carroll, & Moore, 1987). T-tests were used to compare the two groups of subjects on continuous demographic variables and are presented in Table 2-1. The groups were equivalent on age, years married, number of children, and SES, all $t$'s $< 1$.

Subjects were compared on self-report measures completed in the package sent to their homes. Means and standard deviations for these measures are presented in Table 2-2. As expected, the previously depressed subjects were more depressed than were the never depressed subjects, $t(89.43$, separate variance estimate$) = 2.85$, $p < .005$. Interestingly, the DAS scores of previously depressed subjects were also higher than were the scores of the never depressed subjects, $t(93) = 3.00$, $p < .005$. An analysis of covariance for the group effect on the DAS was also carried out using current CES-D as a covariate. This still resulted in a significant difference between previously depressed and never depressed subjects on the DAS, $F(1,89) = 4.96$, $p < .05$. The previously depressed subjects also perceived their children as more stressful, $t(90) = 2.10$, $p < .05$, and the role of parenting as more stressful, $t(90) = 5.14$, $p < .001$, than did the never depressed subjects, according to scores on the PSI.

An interesting and quite unexpected finding was obtained during diagnostic interviews that deserves further consideration. Upon interview, 11 women who had received a diagnosis of depression in the previous studies conducted in this laboratory reported that they had never had a period of depressed mood or anhedonia with accompanying symptomatology lasting long enough to qualify for even RDC diagnosis of minor depression. Nevertheless, they were assigned to the previously depressed group, despite their self-report, as they had previously received diagnoses through interviews conducted in this laboratory. Comparison of the women who recalled previous depressive episodes to those women who did not recall previous episodes using t-test procedures revealed no group differences on all dependent and

Table 2-1. *Means for demographic characteristics of previously depressed and never depressed subjects.*

| Demographics | Groups | |
|---|---|---|
| | ND (n =45) | PD (n = 50) |
| Age (years) | 33.60 (3.63) | 33.76 (4.91) |
| Years Married | 9.33 (3.38) | 9.06 (4.11) |
| # Children | 2.38 (0.72) | 2.28 (1.07) |
| SES | 39.72 (17.65) | 39.94 (14.52) |

*Note.* ND = never depressed, PD = previously depressed, SES = Socioeconomic status according to Blishen system (Blishen et al., 1987). Standard deviations are presented in brackets.

Table 2-2. *Means on self-report inventories for never depressed (ND) and previously depressed (PD) subjects.*

| Questionnaires | Groups | | t Scores |
|---|---|---|---|
| | ND (n = 45) | PD (n = 50) | |
| CES-D | 6.07 (5.86) | 10.14 (8.00) | 2.85** |
| DAS | 100.40 (29.12) | 117.18 (25.45) | 3.00** |
| PSI-Parent | 43.38 (10.59) | 55.15 (11.32) | 5.14*** |
| PSI-Child | 31.64 (8.72) | 35.47 (8.77) | 2.10* |

*Note.* ND = never depressed subjects, PD = previously depressed subjects. CES-D = Centre for Epidemiological Studies-Depression Scale, DAS = Dysfunctional Attitude Scale, PSI = Parental Stress Index. Standard deviations are presented in brackets.
* $p < .05$, ** $p < .005$, *** $p < .001$.

demographic measures (See Table 2-3 for means, standard deviations and t-scores). If the procedure for this investigation had been like many others relying solely on recall of subjects, these subjects would inadvertently have been included in the never depressed group. Such inappropriate classification would result in the means for the "never depressed" control group to be more like the previously depressed group (the commonly reported finding).

Although subject groups differed on the DAS and the PSI Parent and Child subscales, this comparison of group differences does not assess the current mood predictions stemming from the DAH. In order to assess the appropriate interaction of current mood and depression history a regression analysis was used. Therefore, subject Group (previously depressed or never depressed) was dummy coded for purposes of regression analyses. Following procedures described by Cohen and Cohen (1983), the subjects' CES-D scores (Mood) and Group status were entered as main effects in the regression analysis, with the DAS scores as the criterion variable. In this procedure, main effects are entered as a block and significant effects are determined by examining the t statistic. Subsequently, the interaction is added to see if it predicts a significant proportion of variance beyond the main effects, and the F-change statistic is evaluated for significance in the second step for the interaction effect only.

DAS scores were assessed using the regression approach described above. In the first step of this analysis, main effects were entered and the result was significant, $F(2,92) = 9.09$, $p < .001$. T-tests indicated that there were significant main effects for both Group, $t(92) = 2.18$, $p < .05$, and Mood, $t(92) = 2.91$, $p < .005$. However, the subsequent interaction of Group and Mood was not significant, F-change$(1,91) < 1$.

The scores on the Parent and Child subscales of the PSI were also separately assessed as dependent variables using this regression approach. Considering first the child subscale, the main effects of Group and Mood revealed a significant effect, $F(2,89) = 9.30$, $p < .001$. T-tests revealed that only the main effect for current mood was significant, $t(89) = 3.69$, $p < .001$; the main effect of Group was not significant, $t(89) = 1.01$, $p$ = ns. The subsequent interaction effect of Group and

Table 2-3. *Means on self-report inventories and demographics for previously depressed (PD) and previously depressed denying diagnosis (PD-Deny) subjects.*

| Questionnaires/ Demographics | Groups PD (n = 39) | Groups PD-Deny (n = 11) | t Scores |
|---|---|---|---|
| CES-D | 11.05 (8.59) | 6.91 (4.25) | 1.54 |
| DAS | 118.85 (27.23) | 111.27 (17.44) | 1.11 |
| PSI-Parent | 56.33 (12.23) | 51.27 (6.67) | 1.31 |
| PSI-Child | 36.08 (9.25) | 33.45 (6.99) | 0.87 |
| Age | 34.03 (5.25) | 32.82 (3.49) | 0.72 |
| Years ' 'rried | 8.84 (4.34) | 9.82 (3.22) | -0.69 |
| # Children | 2.33 (1.13) | 2.09 (0.83) | 0.66 |
| SES | 40.22 (15.70) | 38.99 (10.10) | 0.24 |

*Note.* ND = never depressed subjects, PD = previously depressed subjects. CES-D = Centre for Epidemiological Studies-Depression Scale, DAS = Dysfunctional Attitude Scale, PSI = Parental Stress Index. Standard deviations are presented in brackets.

Mood was not statistically significant, $F$-change(1,88) < 1. With respect to the parent subscale, main effects for Group and Mood were significant, $F(2,89) = 31.19$, $p < .001$, with both Group, $t(89) = 3.98$, $p < .001$, and Mood, $t(89) = 5.29$, $p < .001$, being significant. The interaction effect of Group and Mood was not significant, $F$-change(1,88) < 1.

Thus, the DAH, assessed by examining responses to questionnaires when in naturally occurring dysphoric moods, was not supported. Instead, only main effects of mood and group predicted responses to DAS, and the Parent domain of the PSI, while only mood predicted responses to the Child domain of the PSI.

## Discussion

The previously depressed and never depressed subjects in the present study differed significantly with respect to their scores on the DAS. This is in contrast to findings usually reported for the DAS. Indeed, investigators typically find that DAS scores are equivalent for both remitted and control subjects. Interestingly, an analysis of covariance using the CES-D scores as a covariate testing the group difference on the DAS still revealed an effect for groups. As well, mood (as measured by the CES-D) was also a significant predictor of DAS scores, irrespective of group status. No interaction effects for group status and current mood were significant in predicting questionnaire responses in the current investigation. This has important implications for both Beck's cognitive theory and Teasdale's DAH. First, this is only the second study that has found group differences, at remission, between previously depressed and control groups. This strongly supports the main-effects model of Beck's theory. The fact that no effects of mood were evident in interaction with depression history casts doubt on the validity of the DAH. This is in direct contrast to the findings reported for naturally occurring dysphoria as reported by Miranda and colleagues (Miranda & Persons, 1988; Miranda et al., 1990) who found that mood status was important for predicting DAS scores, but only for previously depressed subjects.

Such unique findings deserve further consideration. First, as this finding is different from others, it is important to examine potential causes. Considering the sample, it is composed entirely of women of child-bearing age. Although this sample is considerably different from university student samples, it is not unlike those used in many other studies. Indeed, women typically outnumber men in epidemiological studies of depression by about 2:1 (Kessler et al., 1994). Therefore, it is unlikely that the sex and age of the sample would account for group differences on the DAS. One unique characteristic of the sample is that they have all been interviewed at many discrete points in time, in many cases by the same interviewer. Indeed, in the previous study conducted in this lab (Gotlib et al., 1989), from which these women were solicited for participation, if their BDI scores were elevated, these women participated in diagnostic interviews in their first tri-mester, two weeks before the birth of their child, one month after the birth, six months postpartum, and one year

postpartum. All the women in the never-depressed group never had an elevation above 9 on the BDI over this entire period. As well, many of the women participated in further studies in this lab at two and three years postpartum at which they also received diagnostic interviews. Clearly, with respect to diagnostic status, this cohort of subjects has had very careful and relatively continuous follow-up in the 2-5 years preceding the current study. Therefore, a unique characteristic of this group of subjects is that reliance on self-report and recall of diagnostic status was unnecessary. This has been recognized as a potential weakness in many previous studies and may account for the significant group differences found on the DAS in this study. Thus, the failure to find differences in DAS scores between remitted and control subjects in previous studies may have been due to misclassification of subjects based on inaccurate self-reports of subjects. Therefore, careful selection of groups may be a strong contributor to this finding.

In addition to careful selection of the never depressed group through repeated sampling of mood, the previously depressed groups' definition was also unique. These individuals were solicited for participation in the study due to their previous diagnosis of depression as established by interview in a postpartum depression study conducted in this laboratory (Gotlib et al., 1989). Interestingly, on interview, 22 percent of these women reported that they had never been depressed either by the more stringent DSM-III-R criteria or the more relaxed RDC criteria. If this study had relied solely on subjects' recall, these women would have been included in the never depressed subject group. Clearly, such group assignment would lead to systematic error variance such that the previously depressed and the never depressed groups would be more likely to be equivalent on the DAS. Indeed, in the current investigation, those subjects who recalled previous episodes of depression scored equal to those subjects who did not recall their previous episodes on: depression severity, dysfunctional attitudes and parental stress (parent and child subscales). As well, they were equal on demographic characteristics including: age, years married, number of children and SES. Thus inappropriate group assignment for those subjects who did not recall a previous episode of depression would clearly contribute to an increase in a never depressed groups' mean scores on self-report inventories.

Consequently, one would be more likely to obtain previously depressed versus control group equivalence on inventories like the DAS. If one examines the means of the previously depressed group who denied previous diagnosis (mean=111) and the never depressed group (mean=100, see Table 2-2 and 2-3) one can see that inclusion of the previously depressed subjects who deny diagnosis in the never depressed group would result in an elevation of the DAS score for that control group. Such inappropriate group assignment might account for findings in other studies that report group equivalence between previously depressed and control groups when cross-sectional designs reliant on subjects' self-reports are used.

These findings provide strong support for the main-effects hypothesis of Beck's cognitive theory of depression. From the results of this investigation, it appears that individuals who have been previously depressed carry a potential trait-like vulnerability for future depression in the form of elevated dysfunctional attitudes. Indeed, it is possible that the careful selection of subjects through repeated mood sampling allowed previously unreported findings to emerge. Even when current mood was covaried from the equation, group differences between previously depressed and never depressed subjects still emerged significant.

There are also important implications of the findings of this study for the Differential Activation Hypothesis (DAH). The results of the current study did not replicate the findings of Miranda and colleagues (Miranda & Persons, 1988; Miranda et al., 1990) with respect to DAS scores and naturally-occurring dysphoria. In contrast, whereas main effects of both group and current mood were found to be significant predictors of DAS scores, interaction effects of mood and history of depression were not significant. Once again, there are important differences between the current paradigm and that used by Miranda and colleagues that might account for the failure to replicate their results. First, the measure of current mood was not the same; recall that Miranda et al. used a revised, shortened version of the MAACL, while the CES-D was used in the current investigation. Second, and possibly more important, the time of completion of questionnaires was not controlled in the current investigation. Subjects were asked to complete the DAS within a week of their scheduled appointments, and the CES-D the night before their laboratory appointment.

In fact, the average number of days between the CES-D scale completion and the DAS completion was 10.2 days (note that instructions in the CES-D ask subjects to rate the items on the previous seven days). Certainly, it may be important for investigators in future to exercise tighter control over this time lag.

Alternatively, the findings reported by Miranda et al. may be so sensitive that only very minor mood fluctuations would reveal their interaction effect of current mood and history of depression predicting DAS. In Study 1 of their 1990 report, Miranda et al. found that the DAS was responsive to diurnal variation in currently depressed psychiatric patients. It is possible that measures such as the BDI and the CES-D would not be responsive enough to such minor mood changes to provide enough variation, consequently being unable to reveal significant interactions. It would be interesting in future research to examine the BDI or CES-D along with the DAS and MAACL within one subject sample to determine whether these self-report depression measures can yield a mood by history interaction. If minor mood fluctuation results in changes on the DAS, it seems plausible that more stable shifts of dysphoric mood (i.e., mild depression) should also result in elevations on the DAS. However, one might also argue that when never depressed subjects become dysphoric (and are not merely experiencing minor transient mood changes) only then do they have elevations in dysfunctional beliefs and attitudes. Such an interpretation would allow the possibility that everyone could experience a clinical episode of depression with the commonly associated distorted attitudes. However, whereas nondysphoric individuals who do not have a history of depression who experience minor mood fluctuations are less likely to endorse such negative attitudes, previously depressed subjects who experience minor mood changes may endorse such attitudes. Consequently, such differences may be evident only during very mild, transient sad moods.

Interestingly, the results from the PSI parallel the findings of the DAS. Although group was a significant predictor of PSI-parent scores, the interaction of mood and depression history was not. PSI-child scores were only predicted by current mood. In addition to the points raised concerning the DAS, it is important to also consider the objective behaviour of the children of depressed mothers. As one

example, Whiffen and Gotlib (1989) found that infants of postpartum depressed mothers exhibited more negative emotions and tired more quickly under developmental testing than did infants of nondepressed mothers. It may be, therefore, that there is some complex interaction between mother's perceptions and infant difficulty that produces the perception of greater difficulty in caring for these infants. The previously depressed mothers did report the role of parenting to be more stressful than never depressed mothers; indeed, maybe it was. It does seem important, however, to stress that only mood was significant in the prediction of how difficult the child was. Indeed, this finding makes common sense to parents; if asked, when they are stressed or feeling negative, their children do seem to be increasingly fussy or difficult. Such observations may make it important for future research to measure the objective child/infant difficulty in order to separate the effects of distorted versus accurate perceptions that may be dependent on mood status.

In summary, the data very clearly support the existence of differences between vulnerable and less vulnerable subjects on self-reports using both traditionally accepted DAS and interpersonal assessments, in this case, the PSI. These findings clearly lend support to Beck's cognitive theory with regard to the main-effects hypothesis. To date, only the findings of Eaves and Rush (1984) revealed such group effects. It appears that the careful assignment of subjects to groups, relying on repeated mood sampling and repeated diagnostic interviews contributed to this finding. Predictions stemming from the DAH for the DAS and PSI were not supported in the current study. In order to provide greater control over current mood and to assess cognitive schematic functioning with finer-grained analytic procedures utilizing methods developed from cognitive psychology, in Study 2, two information processing tasks were conducted with many of these subjects as well a number of other subjects under more highly controlled laboratory conditions.

## Chapter III -- Study 2, Phase 1: Emotional Stroop Task

Study 2 comprised the laboratory component of this research. At the laboratory session, subjects completed two information processing tasks, in a counterbalanced order: an emotional Stroop colour-naming task, and a deployment-of-attention task. Within each of these information processing tasks subjects also completed both a free- and cued-recall task for stimuli that had been presented in the task. In order to provide clarity of results and to help focus the introduction and discussion of results around relevant issues, the information processing tasks are presented separately as two separate phases of Study 2. Each of these phases will be preceded by an introduction of relevant issues to be assessed in that phase and the results will be separately discussed for each of the phases of Study 2.

A total of 40 previously depressed and 40 never depressed subjects participated in the laboratory task and contributing data to the analytic procedures. Half of each of these groups of subjects participated in a sad mood induction condition, while the other half participated in a neutral mood condition. An additional control group of 20 diagnosed clinically depressed subjects participated in a neutral mood condition in order to provide direct comparisons to a clinical referent.

Beck's theory regarding the cognitive processing of depressed individuals suggests that they attend to (i.e., select) information in their environment that is negative. Indeed, one of the fundamental processing errors identified by Beck et al. (1979) is referred to as selective abstraction. In selective abstraction, the depressed individual is said to attend to a negative detail, often taken out of context, and then to conceptualize the whole experience on the basis of this detail. Phase 1 of this study was designed to assess selection strategies in both vulnerable and nonvulnerable subjects through the use of the emotional Stroop task.

In a given situation, an individual is confronted with an innumerable array of stimuli to which to attend. In order to make this task manageable, individuals must frequently attend only to certain aspects of the stimulus field, while simultaneously ignoring others. However, this attention is often directed without an individual's

conscious awareness. As one example, dichotic listening studies have shown that an individual's attention is often directed to self-relevant stimuli they have been told to ignore (e.g., Bargh, 1982; McCabe & Gotlib, 1993). When an individual is selecting or processing stimulus information in either a consciously motivated or a less conscious obligatory fashion, it is more likely that this information will receive further elaboration, resulting in overall perceptions congruent with that information (Bargh & Pratto, 1986). Indeed, a main tenet of the cognitive model is that depressed individuals both perceive and recall themselves and their environment to be more negative and less positive than is actually the case (Beck et al., 1979). One method of assessing the attention a given stimulus receives is to examine the obligatory processing of the stimulus content, when the task actually requires no processing of the stimulus content (see Bargh & Pratto, 1986). One method of assessing such processing of stimuli is the Stroop colour-naming task (Stroop, 1935).

The Stroop task was designed to measure automatic or obligatory processing of word content through the measure of reaction time to name the colour of a word (as discussed, this processing reflects the selection of stimuli in the environment). It is largely agreed that the key concept in the Stroop colour-naming task (Stroop, 1935) is interference, although the source of this interference is often debated (see section below on the source of interference).

In the original task, subjects were asked to name the colour of various types of stimuli, including words, symbols and a series of coloured rectangles. With the variously coloured stimuli presented in a matrix format, the task for the subject was to name the colours in which the stimuli were presented, starting from the beginning to the end of each matrix (only one stimulus type was presented in each matrix card). Stroop discovered that subjects took longer to name the colours of colour words (i.e., colour-conflict words like the word "blue" printed in red ink) than they did to name the colours of symbols or coloured rectangles. It is hypothesized that the Stroop effect results from the word content interfering with the ink colour-naming response.

In closer examinations of this effect, researchers have found that the response latency to name the colour of words is inversely proportional to the associative distance between the word and the colour (Scheibe, Shaver, & Carrier, 1967, cited in

Geller & Shaver, 1976). For example, Warren (1972) found that when subjects were primed with a stimulus related word, or a word from the stimulus list itself, prior to the Stroop task, response times increased when subjects colour-named the stimulus words. On the basis of this finding, Warren suggested that the oral presentation activates not only the specific words, but also the category name (cross-referenced category), both of which result in longer response times due to response competition. Therefore, stimuli not only activate a specific category, but also related categories, consequently increasing the receptivity for related types of information.

Geller and Shaver (1976) extended the findings of Warren (1972) by manipulating subjects' self-awareness through mirror and videotape observations of subjects. In this study, subjects completed Stroop tasks in either a high or low self-awareness condition. The type of word to be colour-named was manipulated to be either a neutral or self-relevant word. Results indicated that subjects took longer to name the colour of self-relevant words in the high self-awareness condition than neutral words in either condition and self-relevant words in the low self-awareness condition.

Extending such findings to the domain of depression research, Gotlib and McCann (1984) reasoned that if depressive schemata are operating, depressed subjects might demonstrate similar response latency effects in a Stroop colour-naming task if the words presented were of depressed content. The depressed individual purportedly has activated negative cognitive schemata that allow the rapid and more efficient encoding of depressive-content stimuli. Therefore, if depressed individuals are "naturally" primed to perceive negative information more efficiently as a result of the operation of negative cognitive schemata, they may display longer reaction times to depressed- than to nondepressed-content words on the Stroop task. The longer reaction time in verbalizing the correct response is interpreted as resulting from conflicting response tendencies resulting from attention being directed away from the assigned task and towards the stimulus word's content. As in the original Stroop task, the content of the word interferes with the correct colour-naming response. In this case, a depressed word is more likely to interfere with the correct colour-naming

response for depressed than for nondepressed individuals. This colour-naming task has come to be known as an "emotional Stroop task" in the literature.

In the first study reported by Gotlib and McCann (1984), mildly depressed and nondepressed subjects' performance was compared using a modified emotional Stroop colour-naming task. In this case, colour naming and associated response latencies were recorded for each individual word. Words were not repeated in content-consistent blocks, with overall colour-naming time as the dependent measure, as in the original Stroop task; rather, word content was varied on each successive stimulus exposure. The average reaction times for positive-, negative- and neutral-content were then calculated. Furthermore, such a modification has recently been shown to replicate basic Stroop findings (Kleiger & Cordner, 1990). As previously described in the general introduction, Gotlib and McCann (1984) found that dysphoric subjects took longer to colour-name depressed-content than manic- or neutral-content words. Gotlib and Cane (1987) replicated this finding with a group of depressed inpatients; however, the finding was no longer apparent when depressed subjects had recovered. As the single word presentation does not alter basic Stroop findings, and the emotional Stroop has discriminated depressed and dysphoric subjects from controls, this method was used in the present investigation in order to examine separately the effects of different types of stimuli.

Source of Interference: Encoding or Response Biases? One difficulty arising from the use of the Stroop task as a temporal measure of selective attention concerns the specific source of interference in the task itself. Central to this argument is whether the interference results from perceptual interference (i.e., selection stages) or a response production stage of interference. Lupker and Katz (1981) identified four stages of a response production in Stroop and picture-word tasks. These four stages or processes include: an input process, a decision process, a response selection process, and a response output process. Lupker and Katz note that interference effects observed on the Stroop could be a function of any of the processes either alone or in combination with each other.

Indeed, effort to identify the specific source of Stroop interference has spawned a great number of studies designed to determine its specific location. Some

suggest that the source of the Stroop effect can be placed squarely in the conceptual encoding process (i.e., selection or input processes, Seymour, 1977). Others have located the source of the interference in the response processes (e.g., Duncan-Johnson & Kopell, 1981; Dyer, 1973; Lupker & Katz, 1981). Finally, still others have suggested that both processes contribute to the interference (e.g., Naish, 1985; Stirling, 1979). Identification of the source of the interference is particularly important as the Stroop task is often identified as a good measure of selective attention (e.g., Bargh & Pratto, 1986; Johnson & Dark, 1986). If, indeed, the source of interference is a result of response biases, arguments for this as a measure of selective attention are inappropriate.

In an extensive review, C.M. MacLeod (1991) has evaluated the sources of interference as encoding or response biases against 18 types of empirical findings using the Stroop task. He argued that neither the perceptual encoding nor the response competition theories account for all 18 of these empirical findings. Rather, he suggests that a parallel distributed processing model best explains all the findings (see also Cohen, Dunbar & McClelland, 1990, and Logan, 1980). This model does allow for the role of attention in the Stroop task as a one factor in determining how much interference results.

Experimental Stimulus Characteristics. As outlined in the general introduction, a number of issues concerning stimulus content were examined in this research. In this regard, an important consideration in selection of adjectives concerns the state versus trait nature of the stimuli. Recently, longitudinal investigations of construct accessibility have been criticized as being only concerned with state-like adjectives in depression (e.g., sad, blue, moody, down), rather than more trait-like adjectives (e.g., worthless, deficient, incompetent, inadequate), which would be indicative of ongoing vulnerability to depression (see Segal, Hood, Shaw, & Higgins, 1988; Spielman & Bargh, 1990). In order to assess this notion, both state and trait adjectives were used as stimuli.

Teasdale (1988) has also suggested that, once dysphoric, individuals whose cognitive style relates to severe self-deprecatory associations are more likely to become depressed than are individuals whose associations are only mildly self-

deprecatory. However, research to date has not assessed this aspect of the DAH. Thus, a vulnerable individual, according to the DAH, is expected to produce associations that reflect a more severely negative or depressogenic style than would the individual who is nonvulnerable. Therefore, in order to investigate this negative severity hypothesis, stimuli were varied along a mild-severe continuum.

As one can see, Gotlib & McCann's (1984) modification of the emotional Stroop task allows one to assess many different stimulus characteristics within the same presentation set. If traditional methods were used, a card with similar content stimulus items grouped together would have to be constructed and may result in interpretation difficulties due to presentation order effects (especially if many stimulus dimensions are being assessed). As well, when stimuli are grouped together in content-consistent blocks, the delays evidenced by subjects may be the result of reviewing previous errors resulting in fewer attentional resources being allocated to the current stimulus item and the requested response. Consequently, it may not always be attention that is contributing to delays in the correct response but rather such factors as ruminative difficulties. A method whereby the stimulus items are presented in randomized orders such that a content-consistent block is unnecessary avoids both order-effect problems as well as ruminative type errors and delays, both of which make interpretation difficult. The modification provided by Gotlib & McCann (1984) provides a reaction time to each stimulus word. Consequently, the average reaction time for a content-consistent block can be determined at the conclusion of the presentation of all types of stimuli. As well, the presentation of different types of stimuli in random orders negates order effects for stimuli and reduces the likelihood of ruminative types of errors described above.

Consequently, the emotional Stroop used in the current phase of Study 2 used the modification of Gotlib & McCann (1984) and presented stimuli in random orders such that content-consistent blocks did not occur. To summarize, subjects in the current phase of Study 2 were comprised of three groups; previously depressed ($\underline{n}$ = 40), never depressed ($\underline{n}$ = 40) and currently depressed ($\underline{n}$ = 20). Those subjects who were currently nondepressed (i.e., never depressed (ND) and previously depressed (PD)), were randomly assigned to neutral or negative mood induction

conditions and completed the emotional Stroop colour-naming task. Currently depressed subjects (CD) completed the task in the neutral mood condition. Important dimensions assessed concerned state- versus trait-like dimensions of stimuli and the mild versus severe dimensions of self-descriptive adjectives.

According to the DAH, it is hypothesized that those subjects who have had previous episodes of depression and who are in the sad mood condition evidence reaction times on the Stroop task similar to currently depressed subjects. Subjects in the never depressed group (both sad and neutral mood conditions) and in the previously depressed group in the neutral condition perform similarly, and unlike the depressed subjects. More specifically, it is expected that currently depressed subjects and previously depressed subjects in the sad mood condition take longer to colour-name negative-content stimuli than other stimuli, while other subjects do not evidence such differences. Also, the currently depressed subjects and previously depressed subjects in the sad condition take longer to colour-name extremely negative-content stimuli than less severe negative-content stimuli, while other subjects do not perform this way. Finally, it is expected that the strongest support for the DAH will result from the trait-like stimuli rather than the state-like stimuli.

Alternatively, based on the main-effects model, sad mood condition should not effect the outcome of the results. Previously depressed subjects regardless of mood condition are expected to perform tasks like currently depressed subjects and unlike other subjects. Specifically, previously depressed and currently depressed subjects are expected to take longer to colour-name negative-content stimuli than other stimuli. As well, these differences are expected to occur primarily with trait-like rather than state-like stimuli. Other subjects are not expected to take different lengths of time to colour-name the various affective-content stimuli. No predictions are made regarding the emotional intensity dimension as the main-effects hypothesis makes no distinction about this.

## Method

### Subjects for Study 2, Phase 1 and 2

Of the 95 subjects who contributed data to Study 1, 15 were dysphoric as represented by CES-D scores above 15, but were not clinically depressed as evidenced on the diagnostic interview. These 15 subjects did not contribute data to Study 2 as it involved a sad mood induction condition. It was felt to be unethical to ask subjects who were already dysphoric to exacerbate their sad mood through such an induction. Five of the 15 subjects were from the never depressed group and 10 from the previously depressed group of Study 1. Although this would have provided an interesting comparison group, sufficient numbers of subjects were not available from each group to increase the subject sample size adequately for comparison purposes. Therefore, these subjects were dropped from consideration in the laboratory data set.

The eighty nondepressed subjects (i.e., the 40 previously depressed and 40 never depressed subjects) had all contributed to the data reported in Study 1 and their participation was solicited in the method described in that study. Through the telephone solicitation of subjects from the Gotlib et al. (1989) childbirth study, a total of eight subjects were discovered to be clinically depressed according to diagnostic interview completed at the laboratory session (they did not contribute data to the analyses reported in Study 1). In addition, 12 clinically depressed individuals were solicited for participation in the current study from local general and psychiatric hospitals. In order to gain access to these individuals, psychologists and psychiatrists at the local hospitals were informed of this research and regular contact with them resulted in the recruitment of these individuals. Consequently, a total of 20 clinically depressed women also participated in this study.

The method of diagnosing subjects was previously described in Study 1 and will not be repeated here.

### Materials

Questionnaires. In addition to the questionnaires reported in Study 1, all subjects also completed the following questionnaires.

State-Trait Anxiety Inventory. The state and trait versions of the STAI (Spielberger et al., 1970) each consist of 20 items with scores ranging from 20 to 80 with increasing scores suggesting greater levels of anxiety. Originally developed to measure anxiety in normal adult populations, the STAI is one of the most commonly used measures of anxiety in both normal and psychiatric populations. State anxiety is conceptualized as representing a transient emotional state in response to environmental stressors. Trait anxiety refers to relatively stable individual differences in the proneness or likelihood of a person to experience anxiety (purportedly uninfluenced by transient stressors).

Spielberger et al. (1970) reported coefficient alphas in the range of .83 to .92 for both the state and trait versions of the inventory. Spielberger et al. report concurrent validity estimates of .52 to .80 with other anxiety scales (e.g., Taylor Manifest Anxiety Scale, Zuberman Affect Adjective Checklist).

Subjects completed the Trait version of the STAI (i.e., STAI-T) in the package of questionnaires before the laboratory session. At the laboratory session, subjects completed the State version of the STAI (i.e., STAI-S) following the second information processing task.

Self-Evaluation Questionnaire (SEQ). Subjects received a list of words in the package of questionnaires that they completed before the laboratory session. This list of words consisted of stimuli to be presented on the computerized information processing tasks, as well as a number of filler words. Subjects were asked to make self-descriptiveness ratings for each word. These ratings were made on a 5-point likert scale ranging from "Not at all like me" to "Extremely like me" (see Appendix E).

Visual Analogue Scales and Backwards Counting Measures of Mood. Baseline measures of mood were taken to ensure group equivalence prior to experimental tasks. However, because information processing tasks are purportedly susceptible to priming from questionnaires related to the construct under investigation, this assessment needed to be short, so as not to cause priming in any particular direction. Therefore, three 10-point visual analogue scales were used, each containing both a positive and a negative anchor. The three scales assessed depression, anxiety and

boredom. Anchors for the scales were sad-happy, anxious-calm and excited-bored, respectively. For the sad-happy dimension, lower scores were associated with sadness while higher scores were associated with happiness. Similarly, the lower the score on the anxious-calm dimension the more anxious the subjects described themselves. Finally, on the last dimension, excited-bored, the positive and negative ends of the scales were reversed, with excited being represented by lower scores and feeling bored represented with higher scores. Subjects rated their mood on these three dimensions and then wrote numbers out backwards for one minute beginning at 100. Subjects then listened to the music in either the sad or neutral conditions and then completed the mood rating and counting tasks again before beginning the experimental task. The backwards counting was a measure of psychomotor retardation that accompanies sad mood. This was used as a second measure of mood induction success as it was less susceptible to experimenter demand effects than visual analogue scales.

Music Used for Mood Induction Procedures. For the subjects assigned to the sad mood induction procedure, mood induction used musical procedures described by Clark (1983). Subjects in the sad mood condition listened to 'Adagio in G minor' (for organ and strings) by Albinoni. This piece of music had been determined to be the most efficient in inducing sad moods from a larger group of classical music pieces (Kenealy, 1990, personal communication). Subjects in the neutral control condition listened to 'Summer III' Tempo impettuoso d'Estate from The Four Seasons. This piece of music has been shown to be neutral, inducing neither sad or happy moods (Kenealy, 1990, personal communication).

Stimuli. All stimuli chosen in this experiment were equated for word length, concreteness, and frequency of usage in the English language where possible. Twenty words were defined for each category (described below). First, negative-, positive-, and neutral-content words were defined using Myers' (1980) ratings. In Myers' list, depressed and manic patients rated 400 adjectives on a number of dimensions including self-descriptiveness and emotional intensity. Thus, negative-content words were those that depressed patients identified as most self-descriptive and manic patients identified as least self-descriptive. The positive-content words were those

selected by the depressed patients as least self-descriptive and by the manic patients as most self-descriptive. Neutral-content words were those that neither the manic nor depressed patients rated as self-descriptive. Each of the positive- and negative-content categories were broken down into subgroups of 20 words each. In the first subgroup of positive-content words, 20 high emotional intensity and 20 low emotional intensity words were developed (e.g., high intensity--ecstatic, low intensity--rational). Similarly, 20 high emotional intensity negative-content and 20 low emotional intensity negative-content words were developed (e.g., high intensity--tortured, low intensity--dull). The words' intensity ratings (i.e., whether they represent a severe or mild characteristic or behaviour) were determined from Myers' list using the emotional intensity rating for each word. Thus, lists of words reflecting both positive- and negative-content and either low or high levels of intensity were prepared (note that by definition it is not possible to have a high or low intensity neutral-content word).

Additionally, all the words on the Myers list were rated by 10 raters (graduate students) in terms of their state-like or trait-like characteristics in a small normative study, and these ratings were used to classify adjectives as state- or trait-like descriptors of one's self. Definitions of state and trait provided to the raters were developed from three sources: Alport and Odbert (1936); Mischel (1976); Spielberger et al. (1970) (see Appendix F for instructions to raters and statistics related to stimuli). The state and trait adjectives were not mutually exclusive to the high and low intensity words. Thus, 20 words in each of the following ten categories were developed: 1) negative-content state adjectives, 2) negative-content trait adjectives, 3) positive-content state adjectives, 4) positive-content trait adjectives, 5) neutral-content state adjectives, 6) neutral-content trait adjectives, 7) negative-content low emotional intensity adjectives, 8) negative-content high emotional intensity adjectives, 9) positive-content low emotional intensity adjectives, 10) positive-content high emotional intensity adjectives. The same stimuli were used in both information-processing tasks and can be found in Appendix G.

As well, 10 colour-contrast words (i.e., the word "red" printed in a blue colour) and 10 same-colour words (i.e., the word "red" printed in a red colour) were included only in Study 2 to ensure that basic Stroop findings were replicated in this

investigation. Accordingly, it is predicted that all subjects will take longer to name the colour of the colour-contrast words than the same-colour words.

Apparatus

Music was played for subjects using a Sony stereo cassette player and a set of stereophonic headphones. Subjects completed computerized information processing tasks using an IBM-XT compatible computer while viewing stimuli on a Packard Bell CGA monitor. Presentation of stimuli and recording of reaction time was controlled by specially developed software provided by Dr. Roger Graves, University of Victoria (Graves & Bradley, 1987, 1988). This software uses Microsoft Quickbasic to call a series of machine language programs that control raster scan position in timing functions, thereby allowing millisecond accuracy in timing of stimulus presentation and subject response.

A special response box was constructed consisting of two response buttons and a voice-keyed switch that had adjustable sensitivity and was connected to a standard microphone. This box was connected to the computer through the game port as suggested by Segalowitz and Graves (1990) allowing complete automation of the experimental tasks.

Procedure

General Overview of Experimental Method. As previously described, most of the self-report aspects of the study were competed in a relatively uncontrolled fashion, at subjects' homes or in hospital rooms. The information processing and recall tasks were completed at individually arranged laboratory sessions. For currently nondepressed individuals (i.e., never and previously depressed), half completed experimental procedures in an induced sad mood while the other half completed tasks in a neutral mood (i.e., unmodified by procedures). Clinically depressed individuals completed experimental tasks in their current unaltered mood state (i.e., in the neutral condition). Experimental tasks included two computerized information processing tasks that have previously discriminated between depressed and nondepressed individuals (the emotional Stroop colour-naming task, Gotlib & Cane, 1987; Gotlib & McCann, 1984; and the deployment-of-attention task, Gotlib et al., 1988) presented in a counterbalanced order. After completing half of each computerized task, subjects

completed a free-recall task. After the free-recall task, subjects finished the information processing task on the computer followed by a cued-recall task. Both the free- and cued-recall tasks involved recalling stimuli presented during the preceding portion of the information processing task. At the conclusion of the computer task portion of the experiment, subjects completed a self-report inventory and a diagnostic interview.

Assignment to Groups. In the procedure for subject assignment in Study 2, the 40 women who comprised the previously depressed (PD) group consisted of those women who received a prepartum diagnosis of depression in the Gotlib et al. (1989) childbirth study (according to Research Diagnostic Criteria, Endicott & Spitzer, 1978), who were not currently diagnosable as depressed (DSM-III-R) as determined by SCID interview (Spitzer, Williams, Gibbons, & First, 1988) administered at the conclusion of the experimental session, and who had Centre for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977) scores below 16.

Forty women were assigned to the never depressed (ND) group and consisted of those women who did not receive a diagnosis of depression at any of the assessment sessions in the childbirth study (Gotlib et al., 1989), who did not obtain a Beck Depression Inventory (Beck et al., 1961) score greater than nine throughout that study, and whose current CES-D score was less than 16. Final assignment to this group was also established by a SCID interview conducted at the conclusion of experimental tasks.

Finally, a third group of 20 subjects whose CES-D scores were above 16 and who met DSM-III-R criteria for depression according to the SCID interview were assigned to the currently depressed (CD) group. As previously described, 8 of these subjects were solicited from the community and the remaining 12 were obtained through referrals at local hospitals. This group of currently depressed subjects all scored above 16 on the CES-D and received a diagnosis of Major Depressive Disorder using the SCID interview and DSM-III-R criteria.

In summary, a total of 100 subjects contributed data to Study 2. Forty of these women were previously depressed (PD) and 40 reported never being depressed in their lifetime (ND). Twenty women who were currently suffering from a

diagnosed major depressive disorder (CD) completed the sample for Study 2. All currently depressed subjects participated in only the neutral condition of Study 2. The nondepressed subjects (i.e., previously and never depressed subject) were randomly assigned to either the sad mood or the neutral condition. In both the neutral control and sad mood conditions, subjects all scored below 16 on the CES-D, which was completed within 24 hours of the experimental session. All those subjects who failed to complete the CES-D, or failed to date it, were assigned to the neutral condition. At the conclusion of the study, the date they completed the CES-D was solicited, or if they had not completed the CES-D, they completed it at the end of the experimental session. Therefore, there were five combinations of group and condition that subjects could have been assigned to and these are summarized in Table 3-1.

Baseline Mood Measurement and Mood Inductions. All subjects, regardless of condition and group assignment, completed baseline measures of current mood using three visual analogue scales (anchors for each of the scales were: sad-happy, anxious-calm, bored-excited, see Appendix H). They also completed a counting task in which they were required to write numbers counting backwards from 100 by 1's (see Appendix I). The speed of completion of this task has been determined to vary with depressed mood and is less subject to experimenter demand than are visual analogue scales (see Kenealy, 1986, 1988). During the time that subjects were completing the visual analogue scales the depression measure (i.e., the CES-D) was scored in the next room by the experimenter to determine which condition the subject could be assigned. If the CES-D was undated or incomplete, subjects were assigned to the neutral condition.

Subjects were then familiarized with the experimental apparatus and completed a series of practice trials to ensure they understood each computerized task. Then subjects received either sad mood inductions or neutral control procedures.

In the sad mood condition subjects were asked to get themselves in a sad mood in whatever way they could. They were given examples that others used to become sad, such as recalling a sad experience in their life, or imagining a sad experience occurring to them. Further, they were told that previous research had shown that listening to certain types of music had been helpful to subjects for getting into a sad

Table 3-1. *Subject Conditions and Assignment Criteria.*

| | Subjects | | |
|---|---|---|---|
| Conditions | PD | CD | ND |
| Sad mood induction. | • CES-D < 16.<br>• History of depression.<br>• Not currently diagnosable.<br>(n = 20) | _____ | • CES-D < 16.<br>• No history of depression.<br>• Not currently diagnosable.<br>(n = 20) |
| Neutral control. | • CES-D < 16.<br>• History of depression.<br>• Not currently diagnosable.<br>(n = 20) | • CES-D > 15.<br>• Currently diagnosable.<br>(n = 20) | • CES-D < 16.<br>• No history of depression.<br>• Not currently diagnosable.<br>(n = 20) |

Note. PD = remitted depressed group, ND = never depressed group, and CD = currently depressed group.

mood. The following instructions, adapted from Clark (1983), were given to subjects.

> "I will play some music for you in just a minute and I want you to try and get into a sad mood. It might feel a bit silly to do this, but it is important that you try very hard because the main point of the experiment hinges on your getting into a sad mood. You'll find that the music won't automatically put you in a sad mood, you'll have to try very hard yourself, in whatever way you can. Some people have reported that recalling a sad event from their life helps to do this while others report that it is helpful to imagine an event occurring in their life that would make them sad. But you do it in whatever way works best for you. The music lasts about five minutes and I'll be out of the room while it is playing so I don't distract you. Then I'll quietly come back into the room and ask you to re-rate your mood. Although I'd like your mood to change, please base your ratings on how you actually feel, rather than on how you think I want you to feel. Then we will have you do the computer task that we just finished practising."

Subjects in the neutral control condition were told simply that the experimenter had some things to attend to in the next room before beginning the computerized tasks and were asked to listen to the neutral-mood music without explanation. All subjects in the neutral control groups completed this latter procedure. After the music, subjects again completed the visual analogue scales and counting tasks to determine the effectiveness of the mood manipulation. Subjects then completed the computerized task, which took between 10 and 15 minutes.

Recall Measures. Half way through the computerized task the computer stopped unexpectedly and informed subjects that they were to take a break from the task. At this point the computer sounded a beep signalling the experimenter to have subjects complete a free-recall task. Subjects were asked to try and recall as many of the words as they could that were presented in the task on which they had just been working (see Appendix J). Subjects were given as much time as they wanted to complete the recall but were encouraged to finish within one minute and then complete the computerized task. Some subjects spontaneously reported being unable to remember any words and were encouraged to give themselves at least a minute to try, after which they also completed the computerized task. In the cued-recall task, completed at the conclusion of the computerized task, subjects were given the first

letter of the last 10 stimulus items that had been presented. Subjects were asked to complete the word with one of the words that had been presented on the computer screen (see Appendix K). Subjects completed the computerized tasks in a counterbalanced order and each task followed the same method for rating mood, mood induction, and recall each time. However, in the second task, subjects completed the backwards counting task only after the music and not before and after music as they did for the first task.

Computerized Task. As previously described, stimulus presentation and reaction-time recording was controlled by the computer. In the case of the emotional Stroop task, subjects were seated 1 metre from the computer screen and a microphone was placed approximately 30 cm from their mouth on a stand at the desk in front of them. It was situated such that it provided subjects with an unobstructed view of the computer screen. The response box was adjusted so that subject's normal voice tripped the response key while taking a loud breath would not. Subjects were presented with the following instructions on the computer screen. The experimenter allowed them to read through the instructions and went over them again verbally after subjects were through.

> In this task you will be asked to name the colour that the word on the screen is printed in. For example, if you saw the word *BOOK*, it is printed in a blue colour so your correct answer would be 'BLUE'. Please try to answer as quickly as you can. The colours are presented in a random order so you won't be able to guess what the next colour will be based on the previous one. At the beginning of each trial you will be prompted by a cross (+) that will appear just before the word. The '+' prompt will then disappear and the word will appear immediately afterwards in that position. Then quickly say the COLOUR of the word out loud. Please make your response clear and loud so the microphone will pick it up. Also, try not to precede your answer by saying 'Ah...' or 'Um...' as this will trigger the computer and record that as your response. After you respond the computer will then begin a new trial approximately two seconds later. We will practice this five times before actually beginning the experiment.
>
> The five colours to be used are:
> *** --Blue
> *** --Green
> *** --Red
> *** --Purple
> *** --Yellow

(Note that the word BOOK, printed above in italics and the asterisks before each colour name were printed on the computer screen in the indicated colour.)

Subsequently, subjects proceeded through a practice task to familiarize themselves with the stimulus presentation procedures. This involved naming the colour of five number words (e.g., one, two, three etc.) printed in the five different colours used in this study. Subjects were told they would have to continue with the task after the program started because the computer controlled the stimulus presentation and recording and could not be stopped. Therefore, if they had any questions they were instructed to ask them at that point. When subjects indicated they were ready, the experimenter started the program and remained behind the subject to score each of the subject's responses as correct or incorrect. For example, if the subject named the wrong colour or accidentally tripped the microphone switch by coughing or because of some other ancillary sounds, the response was recorded as incorrect and later discarded when reaction times were retrieved from the computer.

The program presented the stimulus words in the centre of the computer screen, one at a time, in one of the five colours (red, blue, yellow, green and purple). All colours were represented equally often for each group of words and were ordered such that the same colour never appeared more than twice in a row.

For each stimulus presentation, subjects were presented with a 750 msec presentation of a fixation point (cross) followed immediately by the stimulus word. The stimulus word remained in the centre of the screen until the subject made a response. Subjects' verbal responses to the stimulus presentation tripped the voice key and caused the program to record the response time from stimulus presentation until the response was made. Subsequent to the response, a 500 msec inter-stimulus interval (a blank screen) was presented followed by the next trial. It took approximately four to five minutes to complete the first half of the task, at which point subjects were stopped and completed the free-recall task. The second half of the computer task also required about four or five minutes (this variation in time was introduced because there were 200 stimulus presentations and subjects varied on how

long it took them to respond). Following the completion of the second half of the Stroop colour-naming task, subjects completed a cued-recall task.

When subjects had completed the second of the counterbalanced information processing task, they then completed the STAI-S (i.e., the State Anxiety Questionnaire). After finishing this, subjects participated in a diagnostic interview with the experimenter. All subjects in the sad mood induction condition then underwent a happy mood induction, were thanked, and fully debriefed regarding the experimental procedures. Subjects in the neutral control conditions were thanked and debriefed without going through a happy mood induction at the conclusion of the experiment.

## Results

The results of the current study will be presented in a hypothesis driven fashion. First, the subject sample is described with respect to basic demographic information followed by a description of current and past diagnoses. Results concerning baseline moods are then presented followed by analyses concerning effectiveness of the mood induction. Next, analyses concerning the validity of basic Stroop findings are presented. This represents what is referred to here as the preliminary analyses. The main analyses assess the theoretical postulates stemming from Teasdale's DAH and Beck's cognitive theory (main-effects hypothesis). In conducting the main analyses, the previously identified stimulus characteristics are analyzed in turn (first the State-trait and then the emotional intensity dimension). Following this the main analyses assessing the two theories with regard to subjects' recall are presented.

### Preliminary Analyses

Forty previously depressed (PD), 40 never depressed (ND) and 20 currently depressed (CD) subjects, for a total of 100 subjects, provided data for Study 2. Half of each of the two nondepressed groups participated in the sad mood condition and half in the neutral condition. In order to ensure subjects assigned to each condition were equivalent on demographic and baseline measures (i.e., those self-report scales that were answered in the week previous to the experimental session) five groups were formed of 20 subjects each and subjected to oneway ANOVAs. Consequently, 20 subjects were in the previously depressed group, in the sad mood induction condition (PD-Sad); 20 subjects in the previously depressed group, in the neutral condition (PD-Neut); 20 subjects in the never depressed, sad mood induction condition (ND-Sad); 20 subjects in the never depressed, neutral mood induction condition (ND-Neut); and, finally, 20 subjects in the currently depressed neutral mood condition (CD-Neut).[1]

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[1] The most appropriate method of data analysis with this design is described by Winer (1971) and is used later in the data analytic procedures. This procedure first analyzes the data in a 2 x 2 (Group: Previously depressed, Never depressed) x (Condition: Sad mood, Neutral Mood) ANOVA and then the currently depressed

Demographics and Pre-Experiment Self-reports

First, subjects were compared on basic demographic characteristics: age, years married, number of children and socioeconomic status (as assessed with the Blishen scales, Blishen, Carroll, & Moore, 1987). Results from these oneway ANOVAs indicated group equivalence on all demographic measures, all Fs < 1.3, all ps nonsignificant, and are presented in Table 3-2.

In terms of the self-report data provided by subjects during the week previous to the experimental session, subjects assigned to the groups were significantly different on the measure of self-reported depression, trait anxiety and dysfunctional attitudes in the expected ways, that is, with currently clinically depressed subjects being more depressed, more anxious and endorsing more dysfunctional attitudes than all groups of nondepressed subjects, all Fs > 12.1, all ps < .001. See Table 3-3 for means and posthoc test results (all posthoc tests were conducted using Scheffé's procedure).[2]

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group is considered a control group whose means are compared to groups in the other condition. This conservative test is most appropriate when one would be concerned about assessing data with too liberal an F-ratio. The five-group method is more liberal in that the F-ratio has four degrees of freedom in the numerator of F-ratios. In the Winer procedure, only one degree of freedom is available in the numerator for the overall F-ratio. Consequently, the Winer procedure is more conservative than the five-group one-way ANOVA procedure. However, if any demographic differences exist among groups, then this may be important to know. Therefore, the five group method was used in analyzing demographic data and pre-existing mood data, but not for experimental reaction-time data. These data (i.e., demographic and mood) were all gathered before any experimental manipulations were instituted, and, therefore, seem more appropriately analyzed via one-way ANOVA procedures.

[2] As can be seen in the Table, mean depression scores for the previously depressed subjects in the two conditions appear higher than those never depressed subjects. Consequently, another oneway ANOVA was conducted comparing the previously depressed, never depressed and currently depressed subjects, without further dividing the groups into their respective conditions as well. This ANOVA revealed a significant effect for the CES-D, $F(2,97) = 177.3$, $p < .001$ with posthoc Scheffé's tests indicating that the depressed group differed from the two nondepressed groups. This was also completed for the anxiety and dysfunctional attitude measures. For the DAS, the analysis was significant $F(2,97) = 23.8$, $p < .001$, with posthoc testing revealing that only the currently depressed group differed from the nondepressed groups. Finally, the ANOVA for the STAI-T was also significant, $F(2,97) = 60.3$, $p < .001$, with posthoc tests indicating that the depressed group was

Table 3-2. *Means for demographic information across the groups in each condition.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| Demographics | PD Sad | PD Neutral | ND Sad | ND Neutral | CD Neutral |
| Age | 32.5 (3.97) | 34.5 (3.79) | 33.4 (4.12) | 33.9 (3.01) | 33.7 (6.32) |
| Years Married | 8.2 (3.98) | 10.2 (4.44) | 9.1 (3.74) | 9.7 (2.74) | 11.5 (7.60) |
| Number of Children | 2.2 (0.81) | 2.5 (0.89) | 2.4 (0.68) | 2.5 (0.69) | 2.4 (1.09) |
| SES | 35.7 (12.16) | 42.1 (14.02) | 38.6 (16.26) | 41.7 (19.88) | 39.1 (14.24) |

*Note.* PD = previously depressed, ND = never depressed and CD = currently depressed. SES = Socioeconomic scores from Blishen et al., (1987). Standard deviations are presented in brackets.

more anxious than either of the nondepressed groups and the previously depressed group was more anxious than the never depressed group.

Table 3-3. *Means on self-reported measures of depression, anxiety and dysfunctional attitudes for subjects in each condition.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| Self-report measures | PD Sad | PD Neutral | ND Sad | ND Neutral | CD Neutral |
| CES-D | 7.2[a] (3.47) | 6.9[a] (4.68) | 3.9[a] (3.23) | 5.2[a] (4.74) | 33.2[b] (10.99) |
| DAS | 109.3[a] (18.14) | 119.0[a] (27.87) | 102.7[a] (29.48) | 94.7[a] (28.64) | 154.4[b] (40.46) |
| STAI-T | 36.5[a] (8.34) | 37.0[a] (6.29) | 30.8[a] (5.56) | 32.0[a] (6.76) | 55.5[b] (12.30) |

*Note.* Means within rows with different superscripts are significantly different at the $p < .05$ level using post hoc Scheffé's procedure. CES-D = Centre for Epidemiological Studies Depression Scale, DAS = Dysfunctional Attitude Scale, STAI-T = State Trait Anxiety Inventory-Trait. PD = previously depressed, ND = never depressed, CD = currently depressed.

Clearly, groups assigned to conditions are equivalent on the basic demographic characteristics of age, years married, number of children and socioeconomic status. All nondepressed subjects were equivalent to each other while being different from the currently depressed subjects in the expected direction on the CES-D, DAS and STAI-T (subjects current and past diagnoses are presented in Appendix D).

Baseline Moods

In order to determine if subjects' baseline moods were comparable before beginning the mood induction procedures, the three visual analogue scales were compared using oneway analysis of variance (ANOVA) procedures. As expected, the clinically depressed group reported that they were more sad than the nondepressed groups, $F(4,95) = 12.94$, $p < .001$, (see Table 3-4 for means and posthoc Scheffé's test results); and more anxious than the ND-neutral subjects, $F(4,95) = 3.64$, $p < .01$. The nondepressed groups did not differ on either depression or anxiety levels. Finally, for the excited-bored dimension, the ANOVA was also significant, $F(4,95) = 6.87$, $p < .001$. Post hoc tests indicated that the PD-Neutral subjects were feeling more excited than either the CD subjects and the ND-neutral subjects. Therefore, with the exception of excitement-boredom, the nondepressed subjects were equivalent on current sad and anxious moods and differed only from the currently depressed subjects.

Mood Induction

Subjects completed visual analogue mood scales and a backwards counting task to determine the success of the sad mood induction. First, subjects completed the visual analogue scales described above before and immediately after the musical mood procedure. If the mood induction was successful, we would expect to see changes in only the sad mood visual analogue scale while the anxious-calm and excited-bored scales should remain the same as baseline. The results from this assessment are reported first, followed by the analyses for the backwards counting task.

Visual Analogue Measures. These data were analyzed separately for the currently depressed subjects and nondepressed subjects (i.e., the previously depressed and the never depressed). As previously described in the footnote, this procedure is the preferable method outlined by Winer (1971). Therefore, two sets of repeated

Table 3-4. *Means of baseline measures of mood on visual analogue scales.*

| Scales | Group and Condition | | | | |
|---|---|---|---|---|---|
| | PD Sad | PD Neutral | ND Sad | ND Neutral | CD Neutral |
| SAD-HAPPY | 6.8[a] (1.80) | 7.0[a] (1.03) | 7.4[a] (1.39) | 7.7[a] (0.66) | 4.9[b] (1.69) |
| ANXIOUS-CALM | 5.4[ab] (2.06) | 5.6[ab] (1.73) | 6.2[ab] (1.87) | 6.6[b] (1.35) | 4.6[a] (1.85) |
| EXCITED-BORED | 4.4[ab] (1.04) | 3.8[a] (0.97) | 4.6[ab] (1.10) | 5.1[b] (0.89) | 5.3[b] (1.17) |

*Note.* PD-Sad, Previously depressed subjects in the sad mood condition; PD-Neutral, Previously depressed subjects in the neutral mood condition; ND-Sad, never depressed subjects in the sad mood condition; ND-Neutral, never depressed subjects in the neutral mood condition; CD, currently depressed subjects in neutral mood condition. Means within rows having different superscripts differ on post hoc Scheffé's tests at the $p < .05$ level. Standard deviations are presented in brackets.

measures analysis of variance were conducted with repeats across three times (baseline, mood induction 1, and mood induction 2) for the visual analogue scales for the depressed and nondepressed groups separately.

The depressed groups' data are presented first. Remember that changes were not expected in the sad-happy or anxious-calm dimensions, although predictions were not made for the excited-bored dimension. For each of the visual analogue scales, ratings were subjected to a repeated measures analysis of variance with subjects making ratings at baseline, after the first neutral mood condition, and after the second neutral mood condition. No significant changes were obtained for any of these three rating scales, all $F$s(2,17) < 1.61, all $p$s nonsignificant (one subject's data were not available because ratings were not made due to time constraints). Thus, for self-rated mood, no changes occurred for the depressed group. Means and standard deviations are presented in Table 3-5.

For the nondepressed subjects, data for the three likert scales were subjected to a 2 x 2 x 3, Group (previously depressed, never depressed) x Condition (sad mood, neutral mood) x Time (baseline, induction 1 and induction 2) with repeated measures on the Time factor. As with the depressed group, measures of mood ratings were taken at baseline, after the first induction and after the second induction. Each scale was analyzed separately using the repeated measures ANOVA.

Considering first the sad-happy rating scale, significant differences were obtained for the main effects of Group, $F(1,76) = 10.06$, $p < .005$; Condition, $F(1,76) = 149.16$, $p < .001$; and Time, $F(2,75) = 63.98$, $p < .001$, as well as an interaction of Condition by Time, $F(2,75) = 55.94$, $p < .001$. For the Group effect, the previously depressed subjects rated themselves as more sad than did the never depressed subjects (means of 5.65 and 6.32, respectively) although both of these means lie on the "happy" side of the 10 point scale. Because the main effects of Condition and Time are subsumed within a higher-order interaction, only the interaction is analyzed further. Post hoc Scheffé's analysis of the six means involved in this interaction indicated that only subjects who received the sad induction became significantly sadder at both inductions 1 and 2. Baseline measures of sadness for the subjects who received the sad mood induction were equal to measures of sadness for

Table 3-5. *Visual analogue means at baseline and after each mood condition for currently depressed (CD) subjects only.*

| Visual Analogue Scales | Time | | |
|---|---|---|---|
| | Baseline | 1 | 2 |
| Sad-Happy | 4.95[1] (1.68) | 4.68 (1.80) | 4.63 (1.80) |
| Anxious-Calm | 4.58 (1.90) | 5.00 (2.00) | 4.58 (1.85) |
| Excited-Bored | 5.11 (0.81) | 5.21 (1.08) | 4.95 (0.78) |

*Note.* Standard deviations are presented in brackets. The column title indicates Time 1 and 2 and this refers to the times immediately following the music presentation. Remember, the depressed group only participated in the neutral condition. These columns refer merely to the time of the measure (i.e., after the music each time) in order to have consistency between this Table and the Table presenting nondepressed subject's data.

[1] The baseline values differ slightly from Table 3-4 because one subject did not supply complete data and therefore that individual's contribution to baseline values is omitted in this table.

subjects in the neutral condition at all three measurement points. Thus, only subjects in the sad mood condition changed mood and became increasingly sad. Furthermore, the second induction did not provide an increase in reported sad mood over the first induction. The means are presented in Table 3-6. Clearly, the sad mood induction resulted in increased self-reported sad mood and was not differentially affected by previous diagnostic status for depression. In other words, because there was not a significant Group by Condition by Time interaction, each group achieved equivalent changes in mood, although the main effect of group indicated that the previously depressed group were somewhat more sad overall than was the never depressed group.

Next, analysis of the anxious-calm likert scale was conducted. This analysis revealed only a significant effect for Group, $F(1,76) = 5.40$, $p < .025$. In this case, the previously depressed group was more anxious than the never depressed group, means of 5.58 and 6.34, respectively. (Note that lower scores on this dimension reflect greater anxiety and that both of these means lie on the positive end of the ten point scale.) No other main effects or interactions were significant. Therefore, the sad mood induction did not result in changes in levels of anxiety for subjects according to VAS ratings.

Analysis of the excited-bored scale revealed significant main effects for Group $F(1,76) = 10.50$, $p < .005$; Condition $F(1,76) = 7.96$, $p < .01$; and Time $F(2,75) = 15.47$, $p < .001$; and significant interactions for Group by Condition $F(1,76) = 6.83$, $p < .025$; and Condition by Time $F(2,75) = 3.93$, $p < .025$. Because each of the main effects are subsumed within higher order interactions, only the interaction effects are analyzed further.

Considering first the Group by Condition interaction, post hoc testing using Scheffé's procedure revealed that the subjects in the neutral condition who had a previous diagnosis of depression were significantly more excited than the previously depressed subjects in the sad mood condition and never depressed subjects in both conditions (see Table 3-7).

Table 3-6. *Means for the Sad-Happy Likert Scale in each condition across three points in time for the PD and ND subjects only.*

| | Time | | |
|---|---|---|---|
| Condition | Baseline | Induction 1 | Induction 2 |
| Sad | 7.05[a] | 3.65[b] | 3.40[b] |
| Neutral | 7.35[a] | 7.28[a] | 7.18[a] |

*Note.* Means with different superscripts are significantly different at the $p < .05$ level using Scheffé's procedures.

Table 3-7. *Means for self-reported Excitement-Boredom dimension for previously depressed (PD) and never depressed (ND) subjects in each condition.*

| | Condition | |
|---|---|---|
| Group | Sad Mood | Neutral Mood |
| PD | 5.07[a] | 4.20[b] |
| ND | 5.17[a] | 5.13[a] |

*Note.* Means having different superscripts are significantly different at the $p < .05$ level using Scheffé's procedures.

Next, the Condition by Time interaction for the Boredom-Excitement dimension was assessed using Scheffé's post-hoc procedures. This test revealed that all subjects reported becoming significantly more bored over the course of the experimental session; however, the subjects in the sad mood condition reported becoming bored more quickly than subjects in the neutral condition (see Table 3-8). However, the means still show that subjects rated their mood approximately between excitement and boredom, thus indicating that they were not likely becoming careless in responding due to boredom with the tasks.

To summarize the findings concerning measurement of the mood induction using visual analogue scales, the data suggest that subjects in the sad mood conditions became significantly more sad while remaining constant on the anxiety dimension. Therefore, it appears from this that the mood induction had its desired effect in producing sad mood without increasing anxiety. Additionally, it appears that a significant level of sadness was induced as the means reported by subjects after the sad mood induction were actually lower than the mean sadness reported by clinically depressed subjects in the neutral conditions. All subjects became more bored over the course of the experiment but means suggest that it was unlikely that they were becoming careless in responding to experimental procedures.

Backwards Counting Measures. The scores for the backwards counting tasks were assessed next. Subjects completed the backwards counting task before and after the first musical mood induction procedure and again after the second mood induction procedure. It was expected that those subjects who received the sad mood induction should slow down in their ability to write numbers backwards because of the sad-mood-associated psychomotor retardation[3]. The last number subjects wrote down

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[3] During pilot testing, it was observed that the novel backwards counting task did not change exactly as was predicted. That is, after subjects completed the task once, a practice effect was obtained. Subjects began using speeding strategies and also spontaneously reported reaching lower numbers on retrials (i.e., getting faster) than on their baseline trial. Therefore, some attenuation of the predictions for evidence of sad mood induction was expected for the backwards counting task. In this case, all groups who did not receive the sad mood induction were expected to get faster and those who received the sad mood induction were expected to either to also

Table 3-8. *Means for self-reported excitement-boredom dimension for PD and ND subjects in each condition over time.*

| | Time | | |
|---|---|---|---|
| Condition | Baseline | Induction 1 | Induction 2 |
| Sad | 4.45[a] | 5.30[b] | 5.60[b] |
| Neutral | 4.40[a] | 4.55[a] | 5.05[b] |

*Note.* Means having different superscripts are significantly different at the $p < .05$ level using Scheffé's procedures.

get faster but not with as great a magnitude as those subjects in the neutral mood conditions or to still become slower.

during the baseline trial was subtracted from the last number the subjects wrote down after the mood induction procedures. In this way, the more positive the difference score, the more psychomotor slowing.

As predicted, practice effects were observed in the depressed group with the difference score being more negative at the second time than at the first with both indicating an increase in speed from baseline, $F(1,18) = 12.45$, $p < .005$ (means were -5.21 and -1.90, respectively).

Next, the nondepressed subjects data on the backwards counting task were analyzed and revealed main effects for Condition $F(1,76) = 27.86$, $p < .001$; Time $F(1,76) = 15.42$, $p < .001$ and an interaction effect of Group by Time $F(1,76) = 4.07$, $p < .05$. The main effect of Condition indicated that those subjects who received the sad mood induction slowed down on average while those subjects who received the neutral mood condition sped up (i.e., there was evidence of a psychomotor slowing; means of 1.1 and -5.7, respectively -- note that positive values indicate slowing of psychomotor speed while negative numbers indicate the subjects became faster on the task). As well, considering the main effect of time, overall, subjects evidenced some increased speed the third time they completed the task versus the second time they completed it (means of -3.2 and -1.4, respectively). Finally, the Group by Time interaction was examined using post-hoc Scheffé's procedures and indicated that never depressed subjects evidenced less psychomotor speeding after the first induction than the second, and that the previously depressed group exhibited equivalent speeding after the first and second induction (see Table 3-9).

Taken collectively, results from the visual analogue scales and the counting task indicate that sad mood was successfully induced in those subjects who received the sad mood induction, while no changes were evident for those subjects who received the neutral mood condition. Clearly, the results of these analyses also indicate that it was sad mood rather than anxiety that was induced in the subjects and therefore differences obtained on experimental tasks are the result of sad mood rather than anxious mood. As well, both previously depressed and never depressed subjects responded to the mood induction procedures in an equivalent manner, with both becoming equally more sad after the sad mood induction and remaining the same after

Table 3-9. *Mean psychomotor retardation as measured by backwards counting tasks for each group (PD & ND) across time.*

| | Time | |
|---|---|---|
| Group | Induction 1 | Induction 2 |
| Previously Depressed | -2.1[ab] | -3.0[a] |
| Never Depressed | -0.6[b] | -3.4[a] |

*Note.* Means with different superscripts are different at the $p < .05$ level using Scheffé's procedures.

the neutral mood condition. Of particular interest here is the magnitude of sad mood experienced by the nondepressed groups following the mood inductions. Subjects who received the sad mood induction reported feeling more sad than did currently depressed subjects (compare Table 3-6 and 3-7 on the sad-happy rating at Induction 1 and 2). Clearly, the sad mood inductions were successful in achieving their goal and, indeed, the sad mood obtained was equivalent in magnitude to that indicated by currently depressed subjects.

Stroop Effects

In order to ascertain whether basic Stroop effects were obtained in the current investigation using the modified Stroop procedure of Gotlib and McCann (1984), five colour-contrast words (e.g., the word "red" presented in a blue colour) and five same-colour words (e.g., the word "green" presented in a green colour) were presented to all subjects. An "interference" score was calculated by subtracting the same-colour reaction time from the colour-contrast reaction time. This interference score was analyzed using a oneway ANOVA and three Groups (Previously Depressed, PD; Never Depressed, ND; and Currently Depressed, CD) design. The F-ratio was not significant for this analysis, $F(2,97) < 1$. The value of this interference score was 290.2 msec for the three groups overall. A t-test was conducted to ensure that this value was significantly different from zero, thereby indicating that the Stroop effect was significant. The results of this analysis were significant, $t(99) = 14.5$, $p < .001$. This clearly indicates that all subjects took longer to name the colour of the colour-contrast words than to name the colour of the same-colour words. Consequently, the basic Stroop findings were preserved in the current investigation, using the word-by-word presentation method (cf. Kleiger & Cordner, 1990).

To ensure that nondepressed subjects in each condition were also equivalent on basic Stroop findings, the interference score for colour-contrast and same-colour words was submitted to a Group (PD, ND) by Condition (Sad Mood, Neutral Mood) ANOVA. This resulted in no significant main effects or interactions, all $F$s $< 1$, with an overall mean reaction time of 295.6 msec for the interference score in the two nondepressed groups. Therefore, nondepressed subjects in each condition obtained the same Stroop effects and therefore performed the task in a similar fashion.

## Analyses of Main Hypotheses for DAH & Beck's Theories

### Statistical Design and Analysis Strategy

In analyzing the emotional Stroop data for State-Trait factors, Intensity, and the weighted reaction time (see below), the nondepressed group's data were analyzed separately from the currently depressed group as suggested by Winer (1971). The Group (Previously depressed, Never depressed) and Condition (Sad mood induction, Neutral mood condition) factors have already been described. Other factors included in the design are State-Trait (State-like adjectives and Trait-like adjectives) and an Affect factor. The Affect factor consisted of two levels, Negative-interference and Positive-interference scores. The Negative-interference score, following Small and Robbins' (1988) suggestion, was the average reaction time taken for the neutral-content adjectives subtracted from the average reaction time taken for the negative-content adjectives (the same procedures have also been used by others, e.g., Mogg, Bradley, Williams & Mathews, 1993). Similarly, the Positive-interference score is the average reaction time taken for the neutral-content adjectives subtracted from the positive-content adjectives. Two extraneous, but potentially important factors were also included in preliminary analyses, but were later excluded if they did not interact with the other factors in important ways. Recall that the emotional Stroop task had an incidental recall task inserted in the middle to assess potential recall biases. Consequently, subjects may have evaluated stimuli differently after the incidental recall task in comparison to evaluations made prior to the recall task. This factor was labelled as Recall for the current investigation and had two levels, Before and After the recall task. Additionally, subjects completed the emotional Stroop and the deployment-of-attention task in a counterbalanced fashion. Therefore, subjects may have treated the data in either of the tasks differently after having been exposed to the other task. Consequently, an Order factor was also assessed for each of the analyses to be reported. Therefore, the preliminary analysis conducted was a Group by Condition by Order repeated over Affect repeated over State-Trait repeated over Recall repeated measures ANOVA. If Recall and Order were found to be irrelevant to the hypotheses being assessed, they were dropped from the design in each case.

Of theoretical interest to the current investigation are those higher-order interactions that involve Group, Condition, and Affect. The predictions stemming from the DAH would require that these three factors be in interactior together. Predictions of Beck's cognitive theory (i.e., the main-effects model) would necessitate higher-order interactions of only Group and Affect together. Consequently, only those higher-order interactions involving all three factors together (to assess the DAH) and only those involving Group and Affect together (to assess the main-effects hypothesis of Beck's theory) were followed up with subsequent post-hoc analytic procedures. Other significant interactions will be reported, but not evaluated due to their lack of theoretical relevance to the current investigation (e.g., a Recall by Order interaction would not be evaluated further as it does not contain Group, Affect and Condition). In addressing mean differences using post-hoc testing, Scheffé's procedures will be used. If theoretically significant findings are revealed in the nondepressed groups (i.e., the previously and/or never depressed subjects) these means will be compared to the currently depressed group's means through t-test procedures.

State-Trait

Table 3-10 presents the mean interference scores for all subjects in all conditions.

In the preliminary ANOVA, significant main effects for Affect, $F(1,72) = 39.08$, $p < .001$; State-Trait, $F(1,72) = 11.70$, $p < .001$; and Recall, $F(1,72) = 5.86$, $p < .025$ were found. As well, a significant two-way interaction of Affect by Recall, $F(1,72) = 4.89$, $p < .05$ and two three-way interactions, Group by Order by Affect, $F(1,72) = 5.44$, $p < .025$; and Affect by State-Trait by Recall, $F(1,72) = 18.91$, $p < .001$ were found. It is important to note that, although Recall and Order were either significant main effects or involved in significant higher-order interactions, no interaction involving Group and Condition and Affect was obtained with either of these two factors. Therefore, it appears that they are not relevant with respect to the DAH. However, Order was involved in an interaction involving Group and Affect, therefore it may be important in assessing Beck's cognitive theory. Recall was not involved with Group and Affect, nor was it involved with a Group,

Table 3-10. *Mean Interference scores for All Groups in Each Condition in Both Orders for State- and Trait-like Adjectives.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| | Previously Depressed | | Never Depressed | | Currently Depressed |
| Interference Scores | Sad | Neutral | Sad | Neutral | Neutral |
| | | | Order 1 | | |
| State | | | | | |
| Negative | 37.4 (62.82) | 72.6 (128.51) | 54.3 (68.21) | 49.6 (44.52) | 42.1 (66.85) |
| Positive | 31.5 (58.25) | 39.1 (42.90) | -1.2 (61.69) | 16.9 (34.16) | 0.1 (56.94) |
| Trait | | | | | |
| Negative | -0.6 (90.71) | 4.0 (76.06) | 9.0 (55.75) | 19.3 (34.93) | 28.3 (33.84) |
| Positive | -40.5 (43.45) | -31.5 (54.63) | -3.8 (53.36) | -15.9 (31.00) | -6.5 (40.43) |
| | | | Order 2 | | |
| State | | | | | |
| Negative | 100.8 (83.23) | 78.3 (77.88) | 22.5 (42.19) | 42.8 (85.07) | 158.8 (241.56) |
| Positive | -4.2 (40.44) | 4.0 (51.35) | 2.8 (31.94) | 22.8 (44.42) | 6.6 (69.49) |
| Trait | | | | | |
| Negative | 40.9 (78.95) | 71.2 (74.78) | 23.2 (26.86) | 9.1 (31.75) | 18.2 (114.99) |
| Positive | -9.0 (81.17) | 19.3 (50.09) | 2.6 (27.85) | -6.1 (43.29) | -62.4 (137.80) |

*Note.* Negative = Negative interference score (i.e., mean Negative reaction time - mean Neutral reaction time). Positive = Positive interference score. Standard deviations presented in brackets.

Condition and Affect interaction. Consequently, the Recall factor was dropped from any further analysis. (Note also that there were significant interactions, for example, the Affect by Recall interaction, that are not relevant to the hypotheses being investigated and therefore this interaction is not discussed further.)

As there was a significant interaction involving Group, Affect and Order this was further analyzed using two, two-way ANOVAs on Group and Affect within each Order. Considering first, the order in which the Stroop task was presented before the deployment-of-attention task, the two-way ANOVA was not significant, $F(1,38) < 1$. When the Stroop task was presented second, the two-way ANOVA of Group and Affect was significant, $F(1,38) = 9.33$, $p < .005$. Therefore, when considering the emotional Stroop task, it appears that only if it is presented following the other information processing task and recall tasks are theoretically significant differences apparent. Follow-up posthoc tests using Scheffé's procedures revealed that, consistent with Beck's main-effects hypothesis, the negative interference score for previously depressed subjects was significantly greater than the positive interference score and that the negative interference score for previously depressed subjects was greater than both the negative and positive interference score for never depressed subjects. See Table 3-11 for means and significant differences.

Following the suggestion of Winer (1971), the currently depressed subjects' mean negative and positive interference scores were then compared to the previously and never depressed subjects' means in Order 2 (i.e., when the emotional Stroop followed the deployment-of-attention task). T-tests revealed that the mean interference scores for the previously depressed group were equivalent to the currently depressed mean interference scores, both for the negative interference score, $t(10.12$, separate variance estimate) $= -.30$, $p$ = ns, and the positive interference score, $t(28) = 1.63$, $p > .10$. Comparisons of the currently depressed subjects' mean interference scores with the never depressed subjects' scores also revealed no significant differences for both the negative interference score, $t(9.36$, separate variance estimate) $= -1.23$, $p$ = ns; and for the positive interference score, $t(10.36$, separate variance estimate) $= 1.62$, $p > .10$. However, the failure to find significant differences between the groups appears to be primarily a function of the large

Table 3-11. *Mean Interference Scores for Never (ND) and Previously Depressed (PD) Subjects for the Stroop task presented in Order 2.*

| | Interference Score | |
|---|---|---|
| Groups | Negative | Positive |
| PD | 72.8[a] | 2.5[b] |
| (n = 20) | (57.21) | (39.62) |
| ND | 24.4[b] | 5.5[b] |
| (n = 20) | (32.59) | (24.31) |

*Note.* Negative = negative interference score, Positive = positive interference score. It is important to recognize that increasingly positive values indicate subjects were more distracted by the emotionally-laden stimuli. Increasingly negative values indicate less attention is accorded to the emotionally-laden adjectives. Standard deviations are presented in brackets. Values having different superscripts are significantly different at the $p < .05$ level using Scheffé's procedures.

standard deviation of the currently depressed subjects' scores for both the positive interference score (mean=-27.9, sd=63.02) and especially the negative interference score (mean=88.54, sd=163.20). Indeed, the t-test comparing the negative and positive interference scores within the currently depressed group was also not significant, $t(9) = 1.72$, $p$ = ns.

In sum, the data for the nondepressed groups follows the predictions suggested by Beck in the main-effects hypothesis in that previously depressed subjects attend more to negative-content information than positive- and attend more to negative-content information than do never depressed subjects. The strongest support for the hypothesis would have been obtained if the analyses also resulted in nonsignificant differences between the previously depressed group and the currently depressed group, with significant differences between the never depressed group and the currently depressed group. Such differences would allow one to confidently conclude that the previously depressed group was negatively biased on the task, as predicted by the main-effects version of cognitive theory, performing like the currently depressed group, and these two groups were different from the never depressed subjects. However, this was not the case, likely due to a small sample size in the currently depressed group in conjunction with the larger variation. Although the comparison with the currently depressed group did not turn out as expected, the attention towards negative-content stimuli in the previously depressed group is consistent with what would be predicted using cognitive theory.

In order to assess the DAH without the extraneous factors included in the design (i.e., both Order and Recall were removed), a Group by Condition by Affect by State-Trait ANOVA design was used. This ANOVA revealed only significant main effects for Affect, $F(1,76) = 37.50$, $p < .001$ and State-Trait, $F(1,72) = 11.50$, $p < .001$. For the Affect factor, subjects took longer to colour-name the negative-content words than the positive-content words (mean interference scores of 39.66 and 1.68 msec, respectively). For the State-trait factor, subjects took longer to respond to state- than to trait-like stimuli (mean interference scores of 35.64 and 5.70 msec, respectively). None of the hypothesized interactions for State-Trait or the Group by Affect interaction or the Group by Condition by Affect interaction were

significant. Importantly, it is either of these latter interactions that would be significant if results followed the findings of Gotlib and McCann (1984) and Gotlib and Cane (1987) and supported either Beck's cognitive theory (main-effects model) or the DAH.

In order to investigate if there was indeed a replication of the basic emotional Stroop findings reported by these researchers, a previously unplanned ANOVA was conducted comparing the never depressed subjects in the neutral condition to currently depressed subjects in the neutral condition. These two subject groups in these conditions are the most analogous to the depressed and nondepressed groups assessed in the two Gotlib and colleagues studies (Gotlib & Cane, 1987; Gotlib & McCann, 1984). The analysis of reaction time interference scores for these two groups of subjects would be expected to yield a significant Group by Affect interaction for the emotional Stroop findings in order to conceptually replicate those of Gotlib and colleagues. This analysis also failed to reach significance, $F(1,38) = 2.04$, $p > .15$; consequently, the current investigation did not replicate the basic emotional Stroop findings reported by Gotlib and colleagues (with the exception of the Group by Affect interaction reported above for order 2).[4]

One final data-analytic procedure was used to determine whether an alternative emotional Stroop finding was possible in the current investigation. Recall from the general introduction that Teasdale (1988) suggested that stimuli might need to be directly self-relevant before differences on cognitive tasks would become apparent. Each of the adjectives presented to subjects in this study was also rated by each subject for self-descriptiveness during the week prior to the experimental laboratory session. In order to use this information, a weighted-reaction-time analysis was conducted on the data. In calculating the weighted reaction time, the reaction time taken by a subject for each adjective was multiplied by the self-referent rating she made on that adjective when completing the SEQ. These individual weighted reaction

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[4] The data in this analysis were also assessed using square-root, $\log_{10}$, and the reciprocal transformation suggested by Cooper, Anastasiades & Fairburn (1992) to give a speed measure (i.e., words per msec). None of these transformations altered the findings described for the reaction-time analysis.

times were then used to compute the weighted-interference scores. These weighted-interference scores were the average weighted-reaction times taken for colour-naming neutral-content adjectives subtracted from the average weighted-reaction times taken to colour-name the affectively valenced adjectives.

The means and standard deviations for the subjects are presented in Table 3-12. Results from the weighted-reaction-time analysis for the currently depressed versus never depressed subjects in the neutral condition revealed significant effects for Group, $F(1,37) = 18.59$, $p < .001$ (note that one CD subject did not complete the SEQ as requested resulting in fewer degrees of freedom); Affect, $F(1,37) = 6.89$, $p < .025$; and State-trait, $F(1,37) = 48.61$, $p < .001$. Significant interactions were also found for Group by Affect, $F(1,37) = 40.83$, $p < .001$; Group by State-Trait, $F(1,37) = 6.29$, $p < .025$; and Affect by State-Trait, $F(1,37) = 19.97$, $p < .001$. All of these effects were subsumed within the higher order three-way interaction of Group by Affect by State-Trait, $F(1,37) = 16.87$, $p < .001$.

The three-way interaction was decomposed by conducting two, two-way repeated measures ANOVAs for State-like and Trait-like adjectives separately. In both cases, the follow-up ANOVA for Group by Affect was significant, $F(1,37) = 46.46$, $p < .001$ for the State ANOVA, and $F(1,37) = 25.31$, $p < .001$ for the ANOVA assessing Trait-like reaction times. However, the pattern of significant differences among the means was different for the two ANOVAs (see Table 3-12). The depressed subjects attended more to negative-content state- and trait-like adjectives than did nondepressed subjects, while attending equally to the positive adjectives. Interestingly, within the depressed group, only the state-like adjectives revealed a difference between positive and negative interference scores. Within the nondepressed group, both state- and trait-like words resulted in less interference for negative- than for positive-content stimuli. Therefore, the weighting of reaction times resulted in findings conceptually similar to those of Gotlib and colleagues (Gotlib & Cane, 1987; Gotlib & McCann, 1984). Currently depressed subjects' weighted interference scores were greater than never depressed subjects' scores for both state- and trait-like adjectives, and within the currently depressed group, it was the state-like adjectives only that discriminated between negative and

Table 3-12. *Weighted Mean Interference Scores for Currently Depressed (CD) and Never Depressed (ND) Subjects in Neutral Mood Conditions.*

| | CD (N = 19) | | ND (N = 20) | |
|---|---|---|---|---|
| Word Type | Negative | Positive | Negative | Positive |
| Trait | -673.3[b] (1292.5) | -774.6[b] (676.2) | -2099.6[a] (637.1) | -388.4[b] (332.3) |
| State | 645.9[c] (1461.0) | -661.2[b] (541.6) | -1736.8[a] (770.5) | -76.4[bc] (304.1) |

*Note.* Negative = weighted negative interference score, Positive = weighted positive interference score. It is important to recognize that increasingly positive values indicate subjects were more distracted by the emotionally-laden stimuli. Increasingly negative values indicate less attention is accorded to the emotionally-laden adjectives. Standard deviations are presented in brackets. Values within rows having different superscripts are significantly different at the $p < .05$ level using Scheffé's procedures.

positive interference scores. Therefore, although both state- and trait-like stimuli discriminate between currently depressed and never depressed subjects, it is the state-like stimuli that provide the greatest discriminatory power.

As the weighted-reaction-time analysis was successful in revealing differences between depressed and nondepressed groups, a weighted analysis was also conducted for the nondepressed groups in each condition. As before, weighted reaction times were analyzed using a Group by Condition repeated over Affect repeated over State-Trait ANOVA. This analysis revealed significant effects for Affect, $F(1,76) = 628.21$, $p < .001$; and State-Trait, $F(1,76) = 88.42$, $p < .001$. Significant interactions of Group by State-trait, $F(1,76) = 4.05$, $p < .05$; and Affect by State-trait, $F(1,76) = 7.84$, $p < .01$ were also found. However, the interaction involving Group by Affect revealed only a trend towards significance, $F(1,76) = 2.86$, $p < .10$; while the Group, Condition and Affect interaction was not significant, $F(1,76) < 1$. Therefore, the weighted reaction time analysis in the nondepressed groups (i.e., the previously depressed and the never depressed subjects) was not supportive of either the DAH nor main-effects hypothesis.

To summarize, with respect to the state-trait dimension, none of the effects predicted by the DAH were observed. In contrast, some evidence of a main-effects hypothesis of Beck's cognitive theory was observed when the Stroop task was presented as the second of the information processing tasks. In the second order, previously depressed subjects were more distracted by negative-content words than positive-content words. The never depressed subjects did not differ. Unfortunately, it appears that due to large variation in the currently depressed group, the direct comparisons to the clinical referent group did not reveal the same pattern of significant results, although the means of the currently depressed subjects were similar overall to the previously depressed group. When Order and Recall effects were not considered in the analyses, previously depressed and never depressed subjects performed equivalently to currently depressed subjects when unweighted interference scores were assessed. The analyses indicated that subjects generally attended more to negative-content than to positive-content adjectives. As well, subjects generally attended more to state-like than to trait-like stimuli. Interestingly, group differences

emerged when reaction times were weighted using subjects' self-referent ratings. This analysis indicated that currently depressed subjects attended more to self-referent negative-content adjectives than did never-depressed subjects. This finding was more pronounced within the depressed group for state-like adjectives. Finally, these effects did not extend to the nondepressed groups in the sad and neutral mood conditions.

Emotional Intensity

As with the State-Trait analyses, the first ANOVA conducted to assess the "intensity hypothesis" of the DAH included the factors of Order and Recall in the Group by Condition repeated over Affect repeated over Intensity (High affective intensity, Low affective intensity) ANOVA[5]. Means and standard deviations can be found in Table 3-13 for all subjects in each order.

This repeated measures ANOVA resulted in significant main effects for Affect, $F(1,72) = 58.06$, $p < .001$; and Intensity, $F(1,72) = 4.24$, $p < .05$; a significant two-way interaction for Affect by Intensity, $F(1,72) = 18.65$, $p < .001$; a significant three-way interaction for Affect by Intensity by Recall, $F(1,72) = 21.52$, $p < .001$; significant four-way interactions for Condition by Order by Intensity by Recall, $F(1,72) = 5.23$, $p < .025$; and Condition by Order by Affect by Intensity, $F(1,72) = 4.84$, $p < .05$; and, finally, a significant five-way interaction of Group by Condition by Order by Affect by Intensity interaction, $F(1,72) = 7.31$, $p < .01$. Although Recall was involved as a significant effect in some interactions, it was not significant in any interactions involving Group and Affect, or Group, Condition and Affect and therefore was dropped from further analyses. Order, however, was involved in the five-way interaction involving Group, Condition and Affect and therefore subsequent analyses included this factor.

Consequently, two, four-way repeated measures ANOVAs were carried out, one for each experimental order to further understand the Order effect in the significant five-way interaction reported above. In the first order (emotional Stroop

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[5] Beck's theory is silent with respect to intensity hypotheses derived from the DAH. However, any interactions involving Group and Affect alone will also be examined in addition to interactions involving Group, Condition and Affect.

Table 3-13. *Mean Interference scores for All Groups in Each Condition in Both Orders for High and Low Intensity Adjectives.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| | Previously Depressed | | Never Depressed | | Currently Depressed |
| Intensity | Sad | Neutral | Sad | Neutral | Neutral |
| | | | Order 1 | | |
| High | | | | | |
| Negative | -9.39 (68.46) | 65.44 (69.33) | 16.83 (65.61) | 34.78 (30.81) | 28.27 (51.18) |
| Positive | -12.54 (60.99) | -20.93 (22.87) | -22.82 (60.99) | -4.94 (24.33) | -15.77 (38.56) |
| Low | | | | | |
| Negative | 9.37 (57.93) | 3.27 (48.06) | 13.95 (39.49) | 26.25 (56.15) | 11.04 (42.64) |
| Positive | 1.28 (47.01) | 1.99 (42.34) | 4.31 (48.74) | 3.90 (48.80) | 15.99 (51.57) |
| | | | Order 2 | | |
| High | | | | | |
| Negative | 37.56 (81.57) | 24.52 (52.30) | 30.22 (45.93) | 33.07 (55.33) | 209.21 (382.20) |
| Positive | -40.92 (61.01) | -21.39 (56.31) | -25.39 (27.68) | -24.54 (44.14) | -35.59 (85.88) |
| Low | | | | | |
| Negative | 4.11 (60.02) | 29.91 (54.06) | 39.39 (26.53) | 36.75 (38.16) | 20.55 (121.01) |
| Positive | 21.55 (53.43) | -1.52 (39.10) | 13.35 (40.93) | 13.73 (45.13) | -32.26 (55.40) |

*Note.* Negative = Negative interference score (i.e., mean Negative reaction time - mean Neutral reaction time). Positive = Positive interference score. Standard deviations presented in brackets.

task presented before the deployment-of-attention task), the four-way interaction for Group by Condition by Affect by Intensity was significant, $F(1,36) = 4.66$, $p < .05$. However, in the second order, (i.e., the emotional Stroop task came second), this interaction was not significant, $F(1,36) = 2.84$, $p = .10$. Therefore, it appears that the significant differences were apparent in only the first order and consequently only the data in the first order were analyzed further.

In the first order, two separate three-way repeated measures ANOVAs (Group by Condition by Affect) were assessed for high- and low-intensity adjectives separately (i.e., separating the Intensity factor). Considering first the high intensity adjectives, the interaction of Group, Condition and Affect was significant, $F(1,36) = 5.44$, $p < .025$. The three-way interaction for the low intensity adjectives was not significant, $F(1,36) < 1$. Therefore, in the first order, it appears that only the high intensity adjectives are responsible for the Group by Condition by Affect interaction as would be predicted using the DAH. In order to break this interaction down further to determine if the means fit what would be expected using the DAH, subsequent ANOVAs for each group were carried out.

In order to understand the interaction involving the high intensity adjectives, in the first order, the previously depressed and never depressed subject groups were analyzed separately. For the previously depressed subjects, the Condition by Affect interaction was significant, $F(1,18) = 7.63$, $p < .025$; the same interaction for the never depressed group was not significant, $F(1,18) < 1$. Therefore, it appears that, as would be predicted using the DAH, the previously depressed group differed in how they responded to the stimuli depending on which condition they were in. In order to assess the pattern of means to determine if they corresponded to predictions derived from the DAH, the four means for the significant Condition by Affect interaction for previously depressed subjects were examined using Scheffé's test to understand the interaction and are presented in Table 3-14.

In contrast to predictions stemming from the DAH, it was previously depressed subjects in the neutral condition that were most distracted by the high intensity negative stimuli. According to the DAH, one would have expected that it

Table 3-14. *Mean Reaction-Time Interference scores for Previously Depressed Subjects in Sad and Neutral Conditions for High Intensity Adjectives Only.*

| | Interference score | |
|---|---|---|
| Condition | Negative | Positive |
| Sad | -9.39[a] | -12.54[a] |
| | (68.46) | (60.99) |
| Neutral | 65.43[b] | -20.91[a] |
| | (69.33) | (22.87) |

*Note*. Standard deviations are presented in brackets. Interference scores presented were computed by subtracting the average neutral word reaction time from the average affective word reaction time, respectively. Increasingly positive values indicate greater attention is accorded to the emotionally-laden adjectives. Means having different superscripts are significantly different at the $p < .05$ level using Scheffé's test.

would be the previously depressed subjects in the sad condition that would take longer to colour-name negative-content stimuli.

T-tests were conducted between the currently depressed subjects' mean interference scores and the means presented in Table 3-14 (means for the currently depressed subjects can be found in Table 3-13). These t-tests indicated that the currently depressed subjects' scores were equivalent to the four means presented in Table 3-14, all ts $< 1.39$, all ps nonsignificant.

In summary, results of the analyses with respect to the emotional intensity factor also failed to demonstrate group differences consistent with predictions made using the DAH. Although a significant interaction, as predicted by the DAH, was obtained, breakdown of the interaction revealed that differences did not correspond to theoretical predictions. That is, the previously depressed subjects in the neutral condition attended more to the neg ıve-content high-intensity adjectives, rather than the previously depressed subjects in the sad condition. Moreover, comparisons to the currently depressed subjects indicated that the results of the previously depressed subjects were not significantly different despite different mood condition assignments. As well, examination of the means of the never depressed subjects presented in Table 3-13 reveals that they too were equivalent to the currently depressed subjects in both mood conditions.

Recall of Words

In order to examine the recall data for both the free- and cued-recall tasks, separate sets of analyses were conducted. In both cases, the total number of words recalled were classified into positive-, negative- or neutral-content groups. Further subdivision into state-trait dimensions or emotional intensity dimensions was not possible as subjects recalled too few words overall. The words subjects recalled were further classified into correctly-recalled words and incorrectly-recalled words.

In defining words as correctly recalled, the word was to have been presented in the segment just previous to the recall task (see Appendix J and K). For example, in the free-recall task during the presentation of the Stroop task, subjects were asked to recall words that had just been presented as part of the Stroop task, not including the practice words presented at the beginning (e.g., one, two etc.). Incorrectly

recalled words were defined in one of two ways. First, if the subject recalled a word that was not presented in the task at all, the word was classified as positive, negative or neutral by the experimenter (this was a very low frequency of occurrence event). More likely however, was the second definition of incorrect recall. If the subject recalled a word that was indeed one of the group of larger stimuli, but that particular word was not in the group of stimuli just presented to the subject, the recalled word was therefore incorrectly recalled. This type of error was called an intrusion and was so defined because the subject was either recalling the word from a questionnaire completed during the previous week (remember all stimuli were rated for self-relevance or may have been incorporated into a questionnaire), or more likely, the subject was perseverating on the word presented in the previous task (remember tasks were presented in a counterbalanced order). Thus, incorrectly recalled words represented either a confabulation (i.e., the first type of defined error) or a perseverative error (i.e., the second type of incorrect recall), both of which are more generally referred to here as intrusions.

Free Recall Results for the correctly-recalled words in the free-recall task are presented first. As previously described, using the method described by Winer (1971), data for the nondepressed subjects were first analyzed separately from the currently depressed subjects. The total number of correctly recalled negative-, positive- and neutral-content words were submitted to a four-way, Group (Previously depressed (PD), Never depressed (ND)) by Condition (Sad induction, Neutral control) by Order (Stroop task before DOAT, Stroop task after DOAT) repeated over Affect (Negative-, Positive- and Neutral-content words) repeated measures ANOVA. Means for all subjects in each condition and order are presented in Table 3-15.

Results of the four-way ANOVA for correctly recalled words revealed only a significant main effect for Affect, $F(2,71) = 55.20$, $p < .001$. A trend for the Group by Condition by Affect was also observed, $F(2,71) = 2.58$, $p = .08$. Posthoc Scheffé's tests on the Affect main effect indicated that all nondepressed subjects recalled more neutral- than negative- or positive-content words (means of 3.2, 1.3 and 1.0, respectively).

Currently depressed subjects' data were also submitted to an Order by Affect repeated measures ANOVA for comparison to the four-way ANOVA just described for nondepressed subjects. Similarly, this ANOVA revealed only a main effect for Affect, $F(2,17) = 10.36$, $p < .001$. Posthoc examination of the means for this effect revealed that, exactly as for the nondepressed subjects, CD subjects recalled more neutral- than either negative- or positive-content words (means of 2.1, 1.15 and .65, respectively). Therefore, all subjects recalled more neutral-content than affectively-valenced words despite diagnostic status or mood induction condition. Therefore, no support for the DAH or main-effects hypothesis was found for the free recall task with correctly recalled words.

Incorrectly recalled words were analyzed next, also using a four-way repeated measures Group by Condition by Order by Affect ANOVA. This analysis revealed two significant two-way interactions, Group by Condition, $F(1,72) = 4.72$, $p < .05$, and Condition by Order, $F(1,72) = 10.00$, $p < .0025$, as well as a significant four-way interaction of Group, Condition, Order and Affect, $F(2,71) = 3.43$, $p < .05$. To break down the significant four-way interaction, two subsequent ANOVAs were performed, one for each order.

When the Stroop task was presented first, the Group by Condition by Affect interaction was not significant, $F(2,35) < 1$. However, when the Stroop was presented second, this three-way interaction was significant, $F(2,35) = 4.54$, $p < .025$. Consequently, potentially theoretically relevant interactions were revealed, but only when the emotional Stroop task was presented second, following the deployment-of-attention task. Therefore, only the recall data for intrusions in the

Table 3-15. *Mean Correct and Incorrect Recall for All Subjects in Each Condition and Both Presentation Orders for the Free Recall Task.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| | PD | | ND | | CD |
| Affect | Sad | Neutral | Sad | Neutral | Neutral |
| | | | Correct Recall | | |
| Order 1 | | | | | |
| Negative | 1.2 (1.14) | .9 (.88) | 1.1 (1.20) | 1.8 (1.14) | 1.4 (.52) |
| Positive | .3 (.48) | .8 (.63) | 1.1 (.88) | 1.0 (.67) | .5 (.53) |
| Neutral | 3.0 (1.76) | 2.9 (1.60) | 3.0 (1.89) | 3.5 (1.51) | 2.2 (1.62) |
| Order 2 | | | | | |
| Negative | 1.6 (1.27) | .4 (.52) | 1.6 (1.27) | 1.5 (2.17) | .9 (1.10) |
| Positive | 1.3 (1.34) | 1.3 (1.06) | 1.1 (.57) | 1.0 (.94) | .8 (.79) |
| Neutral | 3.0 (2.11) | 3.5 (1.78) | 3.7 (1.34) | 3.1 (1.37) | 2.0 (1.89) |
| | | | Incorrect Recall (Intrusions) | | |
| Order 1 | | | | | |
| Negative | .2 (.42) | .4 (.52) | 0 (.00) | .9 (.99) | 1.1 (1.85) |
| Positive | .2 (.63) | .2 (.42) | .1 (.32) | .5 (.53) | .4 (.97) |
| Neutral | .2 (.42) | 0 (.00) | .1 (.32) | .4 (.70) | .3 (.68) |
| Order 2 | | | | | |
| Negative | .7 (1.34) | .2 (.42) | .5 (.97) | .1 (.32) | .1 (.32) |
| Positive | .8 (.79) | .1 (.32) | .1 (.32) | .3 (.68) | .2 (.63) |
| Neutral | .3 (.48) | .4 (.52) | .4 (.70) | .1 (.32) | .2 (.42) |

*Note.* Standard deviations presented in brackets. PD = Previously depressed, ND = Never depressed, CD = Currently depressed.

second order were examined further. This significant three-way interaction was therefore followed up by two, two-way Condition by Affect ANOVAs, one for each group.

The Condition by Affect interaction for the PD subjects was significant, $F(2,17) = 4.52$, $p < .05$. However. the same interaction was not significant for the ND subjects, $F(2,17) = 1.83$, $p > .15$. Posthoc examination of the Condition by Affect interaction for the PD subjects revealed that no two means were significantly different using Scheffé's procedures. Consequently, a less conservative t-test comparison of means between and within conditions was conducted to understand the significant Condition by Affect interaction for the PD subjects. These t-tests indicated that PD subjects in the sad condition recalled more incorrect positive-content words than the PD subjects in the neutral condition, $t(17) = 2.28$, $p < .05$. This finding is, once again, contrary to what would be predicted using the DAH. That is, one would expect to find that in a sad mood, previously depressed subjects would demonstrate a negative bias in recall by recalling negative-content words more frequently than positive- or neutral-content words, and that they would recall more negative-content words than previously depressed subjects in the neutral condition.

For comparison purposes, an Order by Affect repeated measures ANOVA was conducted on the intrusion data for the CD subjects. This ANOVA revealed no significant effects, all $F$s $< 2.30$, all $p$s $> .15$. See Table 3-15 for all means.

To briefly summarize, all subjects, despite diagnostic status, for the free recall task, correctly recalled more neutral- than either negative- or positive-content words. When recalling words incorrectly, previously depressed subjects in the sad condition recalled more positive-content words than previously depressed subjects in the neutral condition, but only when the Stroop task was presented second. Currently depressed subjects, however, did not differ on the number of incorrect words recalled with respect to affective content.

Cued Recall. In the cued recall task, subjects were presented with the first letter of the words occurring in the last positions of the stimuli presented and were asked to complete the word. The correctly-recalled cued-recall data were also

submitted to a Group by Condition by Order repeated over Affect repeated measures ANOVA. All means for all subjects in each condition are found in Table 3-16.

The four-way ANOVA for correctly recalled words in the cued recall task produced only significant effects for Order, $F(1,72) = 10.50$, $p < .003$; and Affect, $F(2,71) = 4.88$, $p < .01$. Posthoc analyses for the Affect effect indicated that subjects correctly recalled equal numbers of negative- and neutral-content words, both of which were greater than the number of correctly recalled positive-content words (means of 1.7, 1.6 and 1.2, respectively). Examination of means for the Order effect revealed that subjects recalled more words correctly in Order 2 than in Order 1 (means of 1.7 and 1.3, respectively). A two-way Order by Affect ANOVA conducted on CD subjects' correctly-recalled cued-recall data revealed no significant effects, all $F$s $< 1.64$, all $p$s $> .20$. Therefore, with respect to the DAH and the main-effects hypothesis, no theoretically significant differences were found.

Incorrectly-recalled cued-recall data were analyzed using the same four-way repeated measures ANOVA, resulting in significant effects for Group, $F(1,72) = 5.11$, $p < .05$; Affect, $F(2,71) = 6.76$, $p < .0025$; Group by Condition, $F(1,72) = 4.53$, $p < .05$; Condition by Order, $F(1,72) = 8.56$, $p < .005$; and Group by Affect, $F(2,71) = 5.40$, $p < .01$. As none of the interactions involved Group, Condition and Affect, no further analysis of the interactions was conducted to assess the DAH. However, the Group by Affect interaction was significant and was further assessed in order to determine whether results corresponded to a main-effects hypothesis of Beck's cognitive theory. Examination of means using Scheffé's tests revealed that Previously Depressed (PD) subjects recalled more incorrect negative-content words than Never Depressed (ND) subjects, while recalling equal numbers of incorrect positive- and neutral-content words. Within the PD group, subjects recalled equal numbers of negative- and neutral-content words, both being significantly greater than positive-content words. Within the ND group, subjects recalled more neutral-content words than negative-content words (see Table 3-17 for means). The fact that the PD subjects incorrectly recalled more negative-content words than ND subjects follows predictions that would be derived from the main-effects hypothesis. That is, previously depressed subjects demonstrated a negative recall bias in comparison to

Table 3-16. *Mean Correct and Incorrect Recall for All Subjects in Each Condition and Both Presentation Orders for the Cued Recall Task.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| | PD | | ND | | CD |
| Affect | Sad | Neutral | Sad | Neutral | Neutral |
| | Correct Recall | | | | |
| Order 1 | | | | | |
| Negative | 1.6 (1.18) | 1.2 (.92) | 1.1 (1.45) | 1.5 (1.51) | 1.1 (.88) |
| Positive | .7 (1.06) | .9 (.88) | 1.1 (1.10) | 1.2 (1.14) | .9 (.88) |
| Neutral | 1.7 (1.25) | 1.1 (1.10) | 1.6 (1.35) | 1.5 (.71) | 1.9 (.74) |
| Order 2 | | | | | |
| Negative | 2.2 (1.03) | 2.1 (.99) | 1.6 (.70) | 2.1 (1.29) | 1.3 (1.57) |
| Positive | .8 (.92) | 1.3 (1.16) | 1.8 (1.14) | 1.6 (1.43) | 1.1 (1.10) |
| Neutral | 2.0 (.67) | 1.6 (.97) | 1.4 (1.08) | 2.1 (.88) | 1.2 (.79) |
| | Incorrect Recall (Intrusions) | | | | |
| Order 1 | | | | | |
| Negative | .7 (1.06) | 1.8 (1.81) | .1 (.32) | .9 (1.20) | .4 (.70) |
| Positive | 0 (.00) | .8 (.79) | .3 (.48) | .5 (.71) | .3 (.48) |
| Neutral | .6 (.84) | 1.1 (.99) | .9 (.88) | .6 (.70) | .7 (.82) |
| Order 2 | | | | | |
| Negative | .9 (.99) | 1.1 (1.10) | .3 (.68) | 0 (.00) | 0 (.00) |
| Positive | .7 (.82) | .4 (.70) | .6 (.84) | .4 (.70) | .3 (.48) |
| Neutral | .9 (.74) | 1.1 (.99) | 1.5 (1.35) | .6 (.84) | .5 (1.08) |

*Note.* Standard deviations presented in brackets. PD = Previously depressed, ND = Never depressed, CD = Currently depressed.

Table 3-17. *Means of Incorrectly Recalled Words for Previously Depressed (PD) and Never Depressed (ND) Subjects.*

| | Groups | |
|---|---|---|
| Affect | PD | ND |
| Negative | $1.13^{a}$ | $.33^{e}$ |
| Positive | $.48^{bcd}$ | $.45^{bcd}$ |
| Neutral | $.93^{ab}$ | $.90^{abc}$ |

*Note.* Means with different superscripts are significantly different at the $p < .05$ level using Scheffé's Tests.

never depressed subjects. In order to determine if currently depressed subjects show a similar bias, thereby demonstrating the strongest support for the main-effects hypothesis, analysis of their data was examined next.

A two-way Order by Affect ANOVA conducted on CD subjects' intrusion errors for the cued-recall task revealed no significant effects, all $\underline{F}$s $< 1.52$, all $\underline{p}$s $> .25$. Table 3-16 presents the means for the free- and cued-recall tasks for subjects in both orders and conditions. Therefore, although previously depressed subjects did demonstrate a negative recall bias for the cued-recall task, this was not demonstrated by the currently depressed subjects, thereby limiting the strength of the support for the main-effects hypothesis.

To summarize the cued recall findings, nondepressed subjects recalled more correct words in Order 2 than in Order 1 and recalled more neutral- and negative- than positive-content words. Currently depressed subjects did not differ on the types of words recalled in either presentation order. With respect to incorrect words recalled, previously depressed subjects recalled more negative-content words than never depressed subjects. As well, within the previously depressed group, more neutral- and negative-content incorrect words were recalled than positive-content words. Currently depressed subjects did not differ on the number or type of incorrect words recalled.

## Discussion

The results of the current investigation clearly support the use of the modified single-stimulus presentation method for the Stroop task. The basic Stroop effect was observed using this method and the results indicated that subjects took almost 300 msec longer to name the colour of colour-contrast words than to name the colours of same-colour words. Previously depressed, never depressed and currently depressed subjects performed the basic Stroop colour-naming task in a similar fashion. Therefore, preservation of the basic Stroop findings across all groups allows inferences to be made confidently for the other aspects of this study.

Results from the mood induction analyses indicate that the attempted mood induction was both specific and successful. Nondepressed subjects' ratings of sad and anxious moods revealed that, after starting out equivalent on self-reported mood, as intended, they became increasingly sad as a result of the sad mood induction, but not increasingly anxious. Perhaps even more important, the nondepressed subjects in the sad mood condition reported experiencing similar levels of sadness as did the currently depressed subjects. Finally, the results also suggest that the reported levels of sad mood were not simply a function of demand characteristics as psychomotor slowing was evident on the backwards counting tasks also in the predicted direction.

### Differential Activation Hypothesis

Results of the current study did not support the DAH when varying stimuli on state-trait or intensity dimensions and when assessing subjects' recall of the presented stimuli. If the data had supported the DAH, the previously depressed subjects in the sad mood condition would have performed tasks in a manner similar to the currently depressed subjects and differently from never depressed subjects and previously depressed subjects in the neutral mood condition. However, sad mood inductions did not result in previously depressed subjects performing the tasks in a fashion similar to currently depressed subjects and differently from other subjects. The previously depressed subjects in a sad mood and currently depressed subjects were expected to take longer to colour-name negative-content stimuli than other stimuli, to recall more negative-content stimuli than other stimuli and to take longer to colour-name intense

negative-content stimuli in comparison to other stimuli. Other groups were not expected to be biased in this negative fashion.

Initially, it appeared that some support for the DAH had been obtained for the intensity dimension. A five-way interaction of Group, Condition, Affect, Order and Intensity was significant and contained the factors relevant to the DAH (i.e., Group, Condition and Affect). The effect obtained only in the first order for high intensity stimuli, and subsequent analyses revealed that it was the previously depressed subjects who accounted for the significant interaction. However, it was the previously depressed subjects in the neutral condition that took longer to colour-name high-intensity negative-content stimuli (although they were not in a sad mood). This seems particularly confusing as it follows no theoretical predictions. However, examination of the currently depressed subjects' means also did not follow the results for these previously depressed subjects. That is, currently depressed subjects' data were as similar to the never depressed subjects' data as were the previously depressed subjects' data.

In order to assess the self-relevance notion proposed by Teasdale (1988) when describing the DAH, and supported by others (e.g., Segal, Hood, Shaw & Higgins, 1988), a weighted analysis of reaction time was carried out in the present study for currently depressed versus never depressed subjects, both in the neutral condition (recall that the weighting of reaction times was achieved by using the subjects' self-descriptiveness ratings of each individual stimulus and multiplying their reaction time by this rating). This weighted analysis indicated that, relative to nondepressed subjects, depressed subjects were more distracted by negative-content state and trait stimuli, while they were equally distracted by the positive-content state and trait words. Within the currently depressed group, only the state-like positive- and negative-content interference scores were significantly different. Within the never depressed group in the neutral condition, both state- and trait-like positive and negative adjectives were different. This suggests that state-like adjectives discriminate best between depressed and nondepressed subjects and also within groups of subjects. This supports the contention of some (e.g., Ingram, Partridge, Scott, & Bernet,1994; Spielman & Bargh, 1988) that one should consider carefully state and trait as

important dimensions in information processing tasks. Furthermore, such findings also clearly support Teasdale's (1988) contention that stimuli must be personally relevant in order to demonstrate differences on such cognitive tasks. Indeed, the DAH was developed based primarily on results of studies that exclusively examined subjects' recall of personal events or autobiographical memory. If researchers continue to use tasks to assess information processing that does not rely on autobiographical data, they must take some measure of self-relevance of the stimuli used (an alternative method to the one used in the current investigation is described by Segal et al., 1988).

When the weighted reaction times were analyzed for previously depressed and never depressed subjects only, the expected three-way interaction of Group by Condition by Affect predicted by the DAH was not obtained. Initially, this also appears to disconfirm the DAH. However, it should also be noted that the self-referent ratings for each word were made by subjects while they were in a normal mood, that is, without having negative schemata activated. Similar to the self-referent rating study by Dobson and Shaw (1987), when subjects are not depressed (or in a sad mood) they do not evaluate themselves negatively by endorsing negative adjectives as being "like them".[6] A more appropriate method for future research would be to have a repeated mood induction where subjects would evaluate themselves on measures like the SEQ while in a sad mood and at some later date they would complete tasks like the emotional Stroop.

Finally, the free recall task placed in the middle of the Stroop task revealed that subjects generally recalled more neutral- than negative- or positive-content words, irrespective of current mood condition or diagnostic status. Certainly this is not a finding that would be predicted from the DAH or cognitive theory. Initially, this lack

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[6] A series of oneway ANOVAs conducted on subjects' self-referent rating summary scores (obtained by summing over state and trait adjectives separately for each of the three affective content categories) revealed that currently depressed subjects rated themselves more negatively, less positively and less neutrally (i.e., their self-referent ratings on neutral words were lower) than did either nondepressed group who were equivalent to each other, all $Fs$ (2, 96) > 11.0, all $ps$ < .001, for both state- and trait-like scores.

of significant findings for a negatively-biased recall is confusing. Depressed and dysphoric subjects have very consistently been found to demonstrate a negative bias in recall. In an extensive review of affect and memory, Blaney (1986) noted that of 13 individual difference studies examining recall with both mildly and clinically depressed subjects, 11 revealed a negative recall bias. That is, depressed or dysphoric subjects recalled more negative-content material and/or less positive-content material than did nondepressed controls. Overwhelmingly, these studies either explicitly included a condition where subjects rated experimental stimuli for self-reference or had the opportunity to do so. Indeed, Blaney commented that "in one of the few studies lacking any mood-congruence effect (Gotlib & McCann, 1984, Study 1), the exposure set was one that likely discouraged self-referenced processing" (p. 232). Therefore, it appears that in order to demonstrate a memory bias, self-referent encoding must be either an explicit part of the research paradigm or there must be opportunity to make such decisions. It appears that the Stroop task is not such a method. Corroborating this assertion is the finding of Teasdale and Dent (1987) who reported that previously depressed subjects in a sad mood recalled more sad words that were rated as like them, using Kuiper's level-of-processing incidental recall procedure (e.g., Derry & Kuiper, 1981), than did never depressed subjects who were also exposed to a sad mood induction.

Main Effects Hypothesis

According to the main-effects hypothesis of Beck's cognitive theory, vulnerable individuals, in this investigation operationalized as previously depressed individuals, would demonstrate trait-like differences in various cognitive processes that make them vulnerable to experiencing a depressive episode. In other words, Beck's theory would predict that subjects with a history of depression, as compared to never depressed subjects would display longer reaction times to colour-name negative-content stimuli in comparison to positive- or neutral-content stimuli and that they would recall more negative- than positive- or neutral content stimuli. In this investigation, an interference score was calculated subtracting the reaction time to colour-name neutral-content stimuli from affectively-valenced stimuli (i.e., negative- and positive-content). Therefore, the subjects with a history of depression would

have greater reaction times for the negative interference score than for the positive interference score if Beck's theory is correct. In addition, previously depressed subjects would perform in a manner similar to currently depressed subjects, according to the main-effects hypothesis. The majority of previous research has typically failed to find remitted versus control group differences on cognitive variables, whether measured by self-report (e.g., Hamilton & Abramson, 1983; Hollon, Kendall, & Lumry, 1986; Persons & Rao, 1985; Silverman, Silverman, & Eardley, 1984--for an exception see Eaves & Rush, 1984) or through information processing paradigms (e.g., Dobson & Shaw, 1987; Gotlib & Cane, 1987; McCabe & Gotlib, 1993).

In contrast, the findings of the current investigation support the existence of trait-like differences between previously depressed and never depressed individuals, as predicted by Beck's main-effects model. Specifically, when the Stroop task was presented as the second of the two information processing tasks, previously depressed subjects' reaction time was longer for negative-content stimuli as compared to positive content stimuli, and, additionally, was longer than the reaction time for never depressed subjects on both negative- and positive-content stimuli. The strongest support for the main-effects hypothesis would have been if the currently depressed and previously depressed group responded in the same manner (i.e., no significant differences on positive- and negative-interference scores) with both being significantly different from the never depressed group on the negative interference score and equivalent on the positive interference score. The findings are tempered however, by the fact that currently depressed subjects' reaction times were not significantly different from either the previously depressed or never depressed subjects. This appears to be a function of both the smaller sample size and larger variation in reaction times for the currently depressed group. However, the results still provide support to the main-effects hypothesis when the means are significantly different in the predicted directions for the previously and never depressed subjects.

A second attenuating factor with regard to conclusions about the main-effects hypothesis is that the Group by Affect interaction was found only when the emotional Stroop task was the second of the two information processing tasks. This is not as easily explained by theory; however one possibility concerns the subjects' potential

change in the processing of stimuli once they had already completed another information processing task with embedded recall tasks. Blaney (1986) in discussing recall findings reported that the Stroop task is one in which self-referent processing is unlikely to occur spontaneously. However, it is possible that once subjects have participated in one information processing task, and two recall tasks (free and cued recall in this study), they may begin to spontaneously evaluate stimuli in a self-referent manner. Such self-referent processing may result in the obtained findings, but only when the emotional Stroop task was presented second after completing the previous tasks.

With respect to the cued-recall task, the analysis of intrusion errors also revealed theoretically predicted differences using the main-effects hypothesis. In this case, previously depressed subjects demonstrated a negative recall bias by recalling more negative-content words than did never depressed subjects, while recalling equal numbers of positive- and neutral-content words. It appears that previously depressed subjects may have difficulty detaching from stimuli in that they continue to intrude into later tasks. This was observed only in the cued-recall task (although the cue in this case was very minor and highly ambiguous, as it was only the first letter of the last 10 words presented to subjects). However, this finding is also tempered in that currently depressed subjects evidenced no such bias. It is important to remain cognizant of the fact that motivational factors may also play a large part in the lack of findings for currently depressed subjects. Indeed, comparison of the number of words recalled overall (i.e., correct and incorrect in the free and cued recall tasks together) revealed that nondepressed subjects recalled more words than currently depressed subjects, $t(98) = 2.65$, $p < .01$, (means of 12.9 and 9.9 words, respectively). Anecdotally, currently depressed subjects were observed to give up more easily and make spontaneous reference to being unable to recall any words, and it was more difficult to motivate them to try or to take their time. Finally, subject groups differed on the types of words recalled that were intruding from previous tasks or sections, but not in any theoretically relevant ways. That is, previously depressed subjects, when the Stroop task was presented second, recalled more positive-content words in the sad condition than in the neutral control condition. However, this held only using less

conservative t-test procedures. Significant effects did not obtain for the currently depressed group, thereby tempering any conclusions that can be reached regarding this somewhat paradoxical finding.

The basic depressed versus nondepressed differences on the emotional Stroop were not observed in the current investigation. That is, when never depressed subjects in the neutral condition were compared to currently depressed subjects, no group differences in reaction times to colour-name affectively-laden stimuli were observed (i.e., no significant Group by Affect interaction was obtained). While this analysis paralleled subject group assignment in studies which did support such differences on affectively-laden stimuli (e.g., Gotlib & Cane, 1987; Gotlib McCann, 1984), the current study failed to demonstrate delayed reaction times in response to negative- versus positive-content stimuli (with the exception of the weighted reaction times presented above).

Interestingly, a number of recent studies have also failed to replicate the basic emotional Stroop findings of Gotlib and colleagues (Gotlib & Cane, 1987; Gotlib & McCann, 1984). For example, Pratto and John (1991) found that all subjects were significantly more distracted by negative-content stimuli than they were by positive-content words. However, the subjects in this study were not selected based on depression level or diagnostic status. More relevant is a study conducted by Mogg et al. (1993) on subject groups formed according to depression status. These researchers were also unable to replicate the emotional Stroop findings reported by Gotlib and colleagues (Gotlib & Cane, 1987, Session 1; Gotlib & McCann, 1984, Study 1). They suggest, however, that this failure may be due to task unreliability. Further, Kleiger and Cordner (1990) found only mildly depressed subjects (i.e., BDI in the 9-16 range) evidenced increased reaction times for negative-content words on the Stroop; moderately dysphoric (i.e., BDI scores in the 16-30 range) subjects did not take significantly longer to name the colour of depressed-content words. Certainly depressed subjects in the current investigation would fall into a severely depressed range. As well, Williams and Nulty (1986) observed that responses to the emotional Stroop were not as negatively biased using current level of depression, as measured by the BDI, as were the same subject's reaction time data when groups

were formed based on BDI scores from 12 months previously. Still others have suggested that the Stroop task is a measure of early attentive processes and that such processes are not affected in depressed individuals (cf. Williams et al., 1988). Rather, Williams et al. suggest that attentional processes are the same in depressed and nondepressed subjects but subsequent processes like recall are differentially affected. They suggest that it is anxious subjects, rather than depressed subjects who differ on tasks of attention, while depressed subjects differ on tasks measuring later stages of information processing (e.g., recall). Clearly, as suggested by Kleiger and Cordner (1990), research using the emotional Stroop task may still be in an exploratory stage. Differences in stimulus selection and subject groups currently make interpretation of the conflicting findings difficult. However, in a recent review, Gotlib and McCabe (1992) noted that the Stroop task does appear to differentiate groups for more highly specialized stimuli, like spider-related words for spider phobic patients. Thus, highly self-relevant stimuli may still be able to differentiate depressed and nondepressed groups on the emotional Stroop and this should be examined in future research.

Another possible future research direction concerns the possibility of altering the instructional set for the emotional Stroop task. Based on Blaney's (1986) observation that negative recall biases obtain only when stimuli are assessed with respect to self-reference, and on Kuiper's depth-of-processing task (e.g., Derry & Kuiper, 1981; Teasdale & Dent, 1987), the experimental instruction set could be varied to produce more self-referent processing of stimuli on the emotional Stroop task. For example, subjects could be informed that they would subsequently participate in a self-referencing and memory task for stimuli presented in the emotional Stroop before conducting the colour-naming task. This group could then be compared to a group receiving only standard instructions with no reference to a memory task or self-referencing task. This notion is at least partially supported by the findings of Geller and Shaver (1976) who found that subjects took longer to colour-name self-relevant stimuli in high self-awareness conditions than did subjects in low self-awareness conditions. Extending this to the domain of depression research

would be particularly interesting given the current state of findings using the emotional Stroop task.

Finally, the results from this study appear to support a distinction of state- and trait-like stimuli. It appears from the weighted analysis on never depressed and currently depressed subjects that it is important to use state-like stimuli, as they appear to provide the greatest distinction both between and within groups. However, this distinction is still tentative given the lack of findings for the state-trait dimension in interaction with Group, Condition, and Affect for the previously depressed and never depressed subjects. The subjects in this analysis did, however, take longer to respond to state-like stimuli than to trait-like stimuli.

To summarize, results of the Stroop data indicate that hypotheses made using the DAH were not supported. It is difficult to determine whether this failing is a result of problems with the DAH or problems with the emotional Stroop task (e.g., task reliability or some other, as yet, undiscovered variable). Although basic colour-naming interference was observed for colour-word names, differential response to negative- versus positive-content words was not observed when previously depressed subjects were primed by sad mood. As well, the task was unable to replicate the earlier findings of Gotlib and colleagues (Gotlib & Cane, 1987; Gotlib & McCann, 1984) when examining only the performance of currently depressed subjects and never depressed subjects in the neutral condition. However, as has been presented in one other study (Kleiger & Cordner, 1990) severely depressed subjects may not evidence the emotional Stroop effect as strongly as dysphoric subjects. In contrast to a lack of findings for the DAH, modest support was obtained for the main-effects hypothesis of cognitive theory. That is, previously depressed subjects' negative interference score was longer than their positive interference score and longer than both negative and positive interference scores in the never depressed group in presentation order 2. Similarly, intrusion errors in the cued recall task also revealed a negative bias for previously depressed subjects as compared to never depressed subjects. Overall then, no support for the DAH was obtained and modest support for the main-effects hypothesis was found.

Chapter IV -- Study 2, Phase 2, Deployment-of-Attention Task (DOAT)

Selection of stimuli to receive further processing can be measured by temporal as well as by spatial procedures (Postman, Bruner & McGinnies, 1948). Temporal attention tasks (i.e., tasks where dependent measures of attentional processing are typically reaction time, and stimulus presentation consists of a single stimulus item), such as the emotional Stroop colour-naming task, have provided some evidence that currently depressed individuals attend more to negative- than to neutral- or positive-content stimuli (e.g., Gotlib & McCann, 1984; Gotlib & Cane, 1987). As well, although strong effects were not obtained in the current investigation, presentation following other tasks (i.e., recall tasks and the DOAT) and a weighted analysis of reaction times provided similar results. Interestingly, however, in a number of independent studies, this effect has not been replicated (Mogg et al., 1993; Williams & Nulty, 1986). In these investigations nondepressed and depressed subjects appear to be equally distracted by negative-content stimuli (see also Pratto & John, 1991).

In contrast to temporal attention tasks, spatial attention tasks have provided results suggesting that depressed individuals do not demonstrate attentional biases for emotional words. Spatial attention tasks are those tasks in which stimulus presentation includes two or more stimuli presented in different spatial locations and dependent measures can include reaction times, accuracy, or proportions of times a target is chosen compared to chance. Two spatial tasks have been previously described including the dot-probe task (MacLeod, Mathews, & Tata, 1986) and the deployment-of-attention task (Gotlib, McLachlan, & Katz, 1988). Spatial selection paradigms may be more ecologically valid than temporal selection tasks. It is certainly reasonable to assume that emotional stimuli of more than one valence are frequently present in one's environment. Thus, examination of what types of stimuli attract attention in comparison to other types of stimuli may be more reflective of the types of selection that would naturally occur. Moreover, the choice of a spatial selection strategy does not suffer from the same difficulties in interpretation of sources of influence previously discussed in the emotional Stroop task. That is, the

to-be-attended and to-be-ignored aspects of the stimulus are separated, and the response is neutral as is the aspect of the stimulus presentation that is to be responded to.

One spatial attention task, introduced in the study of attention in anxiety disorders, is the dot-probe task. MacLeod and Mathews and colleagues (MacLeod et al., 1986; MacLeod & Mathews, 1988; Mogg, et al., 1990) have used this dot probe detection task to determine how state and trait anxiety interact to alter tendencies to attend to threatening words. In this task subjects are presented with word pairs consisting of an emotionally "threatening" word and a neutral word, displayed one above the other on a computer screen. Approximately one third of the trials are followed with a dot replacing one of the words and the other two thirds are followed by a blank screen. On trials when the dot probe follows the word pair, subjects are required to press a hand-held button as soon as they see the dot probe. MacLeod et al. argued that if subjects were attending to one word and the dot probe displaced the other word, they would be required to make an attentional shift, resulting in a longer latency for them to respond than if the dot probe had displaced the word to which they were attending. Thus, the reaction time provides an indication of subjects' allocation of attention to the visual display. In other words, if reaction times are shorter when the dot probe was in the same location as words of a particular emotional valence, this suggest that subjects are directing attention towards these words. In contrast, if they are directing their attention towards another word, then their reaction times will be longer. Williams et al. (1988) have argued that this paradigm is independent of response bias interpretations, as both the stimulus (i.e., the dot probe) and the response (i.e., the button press) are both neutral (i.e., not affectively toned). Moreover, the to-be-attended and the to-be-ignored components of the perceptual display are separated (cf. Gotlib et al., 1988; Lupker & Katz, 1981) thereby allowing one to determine if the observed effects are the result of attentional differences or response production differences (i.e., a later stage of information processing).

Generally, studies using this attentional deployment task have revealed that, whereas anxious individuals shift their attention towards anxious-content stimuli,

nonanxious individuals shift their attention away from such stimuli. There have been few studies examining depressed individuals utilizing this task. MacLeod et al. (1986) did assess a control group of subjects with a "primary diagnosis of depression" (p. 18, diagnostic system was unspecified). In this study, depressed subjects showed no tendency to shift attention towards 'threat' words. One must be cognizant however, that the type of words used in the MacLeod et al. study represented only anxious-content words. As many researchers have pointed out, the specific stimulus content is very important to finding differences on information processing tasks (e.g., Gotlib & McCabe, 1992; Watts et al., 1986; Williams & Broadbent, 1986). It may be, therefore, that the types of words used in the MacLeod et al. (1986) study were not specific enough to depression to reveal group differences. Although depression and anxiety are often highly correlated (see Shaw et al., 1985), the specific types of 'threat' or target words often significantly affect whether differential performance on tasks is detectable (see Gotlib & McCabe, 1992 for a review). Interestingly, though Hill and Dutton (1989) modified word content on the task to be "self-esteem threatening" as defined by unselected students' ratings, they were also unable to find attentional bias in mildly depressed subjects.

It may be, therefore, that the types of words used in the MacLeod et al. (1986) study were not specific enough to depression to reveal differences. The stimulus items used in Hill and Dutton (1989) were defined as representing self-esteem threatening words. However, low self-esteem is only one facet of the depressive syndrome. Low self-esteem is represented in depression, according to DSM-III-R, as feelings of worthlessness. In a recent study examining what symptoms were reported by depressed individuals, Buchwald and Rudick-Davis (1993) found that only 68 percent of depressed subjects reported feelings of worthlessness. Indeed, only motor disturbance was found in fewer subjects in their sample. Using this selection strategy, one reason why depressed subjects were not biased on the dot probe task in the Hill and Dutton (1989) study may be that on average only 68 percent of subjects would have experienced such "threat" in their personal experience of depression, thereby reducing the likelihood of finding significant differences in group means. A more appropriate stimulus selection method would tap areas representing a broad

cross section of depression-related concerns and symptoms. The most ecologically valid method of making such stimulus selection is to use adjectives that a number of depressed patients rate as self-descriptive, as has been done in the current research as well as in all studies on information processing conducted by Gotlib and colleagues (Gotlib & Cane, 1987; Gotlib & McCann, 1984; Gotlib et al., 1988; McCabe & Gotlib, 1993).

However, Williams et al. (1988) have argued that it is not stimulus characteristics that account for the lack of findings for depression-associated biases on the dot-probe task. Instead they suggest that, whereas biases in anxiety disorders occur in the early perceptual stages of information processing, biases in depressive disorders are associated with later stages of processing (e.g., elaboration and recall). Thus, they argue that the perceptual biases present in depressives would not be reflected in deployment-of-attention tasks. However, more precise assessment utilizing syndrome-appropriate stimuli must be conducted before this assertion can be accepted.

A second type of spatial task that has been used to assess the attention of depressed subjects by Gotlib et al. (1988) is the Deployment-of-Attention Task (DOAT). These investigators modified the dot probe task of MacLeod et al. (1986) such that reaction time was no longer the dependent measure. In their task, Gotlib et al. presented pairs of words that contained a depressed-content target and either a manic-content or a neutral-content word, or, pairs of words that contained depressed and manic-content words. Subsequent to the presentation of each word pair, two colour bars (one red and one green), simultaneously replaced each word in the pair. Subjects were informed that one bar preceded the other and they were to choose which of the two colour bars they thought appeared first. Based on Titchener's (1908) Law of Prior Entry, the attended word would appear to be replaced before the unattended word. Consequently, the dependent variable was no longer reaction time, but rather the proportion of times a particular target word was chosen compared to chance. In this study, Gotlib et al. found that, whereas depressed subjects attended equally to depressed-, manic-, and neutral-content words, the nondepressed subjects attended more to manic-content words than they did to either depressed- or neutral-

content words. These results suggest that attentional biases on the DOAT occur in nondepressed, rather than in depressed subjects. In addition to using different stimuli, the subjects used in the Gotlib et al. research were mildly depressed or dysphoric rather than clinically depressed as in the MacLeod et al. research, making direct comparisons difficult.

Both the MacLeod et al. (1986) and Gotlib et al. (1988) studies measured which of two stimuli attract subjects' attention. MacLeod et al. examined shifts in attention by comparing group reaction times to detect an infrequently occurring dot probe, while Gotlib et al. examined the proportion of times colour bars were selected that replaced target words. One drawback associated with the dot probe paradigm concerns the large number of neutral word pairs used only as fillers. Not only are appropriate neutral words difficult to obtain, but the many extra presentations of irrelevant material significantly extends the length of the study. In dealing with relatively short-lived emotional changes of mood induction studies (approximately 20 minutes), this paradigm may potentially result in subjects completing the task after mood effects have waned. Therefore, the current study used the colour-bar deployment-of-attention task (DOAT) designed by Gotlib et al. (1988).

Using the same subject population as described in Phase 1 of Study 2 (i.e., the emotional Stroop), this study compared previously depressed and never depressed subjects who participated in either a sad mood induction or a neutral condition. Currently depressed subjects also completed the task and their data were analyzed separately from nondepressed subjects as suggested by Winer (1971) described in Study 2.

Based on the Differential Activation Hypothesis (DAH), it was hypothesized that currently depressed and previously depressed subjects in the sad mood condition do not evidence an attentional bias. That is, as in the Gotlib et al. (1988) research, it was predicted that these subjects choose the colour bar replacing the target word at a level equal to chance (i.e., 50%). It was predicted that subjects who were never depressed and subjects who were previously depressed in the neutral mood condition respond in a biased fashion. That is, these subjects are predicted to choose the colour bars replacing positive-content words more frequently than the colour bars replacing

either negative- or neutral-content words. It was also predicted that subjects demonstrate a negative bias in recall of stimuli if they are currently depressed or previously depressed in the sad mood condition when compared to never depressed subjects and previously depressed subjects in the neutral mood condition.

Alternatively, using the main-effects model, it was predicted that mood would not influence bias, but rather, that previously depressed and currently depressed subjects are unbiased in their attention and would therefore choose the colour bar replacing the target word at a level equal to chance. It was predicted that never depressed subjects respond in a biased fashion. That is, these subjects are predicted to choose the colour bars replacing positive-content words more frequently than the colour bars replacing either negative- or neutral-content words. Previously depressed and currently depressed subjects were expected to recall more negative-content words than other words while never depressed subjects would recall equal numbers of words irrespective of the words' affective valence.

## Method

### Subjects

As previously described, the same subjects completed the deployment-of-attention task and the emotional Stroop task in a counterbalanced order. Since the same subjects participated in both phases of Study 2, demographic characteristics are identical and are therefore not presented again.

### Stimulus Word Pairs

The stimulus words used in this study were the same as those used in the emotional Stroop task. Omitted from this study however, were the colour-name words (e.g., yellow, green etc.). In constructing the word pairs, words were arranged in order of length and each was paired with a word that was approximately the same length and simultaneously matched as closely as possible on Kucera Francis word frequency. Thus, word pairs varying along the state-trait dimension and along the emotional intensity dimension described in Study 2 were used in the current study. For the state-trait dimension, three types of word pairs were constructed: 20 negative-content/neutral-content; 20 positive-content/neutral-content; and 20 positive-content/negative-content. Thus, a total of 60 word pairs that were state-like (e.g., a negative-content state-like word paired with a neutral-content state-like word) and 60 word pairs that were trait-like were prepared. Therefore, a total of 120 word pairs were prepared for the state-trait dimension. Use of these three types of word pairs allowed an examination not only of whether subjects shift attention towards (or away from) emotional stimuli relative to neutral stimuli, but also of whether subjects' attention is differentially attracted or deflected by positive- or negative-content stimuli.

In order to assess the emotional intensity hypothesis of the DAH, word pairs were constructed using only high and low, positive and negative emotional intensity words. As neutral words are, by definition, neither high nor low intensity, they were not used to assess this hypothesis. Instead, pairs of words were constructed such that there was a high-intensity word paired with a low-intensity word. In each case the high intensity word was defined as the target word. Thus, in 20 word pairs a high-intensity negative-content word was paired with a low-intensity negative-content word

(e.g., "DAMNED" and "AIMLESS"). Similarly, 20 word pairs contained a high-intensity positive-content word paired with a low-intensity positive-content word (e.g., "ECSTATIC" and "EFFICIENT"). All words were selected such that as a group they matched as closely as possible on Kucera Francis word frequency and length. Therefore at total of 40 word pairs were used to assess the intensity dimension. The combination of state-trait and emotional intensity dimensions brought the total number of word pairs presented to subjects to 160 (see Table 4-1 for the word pair types and examples of each).

Apparatus

Subjects completed the deployment-of-attention task using an IBM-XT-compatible computer. Subjects viewed stimuli on a CGA monitor and indicated their colour-naming choice by pressing either of two buttons labelled "red" or "green" on a box connected through the game port of the computer. Buttons (2 cm in diameter) were located 10 cm apart such that subjects could use both hands to press the buttons. Presentation of stimuli and recording of responses was controlled by software developed by Graves and Bradley (1988) that allows millisecond accuracy.

Procedure

Subjects completed Phases 1 and 2 of Study 2 in a counterbalanced order.

Deployment-of-Attention Task. Subjects were presented with 750-msec displays of pairs of words in the centre of a computer screen, one word above the other, 8 cm apart. Visual angle to each word from a centre fixation dot was less than 2.5 degrees. Subjects were told to look at both words, and were informed that the words would be quickly replaced by colour bars, one red and one green. Subjects were informed that one colour bar would appear first, but that the difference in timing would be very subtle (in fact, the two bars were presented simultaneously). Subjects were asked to indicate which colour bar they believed was presented first by pressing a button on a button box corresponding to the colour of that bar. For each type of word pair, the content types were represented equally often at the top and bottom of the display. Furthermore, each colour of bar was equally likely to replace a given content of word. Each of the 160 trials consisted of a 1-sec presentation of a fixation

Table 4-1. *Word Pairs Used in the Deployment-of-Attention Task*

| Dimension | Affective Content of Each Word in the Pair, Example & Number of Pairs | | |
|---|---|---|---|
| State-like | Negative-Positive<br>TIRED-MERRY<br>(n=20) | Negative-Neutral<br>EMPTY-CALM<br>(n=20) | Positive-Neutral<br>GLAD-ORIENTED<br>(n=20) |
| Trait-like | Negative-Positive<br>STUPID-BRIGHT<br>(n=20) | Negative-Neutral<br>USELESS-GIVING<br>(n=20) | Positive-Neutral<br>STRONG-CARING<br>(n=20) |
| Intensity | Negative High-<br>Negative Low<br>AWFUL-WEAK<br>(n=20) | Positive High-Positive<br>Low<br>ELATED-ACTIVE<br>(n=20) | |

cross, followed by a 100-msec blank interval, followed by a 750-msec presentation of a word pair. The words were then immediately replaced by the colour bars, which remained on the screen until the subjects' response. The subjects' response terminated the presentation of colour bars and initiated the next trial.

The following instructions were presented to subjects on the computer screen and then repeated verbally by the experimenter to ensure they understood the procedure.

> On this task you will first see a single cross (+) appear in the centre of the screen. This tells you that a trial is about to begin and to focus your eyes on the computer screen. Afterwards, this cross will disappear and you will see two words appear one above the other on the screen. Please try to look at both of these words. Then the screen will go blank and each word will be replaced by a line of asterisks that are either Green or Red. One of these colours will appear slightly before the other, although the difference in timing is very subtle. What you will be required to do is indicate which of the colours appeared first by pushing the button corresponding to that colour as quickly as possible. We will practice this five times before you actually begin the experiment. If you have any questions, ask the experimenter now.

Subsequently, subjects completed five practice trials where the word pairs were number names (e.g., "ONE", "TWO" etc.). Subjects completed the first half of the deployment-of-attention task and then, as in the Stroop task, the computer stopped and subjects completed a free-recall task. Subjects took between five and seven minutes to complete the first half of the task depending on how quickly they responded to stimulus presentations. After completing the recall task subjects completed the second half of the deployment-of-attention task. The experimenter left the room during the task and re-entered only when the recall task was to be completed and again when the subject was completely finished the task.

## Results

As with the Stroop task, results of the deployment-of-attentior task will be presented in a hypothesis-driven fashion. First, results for the state-trait analyses will be presented followed by the emotional intensity analyses, and finally, the results of the recall analyses. An additional set of correlational analyses will be presented last.

As in the Gotlib et al. (1988) study, three types of word pairs were constructed for presentation to subjects for examination of the state-trait dimension; a negative-content word paired with a neutral-content word (e.g., "DULL" and "NEAT"), a negative-content word paired with a positive-content word (e.g., "INFERIOR" and "DYNAMIC"), and finally, a positive-content word paired with a neutral-content word (e.g., "BRIGHT" and "QUIET"). In each case one of the words was defined as the "target" word. For the three types of word pairs, the target was the negative-content word for both the negative-neutral and negative-positive word pairs, and the positive-content word was defined as the target for the positive-neutral word pair. If subjects' attention was unbiased, it was expected that the proportion of times that they would identify the colour bar as replacing the target word would equal .50 (i.e., the colour bars are presented at exactly the same time so subjects would demonstrate an unbiased attention if they attended to either word equally often). Thus, the unit of analysis for this task was the proportion of times the subjects identified the colour bar replacing the target word as having appeared first. In the following pages, word-pair types were identified using the first three letters of a word-pair name to represent the affective content of the target word and the last three letters to represent the affective content of the other word in the pair. Thus, NEGNEU represents a negative-content target paired with a neutral-content word. Similarly, NEGPOS represents a negative-content target paired with a positive-content word, and POSNEU represents a positive-content target paired with a neutral-content word.

### State-Trait

As in Phase 1 of Study 2 (i.e., the emotional Stroop) the basic design was a Group (Previously depressed, Never depressed) by Condition (Sad induction, Neutral control) repeated over Affect (Negative, Negative, and Positive targets for the

Negative-Neutral (NEGNEU), Negative-Positive (NEGPOS) and Positive-Neutral (POSNEU) word pairs, respectively) repeated over State-trait (State-like adjectives, Trait-like adjectives) repeated measures ANOVA. As well, the Recall (Before and After the incidental free recall in the middle of the task) and Order (DOAT task first, DOAT task second) factors were assessed in preliminary analyses to determine their potential influence. If significant differences were found, they were compared to currently depressed (CD) subjects' results in order to assist with interpretation. Means for all subjects in each condition and order are presented in Table 4-2.

The preliminary analysis revealed main effects for Condition, $F(1,72) = 4.86$, $p < .05$; and Affect, $F(2,71) = 10.82$, $p < .001$; a two-way interaction for State-trait by Affect, $F(2,71) = 3.87$, $p < .025$; and three, four-way interactions for Group by Condition by Order by State-trait, $F(1,72) = 5.42$, $p < .025$; Group by Condition by Order by Affect, $F(2,71) = 6.74$, $p < .003$; and Group by Condition by State-trait by Affect, $F(2,71) = 3.08$, $p < .05$. Note that in the latter four-way interactions, the three main theoretically important factors for the DAH were involved (i.e., Group, Condition and Affect). As one of the "extraneous" factors (Order) was involved in a four-way interaction involving the three theoretically-relevant factors, two separate ANOVAs were conducted, one for each order (Recall was not significant in any effect and was therefore dropped from further consideration).

In Order 1 (i.e., DOAT presented before the emotional Stroop), the Group by Condition by Affect interaction was significant $F(2,35) = 5.18$, $p < .01$. However, it was also significant in Order 2 (i.e., DOAT presented after the emotional Stroop), $F(2,35) = 3.68$, $p < .05$. As a result, each of these three-way interactions was broken down separately to understand the different patterns of significance.

In Order 1, the Condition by Affect interaction was not significant for the previously depressed group, $F(2,17) < 1$. However, for the never depressed group this interaction was significant, $F(2,17) = 7.26$, $p < .005$. In Order 2, the

Table 4-2. *Mean Proportions for All Groups in Each Condition in Both Orders for State- and Trait-like Word Pairs.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| | Previously Depressed | | Never Depressed | | Currently Depressed |
| Word Pairs | Sad | Neutral | Sad | Neutral | Neutral |
| | | | Order 1 | | |
| State | | | | | |
| NEGNEU | .45 (.117) | .45 (.062) | .50 (.108) | .36 (.190) | .54 (.138) |
| NEGPOS | .44 (.129) | .40 (.128) | .51 (.121) | .23 (.189) | .57 (.155) |
| POSNEU | .49 (.115) | .48 (.130) | .46 (.130) | .48 (.142) | .49 (.175) |
| Trait | | | | | |
| NEGNEU | .45 (.136) | .41 (.118) | .48 (.110) | .35 (.144) | .49 (.202) |
| NEGPOS | .44 (.086) | .47 (.085) | .52 (.090) | .27 (.154) | .47 (.159) |
| POSNEU | .48 (.114) | .47 (.131) | .50 (.132) | .52 (.085) | .50 (.085) |
| | | | Order 2 | | |
| State | | | | | |
| NEGNEU | .48 (.134) | .45 (.118) | .43 (.170) | .41 (.183) | .51 (.080) |
| NEGPOS | .43 (.142) | .42 (.111) | .39 (.178) | .42 (.169) | .48 (.092) |
| POSNEU | .47 (.095) | .50 (.080) | .55 (.118) | .42 (.133) | .49 (.071) |
| Trait | | | | | |
| NEGNEU | .47 (.133) | .33 (.143) | .34 (.182) | .46 (.139) | .48 (.125) |
| NEGPOS | .52 (.142) | .38 (.104) | .42 (.223) | .42 (.155) | .51 (.116) |
| POSNEU | .50 (.082) | .49 (.120) | .54 (.123) | .48 (.114) | .43 (.148) |

*Note.* First three letters of the word-pair name indicates the target word for that pair. PD = Previously Depressed, ND = Never Depressed, CD = Currently Depressed. Standard deviations presented in brackets.

Condition by Affect interaction was not significant for either the PD, $F(2,17) = 1.97$, $p > .15$, or the ND subjects, $F(2,17) = 1.90$, $p > .15$. This suggests that for the Group by Condition by Affect interaction it is most important to look at Order 1 (i.e., where this task was presented first). To understand the Condition by Affect interaction in Order 1 for the ND group, two, one-way ANOVAs were conducted, one for each condition (i.e., Sad and Neutral). In the sad condition, the main effect of Affect was not significant, $F(2,8) < 1$, $p$ = nonsignificant. In the neutral condition, the main effect of Affect was significant, $F(2,8) = 7.89$, $p < .025$. Examination of the three means using Scheffé's posthoc procedures revealed that, when the target word was negative (i.e., in the NEGNEU and NEGPOS word pairs, means of .356 and .[illegible], respectively) they were equal, but both were significantly different from the positive target word pair (i.e., the POSNEU word pair, mean of .495). Thus, the results indicate that when considering interactions involving only Group, Condition and Affect, it is most important to conduct the deployment-of-attention task before other information processing tasks.

However, most relevant to the current set of hypotheses was the four-way interaction of Group by Condition by Affect by State-Trait, and therefore this interaction was investigated next. Although Order was involved separately with interactions involving both Affect and State-Trait, it was not involved in a five-way interaction with Group, Condition, Affect and State-Trait. Consequently, of primary interest to the current investigation were those factors that were relevant to the theoretical hypotheses being examined and thus the Order was not considered further.

The significant four-way interaction of Group, Condition, Affect and State-Trait was decomposed by first examining two, three-way ANOVAs, one for state-like stimuli and one for trait-like stimuli. For the state-like stimuli, the interaction of Group by Condition by Affect was not significant, $F(2,75) < 1$. For the trait-like stimuli, this interaction was significant, $F(2,75) = 5.61$, $p < .005$. This result would seem to support the contention that only trait like words reveal differences in remitted versus never depressed subjects.

Consequently, only the trait-like stimuli were examined further. This was completed by conducting two, two-way ANOVAs, one for each group in order to

examine the Condition by Affect interactions. First, for the previously depressed subjects (PD) the Condition by Affect interaction was not significant, $F(2,37) = 1.38$, $p > .25$. However, for the never depressed (ND) subjects the interaction was significant, $F(2,37) = 7.74$, $p < .0025$.

Following up the significant Condition by Affect interaction for ND subjects, in the sad condition a oneway ANOVA revealed that the main effect for Affect was significant, $F(2,18) = 4.93$, $p < .025$. However, the Affect main effect was also significant in the neutral control condition, $F(2,18) = 7.36$, $p = .005$. In order to examine this, posthoc analyses using Scheffé's procedure revealed that in the sad condition the mean for the POSNEU (.52) was greater than the mean for NEGNEU (.39), while the mean for NEGPOS (.47) was not different from either. For the neutral condition NEGNEU (.40) was equal to NEGPOS (.35) while both of these means were significantly different from POSNEU (.50). Therefore, the results indicated that attentional differences exist in the nondepressed group primarily for trait-like stimuli. Whereas PD subjects performed similarly in both sad and neutral conditions, ND subjects generally attended less to negative-content targets than they did to positive-content targets.

Currently depressed subjects' data were submitted to a four-way Order by Recall by State-trait by Affect ANOVA. Results from this analysis indicated that neither Order nor Recall were involved in any significant interactions, although one trend emerged for a State-trait by Recall interaction, $F(1,18) = 4.31$, $p = .06$. All other $F$s were less than 2.38 and all $p$s greater than .10. A subsequent State-trait by Affect ANOVA was conducted on CD subjects' data. This analysis also revealed no significant effects or interactions, all $F$s $< 2.46$, all $p$s $> .10$.

In summary, it appears that it might be most appropriate to use the deployment-of-attention task (DOAT) first, before other tasks if one is going to attempt to have subjects complete more than one task. However, significant theoretical differences emerged irrespective of the order in which the task was completed. Specifically, for trait-like stimuli, never depressed subjects attended less to negative targets than to positive targets, while previously depressed subjects, irrespective of mood induction condition, attended equally to the target words as did

the currently depressed subjects, once again providing support for a main-effects hypothesis of Beck's cognitive theory.

Although the previous analysis indicated how the target-word proportions differed from each other in the three types of word pairs, it did not indicate if and how these proportions differed from chance. Remember that bias is defined as a significant discrepancy from .5, with .5 being the expected target-word proportion if subjects' attention were randomly drawn to either member of a word pair. In order to assess the obtained proportion for each target word for state and trait words, a number of t-tests assessing the difference between the mean observed and the mean expected by chance (i.e., .50) was computed. Therefore, each mean target-word proportion obtained by subjects in each group and condition, for both state- and trait-like word pairs was compared to .50 using t-tests. If subjects were unbiased in their choice of colour-bars appearing first, the colour bar that replaced the target word in each word pair would be chosen 50 percent of the time (i.e., the proportion expected by chance with two potential outcomes in each trial). If, in contrast, subjects were biased, we would expect the target proportion to be different from .5. If subjects focused attention towards the target, we would expect a proportion greater than .5. If they focused attention away from the target we would expect a proportion less than .5.

Recall that in the study by Gotlib et al. (1988) nondepressed university students performed the DOAT in a positively biased manner. That is, they attended more frequently to positive-content targets when paired with either negative- or neutral-content words (they attended equally to a negative-content target and a neutral-content word). Consequently, it was expected that the never depressed subjects should perform the task in a biased manner (i.e., they would have means different from .5 for the target-word proportions) while the currently depressed subjects should be unbiased (i.e., they would have means equal to .5 for the target-word proportions). Data from past studies would suggest this prediction should be true for both state-like and trait-like words. However, based on the data just presented from the current study and in light of the Spielman and Bargh (1988) arguments, the prediction is most likely to hold for trait-like stimuli.

As the first step in the t-test analyses of potential bias, it is important to examine the bias (or lack thereof) demonstrated in the currently depressed and never depressed subjects in the neutral conditions. These two groups are most analogous to the dysphoric and nondysphoric groups used in the Gotlib et al. (1988) study. Their data were examined first, and separately from the previously depressed subjects and never depressed subjects in the neutral condition because of at least two important and fundamental differences between the current investigation and that of Gotlib et al. (1988). First, the subjects in the current study were quite different from the subjects in the Gotlib et al. (1988) study. The current subjects were all women who were in their early thirties as opposed to the younger first-year university students of the Gotlib et al. study. As well, the depressed group tested here was clinically depressed in contrast to a dysphoric group in the Gotlib et al. study. Second, the stimuli used in the current investigation consisted only of adjectives, whereas the Gotlib et al. study contained positive- and negative-content adjectives and neutral-content nouns. Given these differences, the crucial test of the DAH is to determine whether previously depressed subjects in a sad mood perform like currently depressed subjects, while all never depressed subjects and previously depressed subjects in a neutral mood perform similarly, and unlike currently depressed subjects. Therefore, the data for never depressed and currently depressed subjects in the neutral condition will be examined first to see if they conform to the Gotlib et al. (1988) study. Consequently, predictions will be made for the previously depressed group in the sad and neutral condition and the never depressed group in the sad condition.

The means for the CD and ND subjects in the neutral condition are found in Table 4-3, for both state- and trait-like word pairs along with the t-tests comparing these means against chance.

As can be seen from Table 4-3, for both the state- and trait-like word pairs, the CD subjects were unbiased as were Gotlib et al.'s (1988) dysphoric subjects. The ND subjects also performed the task in a biased manner that was the same for both state- and trait-like word pairs. However, the bias is different than that reported by Gotlib et al. for their control group. Examination of the sign of the t-test results reveals that in each word pair where a negative-content target word was present, ND

Table 4-3. *Mean Proportions for Target Word Selections for State- and Trait-like Stimuli for Never Depressed and Currently Depressed Subjects in the Neutral Condition.*

| | Word Pairs | | | | | |
|---|---|---|---|---|---|---|
| | NEGNEU | | NEGPOS | | POSNEU | |
| Groups & Condition | State | Trait | State | Trait | State | Trait |
| ND Neutral | | | | | | |
| Mean | .383 | .404 | .373 | .346 | .445 | .498 |
| t value | -2.86* | -2.90* | -3.14* | -4.12* | -1.78 | -0.09 |
| CD Neutral | | | | | | |
| Mean | .520 | .487 | .525 | .485 | .488 | .463 |
| t value | 0.81 | -0.35 | 0.85 | -0.49 | -0.41 | -1.35 |

*Note.* First three letters of the word-pair name indicates the target word for that pair. ND = Never Depressed, CD = Currently Depressed. Negative t values indicate means that are less than .5 (the value expected by chance), while positive t values indicate means that are greater than .5.
*$p < .05$.

subjects in the neutral condition attended more to the other word (i.e., both neutral- and positive-content words). This is demonstrated by a proportion less than .50 when the target was the negative-content word for both the negative-neutral word pair (NEGNEU) and the negative-positive word pair (NEGPOS). They were unbiased when the word pair consisted of a neutral- and a positive-content word pair (i.e., they attend equally to each). From these results the ND subjects in the neutral condition appear to direct their attention away from negative-content stimuli in favour of either positive- or neutral-content stimuli, while CD subjects are unbiased. Having compared the results of the current investigation to Gotlib et al. (1988) and established the exact nature of the bias exhibited by the subjects in this study, the next step is to make the predictions for the previously depressed subjects in both mood induction conditions and for the never depressed subjects in the sad mood condition.

Consequently, the predictions for the PD subjects in both conditions and ND subjects in the sad mood condition are slightly different than would have been predicted from Gotlib et al.'s (1988) study. These predictions are presented in Table 4-4 for these three subject groups and are the same for both state- and trait-like stimuli. The obtained mean proportions and t-test results are presented in Table 4-5.

As seen in Table 4-5, the results were very close to what was predicted for the trait-like stimuli. That is, whereas PD subjects in the sad mood condition performed the task in an unbiased manner, PD subjects in the neutral condition performed the task in a biased manner, the same as did ND subjects in the neutral condition. ND subjects in the sad condition showed a bias only for the NEGNEU word pair. A bias was not observed for the NEGPOS word pair. For the state-like stimuli results were not nearly so strong. PD subjects in the sad condition were biased on the NEGPOS word pair, while ND subjects in the sad condition were not. Moreover, ND subjects in the sad condition were unbiased in their colour-bar choice, indicative of unbiased attention for state-like stimuli.

To summarize, as with the Gotlib et al. (1988) study, a bias in attention was apparent for the nondepressed control subjects. However, unlike the Gotlib et al. study, ND subjects in the current investigation displayed a disattending bias for negative-content words, rather than directing attention towards positive-content words.

Table 4-4. *Predictions for Mean Proportion Expected on Target Words for Subjects in Each Condition.*

| | Target Proportions Expected | | |
|---|---|---|---|
| Groups & Condition | NEGNEU | NEGPOS | POSNEU |
| PD Sad | =.5 | =.5 | =.5 |
| PD Neutral | <.5 | <.5 | =.5 |
| ND Sad | <.5 | <.5 | =.5 |

*Note.* NEGNEU = Negative-Neutral word pair, NEGPOS = Negative-Positive word pair, POSNEU = Positive-Neutral word pair. PD = Previously depressed, ND = Never depressed.

Table 4-5. *Mean Proportions for Target Word Selections for State- and Trait-like Stimuli for PD Subjects in the Sad Condition and ND Subjects in Each Condition.*

| | Word Pairs | | | | | |
|---|---|---|---|---|---|---|
| | NEGNEU | | NEGPOS | | POSNEU | |
| Groups & Condition | State | Trait | State | Trait | State | Trait |
| PD Sad | | | | | | |
| Mean | .463 | .461 | .430 | .480 | .480 | .487 |
| t-test | -1.35 | -1.32 | -2.37* | -0.73 | -0.87 | -0.60 |
| PD Neutral | | | | | | |
| Mean | .450 | .368 | .408 | .425 | .488 | .475 |
| t-test | -2.43* | -4.41* | -3.52* | -3.26* | -0.51 | -0.91 |
| ND Sad | | | | | | |
| Mean | .465 | .391 | .447 | .467 | .503 | .515 |
| t-test | -1.10 | -3.11* | -1.49 | -0.85 | 0.10 | 0.53 |

*Note.* First three letters of the word-pair name indicates the target word for that pair. PD = Previously Depressed, ND = Never Depressed, CD = Currently Depressed. Negative t values indicate means that are less than .5 (the value expected by chance), while positive t values indicate means that are greater than .5.
*$p < .05$.

The results further suggest that trait-like stimuli are superior to state-like stimuli in differentiating group performance. Currently depressed subjects, as well as previously depressed subjects in the sad condition demonstrated no attentional bias for trait-like stimuli. Disattending from negative-content trait-like stimuli was also apparent for the ND and PD subjects in the neutral condition. This finding held for all but one comparison, where ND subjects in the sad condition attended equally to negative- and positive-content words in the NEGPOS word pair. These findings provide support for the DAH.

Emotional Intensity

As previously described, there were two types of word pairs, one negative- and one positive-content, used in assessing the emotional intensity hypothesis of the DAH. In each case the high-intensity word was defined as the target word. Thus, the label HINEG described a high-intensity negative-content word paired with a low-intensity negative-content word. Similarly, the label HIPOS refers to a high-intensity positive-content word paired with a low-intensity positive-content word.

As with the previous analyses, the design, initially including Order and Recall, was a Group (PD, ND) by Condition (Sad, Neutral) by Order (First, Second) repeated over Affect (Positive, Negative word pairs) repeated over Recall (Before, After incidental recall task) repeated measures ANOVA. First, the extraneous factors, Order and Recall, were assessed in order to determine if they needed to be included in subsequent analyses of theoretically relevant variables. Means and standard deviations for all subjects in each condition and order are presented in Table 4-6.

The five-way ANOVA conducted on nondepressed subjects' data resulted in significant main effects for Condition, $F(1,72) = 4.56$, $p < .05$; and Affect, $F(1,72) = 6.31$, $p < .025$. Consequently, the "extraneous" factors of Recall and Order effects were dropped and the subsequent Group by Condition by Affect repeated measures ANOVA revealed the same significant effects for Condition, $F(1,76) = 4.76$, $p < .05$; and Affect, $F(1,76) = 6.52$, $p < .025$. Examination of means for the Condition effect indicated that all subjects in the sad condition attended more equally to high- and low-intensity words (mean of .473) than did subjects in the neutral condition, who attended more to low-intensity adjectives (mean of .413). T-

Table 4-6. *Mean Proportions for All Groups in Each Condition in Both Orders for High- and Low-intensity Word Pairs.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| | Previously Depressed | | Never Depressed | | Currently Depressed |
| Word Pairs | Sad | Neutral | Sad | Neutral | Neutral |
| | | | Order 1 | | |
| HINEG | .467 (.1394) | .491 (.1082) | .483 (.1357) | .409 (.1344) | .445 (.1048) |
| HIPOS | .458 (.2300) | .301 (.1627) | .468 (.1574) | .416 (.1568) | .312 (.1869) |
| | | | Order 2 | | |
| HINEG | .502 (.1348) | .465 (.1278) | .492 (.1637) | .518 (.2128) | .469 (.1048) |
| HIPOS | .458 (.3366) | .306 (.1902) | .454 (.1833) | .397 (.1436) | .333 (.2125) |

*Note*. Targets were the high intensity words. The last three letters of the word-pair name indicate if the word pair consisted of negative (NEG) or positive (POS) content words. PD = Previously Depressed, ND = Never Depressed, CD = Currently Depressed. Standard deviations presented in brackets.

tests comparing these values against chance (i.e., .50) indicated that subjects in the sad condition were unbiased, $t(39) = -1.46$, $p$ = n.s., while subjects in the neutral condition performed in a biased fashion, $t(39) = -4.74$, $p < .05$, directing their attention away from the high-intensity adjectives. As well, for the Affect effect, subjects attended to high- and low-intensity negative-content adjectives more equivalently, while attending less frequently to high-intensity positive-content words (means for the HINEG word pair of .478 and for HIPOS of .407). T-tests evaluating whether subjects attended more frequently to one type of word compared to chance (i.e., .50) indicated that subjects' attention was unbiased for the negative-content word pairs, $t(79) = -1.28$, $p$ = n.s., while they attended to high-intensity positive-content words less often than would be expected by chance, $t(79) = -4.02$, $p < .05$. Therefore, when analyzing data from the nondepressed subjects, no evidence for the DAH was found. That is, previously depressed subjects in either mood condition did not attend more frequently to high-intensity negative-content stimuli in comparison to never depressed subjects. Although the main-effects hypothesis of cognitive theory does not contain reference to the intensity dimension, the current results for nondepressed subjects cannot be explained within that theoretical framework either.

Within the currently depressed subject group, the positive- and negative-content word pair (i.e., HIPOS and HINEG) proportions were subjected to an Order by Affect by Recall repeated measures ANOVA. Results revealed only a significant effect for Affect, $F(1,18) = 7.78$, $p < .025$. Examination of means revealed that for the negative-content word pair (i.e., high- and low-intensity negative-content words) CD subjects attended to each word in a less biased manner (mean of .457) than for the positive-content word pair where CD subjects attended less frequently to the high-intensity positive-content word (mean of .322). Indeed, t-tests comparing the mean proportion to the value expected for unbiased attention (i.e., .50) revealed that CD subjects were unbiased for high- or low- intensity negative-content words, $t(19) = -1.87$, $p$ = n.s., whereas they attended less frequently to high-intensity positive-content words in comparison to low-intensity positive-content words, $t(19) = -4.08$, $p < .05$. Therefore, the currently depressed subjects performed like the nondepressed subjects (i.e., the PD and ND subjects) by directing their attention

away from the high-intensity positive-content words. Thus, the intensity dimension does not appear to be an important factor as outlined by Teasdale (1983; 1988) as all subjects performed in exactly the same manner with respect to high and low intensity stimuli.

Recall of Words

Free Recall. As with the emotional Stroop Phase of the study, the total number of words recalled was examined separately for correct words recalled and incorrect words recalled (i.e., intrusions). Nondepressed subjects' data were similarly analyzed using the Group (PD, ND) by Condition (Sad, Neutral) by Order (First, Second) repeated over Affect (Negative, Positive and Neutral) design. CD subjects' data were analyzed using an Order repeated over Affect analysis. In each case, the nondepressed subjects' results are presented first, followed by the analysis for CD subjects. See Table 4-7 for subject's mean recall in each condition and order.

In examining correct recall for nondepressed subjects, significant main effects for Condition, $F(1,72) = 8.28$, $p < .01$; and Affect, $F(2,71) = 36.38$, $p < .001$ were found. All other effects and interactions were nonsignificant. For the Condition factor, examination of the means revealed that subjects in the sad condition recalled fewer words than did subjects in the neutral condition (means of 1.54 and 2.12, respectively). For the Affect factor, subjects recalled more negative-content words than either positive- or neutral-content words, and, recalled more positive-content words than neutral-content words (means of 2.55, 1.95 and 0.99, respectively) according to posthoc Scheffé's tests. The findings regarding correct recall for the nondepressed subjects do not conform to either the DAH nor the main-effects hypotheses.

Analysis of correct words recalled for currently depressed subjects revealed only a main effect for Affect, $F(2,17) = 5.01$, $p < .025$. A subsequent post hoc Scheffé's test indicated that currently depressed subjects recalled more negative-content words than either positive- or neutral-content words (means of 2.0, 1.1 and 0.7, respectively). Thus, the currently depressed subjects recalled words in the same manner as nondepressed subjects (i.e., PD and ND subjects), a finding that also does not fit with either the DAH or main-effects hypothesis.

Table 4-7. *Mean Correct and Incorrect Recall for All Subjects in Each Condition and Both Presentation Orders for the Free Recall Task.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| | PD | | ND | | CD |
| Affect | Sad | Neutral | Sad | Neutral | Neutral |
| | Correct Recall | | | | |
| Order 1 | | | | | |
| Negative | 2.5 (1.58) | 3.4 (1.90) | 2.1 (1.37) | 2.8 (1.55) | 2.2 (1.69) |
| Positive | 1.5 (1.35) | 2.5 (0.97) | 1.7 (1.16) | 2.9 (1.85) | 1.3 (1.34) |
| Neutral | 1.0 (0.94) | 1.0 (1.25) | 0.7 (0.68) | 1.2 (0.79) | 0.6 (0.70) |
| Order 2 | | | | | |
| Negative | 1.6 (1.08) | 3.0 (1.63) | 2.2 (2.10) | 2.8 (1.32) | 1.8 (1.75) |
| Positive | 1.3 (0.95) | 1.5 (0.71) | 2.2 (1.62) | 2.0 (1.33) | 0.9 (0.99) |
| Neutral | 0.6 (0.70) | 0.7 (0.68) | 1.1 (0.74) | 1.6 (1.43) | 0.8 (1.03) |
| | Incorrect Recall (Intrusions) | | | | |
| Order 1 | | | | | |
| Negative | 0.7 (0.82) | 0.5 (0.71) | 0.7 (0.82) | 0.8 (1.14) | 0.4 (0.52) |
| Positive | 0.4 (0.70) | 0.8 (0.79) | 0.6 (0.84) | 0.5 (0.53) | 0.2 (0.63) |
| Neutral | 0.0 (0.00) | 0.5 (1.27) | 0.1 (0.32) | 0.2 (0.42) | 0.1 (0.32) |
| Order 2 | | | | | |
| Negative | 0.6 (0.70) | 0.8 (0.42) | 0.5 (0.53) | 0.5 (1.08) | 0.9 (0.99) |
| Positive | 0.0 (0.00) | 0.2 (0.42) | 0.4 (0.52) | 0.4 (0.70) | 0.5 (0.85) |
| Neutral | 0.1 (0.32) | 0.9 (0.88) | 0.2 (0.63) | 0.7 (1.06) | 0.4 (0.97) |

*Note.* Standard deviations presented in brackets. PD = Previously depressed, ND = Never depressed, CD = Currently depressed.

Next, consideration of the words that were incorrectly recalled was undertaken. Remember that incorrectly recalled words are those that were either intruding from a previous task, or were not included in any of the tasks. The ANOVA results for the incorrect words recalled (i.e., intrusions) by the nondepressed subjects in the free-recall task revealed main effects for both Condition, $F(1,72) = 4.55$, $p < .05$; and Affect, $F(2,71) = 3.34$, $p < .05$; and an interaction of Order and Affect, $F(2,71) = 4.46$, $p < .025$. For the Condition effect, examination of the means indicated that subjects in the sad condition made fewer intrusion errors than subjects in the neutral condition (means of .358 and .567, respectively). Examination of means for the Affect effect revealed that subjects made more negative intrusion errors than neutral intrusion errors while positive intrusion errors were equal to both negative and neutral intrusions (means of .638, .338 and .438, respectively).

CD subjects' data revealed no significant main effects or interactions for intrusion data. Therefore, to summarize the intrusion recall effects, no results consistent with either the main-effects or the DAH were found. Taken together with the correct recall results, no support for either of these hypotheses was found with the free recall task.

Cued Recall

Next, the data for the cued recall task were examined. The means for subjects in each condition and order are found in Table 4-8.

Examining first the performance of the nondepressed groups (i.e., PD and ND in sad and neutral conditions), in the cued-recall task, the ANOVA for the correct words recalled revealed main effects for Condition, $F(1,72) = 7.55$, $p < .01$; and Affect, $F(2,71) = 64.65$, $p < .001$; and an interaction of Group and Affect, $F(2,71) = 3.13$, $p = .05$. Examination of means for the condition effect indicated that subjects in the sad condition correctly recalled fewer words than did subjects in the neutral condition (means of 2.83 and 3.56, respectively). The Affect effect was examined within the Group by Affect interaction as it is relevant to theoretical predictions stemming from the main-effects hypotheses of Beck's cognitive theory. Post hoc Scheffé's tests revealed that in the PD group, subjects recalled an equal

Table 4-8. *Mean Correct and Incorrect Recall for All Subjects in Each Condition and Both Presentation Orders for the Cued-Recall Task.*

| | Group and Condition | | | | |
|---|---|---|---|---|---|
| | PD | | ND | | CD |
| Affect | Sad | Neutral | Sad | Neutral | Neutral |
| | Correct Recall | | | | |
| Order 1 | | | | | |
| Negative | 4.3 (1.57) | 3.4 (1.58) | 2.6 (1.35) | 3.3 (2.00) | 3.3 (1.64) |
| Positive | 3.5 (1.51) | 4.0 (1.76) | 4.2 (2.49) | 5.3 (2.00) | 2.5 (1.58) |
| Neutral | 0.9 (1.10) | 1.9 (1.20) | 1.8 (1.48) | 2.2 (1.69) | 0.8 (1.35) |
| Order 2 | | | | | |
| Negative | 3.1 (1.37) | 4.3 (2.41) | 3.2 (2.44) | 4.4 (1.90) | 3.1 (1.91) |
| Positive | 3.3 (0.68) | 4.8 (1.62) | 4.5 (2.99) | 5.2 (1.55) | 2.4 (2.32) |
| Neutral | 1.3 (0.82) | 2.0 (1.41) | 1.3 (1.16) | 1.9 (1.79) | 1.3 (1.42) |
| | Incorrect Recall (Intrusions) | | | | |
| Order 1 | | | | | |
| Negative | 1.1 (0.74) | 0.5 (0.71) | 0.7 (1.34) | 0.3 (0.48) | 0.4 (0.52) |
| Positive | 0.7 (1.06) | 1.5 (1.08) | 1.2 (1.23) | 1.2 (1.55) | 0.1 (0.32) |
| Neutral | 0.9 (0.99) | 1.0 (1.33) | 0.8 (1.62) | 0.4 (0.70) | 0.2 (0.42) |
| Order 2 | | | | | |
| Negative | 0.6 (0.84) | 0.9 (1.10) | 0.2 (0.42) | 0.8 (1.03) | 0.7 (0.95) |
| Positive | 0.3 (0.48) | 1.3 (1.25) | 0.6 (0.52) | 1.4 (0.97) | 0.8 (1.32) |
| Neutral | 0.6 (0.97) | 0.5 (0.97) | 0.1 (0.32) | 0.9 (0.88) | 0.1 (0.32) |

*Note.* Standard deviations presented in brackets. PD = Previously depressed, ND = Never depressed, CD = Currently depressed.

number of positive- and negative-content words, both of which were significantly greater than the number of neutral-content words recalled correctly (means of 3.90, 3.78 and 1.53, respectively). ND subjects recalled more positive- than negative- or neutral-content words and more negative- than neutral-content words (means of 4.80, 3.38 and 1.80, respectively). Thus, in comparison to the ND group, PD subjects appear to recall more negative-content stimuli with respect to positive- and neutral-content stimuli. This fits within the hypotheses generated from the main-effects model.

The Order by Affect ANOVA for CD subject's data revealed a main effect for Affect, $F(2,17) = 25.30$, $p < .001$. Post hoc Scheffé's tests indicated that depressed subjects correctly recalled an equal number of positive- and negative-content words, both of which were significantly greater than the number of neutral-content words recalled (means of 2.5, 3.2 and 1.1, respectively). Therefore, CD subjects performed like PD subjects in terms of the pattern of recall among positive-, negative- and neutral-content stimuli in that both recalled negative-content stimuli more frequently than ND subjects (recall that the ND subjects recalled more positive- than negative-content stimuli, while PD and CD recalled negative- and positive-content stimuli equally).

The pattern of recall for positive-, negative- and neutral-content stimuli was equal for PD and CD subjects with both recalling equally the positive- and negative-content stimuli, while recalling significantly fewer neutral-content stimuli. In terms of the *pattern* of response, then, this supports Beck's main-effects hypothesis (i.e., PD and CD subjects perform similarly and unlike ND subjects). In order to assess the strength of this finding, between-subjects comparisons were made for each of the respective affective-content of stimuli as suggested by Winer (1971). As currently depressed subjects recalled far fewer words overall, proportions were analyzed for these between groups comparisons. With respect to negative-content words, PD and CD subjects recalled an equal proportion of words, $t(27.09$, separate variance estimate$) < 1$, $p$ = n.s. , both greater than the ND subjects, both $ts(78 \text{ \& } 24.89) > 2.24$, both $ps < .025$, respectively. For cued recall of the neutral-content stimuli, none of the three groups differed from each other, all $ts < 1.80$, all $ps > .05$.

Finally, for the positive-content stimuli, the currently depressed subjects recalled proportionally fewer positive-content words than did the previously depressed or never depressed subjects, $ts(58) > 1.59$, $ps < .05$ , both of which were equal, $t(78) = -1.30$, $p > .15$. Therefore, with respect to the recall of negative-content stimuli, PD and CD groups were equal and recalled proportionally more negative-content stimuli than did ND subjects. This fits exactly what would be predicted by a main-effects hypothesis of cognitive theory (i.e., PD and CD perform similarly and unlike ND subjects).

Incorrect words recalled (i.e., intrusions) were also analyzed using the Group by Condition by Order by Affect design described previously for the PD and ND subjects together (remember the means were presented in Table 4-8). This ANOVA revealed a significant main effect for Affect, $F(2,71) = 4.24$, $p < .025$; and a significant interaction of Condition by Order, $F(1,72) = 4.60$, $p < .05$. A trend for the Condition by Affect interaction was also observed, $F(2,72) = 2.96$, $p = .06$. Post hoc Scheffé's test for the Affect effect indicated that subjects recalled more incorrect positive-content words than either negative- or neutral-content words (means of 1.025, .638 and .650, respectively). Therefore, support for neither hypothesis (i.e., DAH or main-effects) was observed for the number of intrusions for nondepressed subjects (i.e., PD or ND).

CD subjects' data, analyzed separately using the Order by Affect ANOVA revealed only a trend for the Affect main effect, $F(2,17) = 2.88$, $p = .08$. To summarize the intrusion data, no predicted effects were observed for either the DAH or main-effects hypothesis for any subjects.

Attentional Bias Score, Depression and Anxiety

In any study where there appear to be differences between depressed and nondepressed groups, researchers have typically examined the role of anxiety, due to the frequently reported high correlation between them. In addition, Williams et al. (1988) have also hypothesized that effects obtained on information processing experiments that examine attention are most likely influenced by anxiety rather than depression. For this reason, the role of anxiety was examined in the current investigation as well.

Mogg et al. (1991) used the deployment-of-attention task (DOAT) to study performance of subjects with both clinical and subclinical levels of anxiety. In that study, Mogg et al. described an attentional bias score computed from the proportions of times subjects chose each target word. This bias score was correlated with self-report responses of subjects on depression, state anxiety and trait anxiety inventories. Consequently, one can examine the relative contributions of depression and anxiety to the obtained results by computing both correlations and partial correlations. The bias score derived by Mogg et al. subtracts the proportion of times subjects chose a positive target from the proportion of times subjects chose a negative target. In defining their target words, Mogg et al. defined two positive targets for word pairs containing a positive word (i.e., POSNEU and POSNEG) and a negative target for the word pair containing a negative and neutral word (i.e., NEGNEU). Mogg et al. described the bias score as being the proportion of times the positive targets were selected, both subtracted from the proportion of times the negative target was selected (i.e., Bias=NEGPOS-POSNEU-POSNEG). In the current investigation the targets were defined as the negative word in the word pairs containing a negative word (i.e., NEGNEU and NEGPOS word pairs). Thus, to make the bias score conceptually identical to that calculated by Mogg et al. the formula used was Bias=NEGNEU-POSNEU-(1-NEGPOS).

The bias score was then correlated with all subjects' responses to the CES-D, STAI-T and STAI-S. As this study examined both state- and trait-like stimuli in a fashion conceptually equivalent to the Mogg et al. (1991) study, both a state and trait bias score were calculated (i.e., BIAS-S and BIAS-T, respectively). Correlations and partial correlations for the two bias scores and the self-report measures of state and trait anxiety are presented in Table 4-9.

As seen in Table 4-9, the trait bias score is significantly and equally correlated with self-reported measures of depression, trait anxiety and state anxiety. Examination of the partial correlations reveals that the correlation between the bias score and trait anxiety drops to near zero when controlling for either depression or state anxiety. In contrast, the correlations between the bias score and depression drop when controlling for both trait and state anxiety scores, with the correlation remaining

Table 4-9. *Correlation and Partial Correlations Among Symptom Measures and Bias Scores.*

| | CES-D | STAI-T | STAI-S |
|---|---|---|---|
| CES-D | ----- | | |
| STAI-T | .82** | ----- | |
| STAI-S | .63** | .72** | ----- |
| BIAS-T | .27** | .21* | .25* |
| BIAS-S | .26* | .26* | .32** |
| Partial Correlations | | | |
| BIAS-T (CES-D) | ----- | -.02 | .11 |
| BIAS-T (STAI-T) | .18* | ----- | .15 |
| BIAS-T (STAI-S) | .15 | .04 | ----- |
| BIAS-S (CES-D) | ----- | .08 | .21* |
| BIAS-S (STAI-T) | .08 | ----- | .22* |
| BIAS-S (STAI-S) | .07 | .03 | ----- |

*Note.* Bias Score = NEGNEU-POSNEU-(1-NEGPOS). BIAS-T is the bias score computed from trait-like stimuli. BIAS-S is the bias score computed from state-like stimuli. CES-D = Centre for Epidemiological Studies Depression Scale; STAI = State-Trait Anxiety Inventory (-S=State; -T=Trait). In the partial correlations portion of the table, name of variable in brackets indicates the variable being controlled.

* $p < .05$; ** $p < .01$ (two-tailed).

significant between the bias score and depression when controlling for trait anxiety. The correlation between state anxiety and the trait bias score also drops when controlling for depression and trait anxiety. The magnitude of these partial correlations is equal to the magnitude of the partial correlations between the bias score and depression. Consequently, it can be concluded that the trait bias score is equally related to both levels of depression and state anxiety. Trait anxiety appears unrelated to the obtained bias scores when controlling for either depression or state anxiety.

With respect to the state bias score, when controlling for depression, the partial correlation between the bias score and trait anxiety drops to near zero. In contrast, the correlation between state anxiety and the state bias score remains significant and of similar magnitude when controlling for depression. When controlling for trait anxiety, the correlation between the state bias score and depression drops to near zero, while once again, the state anxiety correlation remains significant. Finally, when controlling for state anxiety, the correlation between the state bias score and both depression and trait anxiety drop to near zero. This suggests that the relationship between the state bias score is most strongly influence by state anxiety than either depression or trait anxiety.

## Discussion

As in the Stroop task discussion, the results are discussed in a hypothesis-driven fashion. First, a discussion of the results with respect to the DAH, followed by the main-effects hypothesis is presented. Finally, discussion of the relationship between the findings on the deployment-of-attention task (DOAT) and anxiety and depression will conclude this section.

### Differential Activation Hypothesis

Of the studies conducted in this series, results on the deployment-of-attention task provided the greatest support for the DAH proposed by Teasdale (1983; 1988). To reiterate briefly, using the DAH one would predict that previously depressed subjects in a sad mood would perform tasks in a fashion similar to currently depressed subjects, with both of these groups performing the task differently than previously depressed subjects in a neutral mood and never depressed subjects irrespective of mood. In examining the data, the results of this study indicate that it was the never depressed group that demonstrated an attentional bias by directing their attention away from negative-content stimuli. Currently depressed subjects performed this task in an unbiased manner.

When examining the group differences on the mean target-word proportions, the results conform to a main-effects hypothesis. That is, previously depressed subjects, irrespective of mood condition, chose the target word equally often in each of the three word-pair conditions, as did the currently depressed subjects. In general, never depressed subjects chose the colour-bar replacing the target word as having appeared first less frequently for negative-content targets than for positive-content targets. However, the DOAT is an unusual task in that one can do more than compare group means to each other; it allows a comparison of means against the value expected if performance were completely unbiased. Indeed, this set of comparisons revealed that the pattern of comparisons against what would be expected from unbiased performance revealed some support for the DAH.

More specifically, hypotheses concerning biased performance on the deployment-of-attention task were generated based on the results of never depressed subjects in the neutral mood condition and currently depressed subjects. Analysis of

the currently depressed subjects and never depressed subjects in the neutral condition revealed that the never depressed subjects did indeed evidence a bias, although the bias was quite different from that reported by Gotlib et al. (1988). In the Gotlib et al. (1988) study, nondepressed subjects demonstrated a "positive" bias in that they attended more frequently to positive-content words (targets) when paired with either negative- or neutral-content words. As well, that study revealed that subjects were unbiased when a negative- and neutral-content stimulus word pair was presented. In contrast, never depressed subjects in the current investigation demonstrated what can be referred to as a "protective" bias. Specifically, this bias resulted in an avoidance of negative-content words when paired with either positive- or neutral-content words, while performance equalled chance when a positive- and neutral-content word were paired together. Avoidance of potentially negative self-referent stimuli in the environment would possibly allow subjects to maintain a more positive view of self. Such a bias could be considered to be *protective* by shielding the individual from processing negative-content stimuli in a self-referent manner. The never depressed group's protective bias in the current study, as opposed to the positive bias demonstrated by nondepressed subjects in the Gotlib et al. study, could be attributed to any number of demographic differences between the two studies including age, marital status, parental status and possibly gender (Gotlib et al.'s study had both males and females). Also, the never depressed group consisted of women who had never been depressed versus subjects in Gotlib et al.'s studies who were just not currently depressed. Additionally, this difference in bias specifics could be the result of stimulus differences between the two studies (Gotlib et al.'s study used nouns and adjectives as neutral-content words, whereas the current investigation used only adjectives). Further research would be necessary in order to clarify this issue. Irrespective of the specifics of the bias, it is important to recognize that in the current investigation, whereas the never depressed group exhibited attentionally biased responding, currently depressed subjects did not.

After examining never depressed subjects' performance in the neutral condition, it was apparent that the demonstrated protective bias was sufficiently different from the positive bias demonstrated by Gotlib et al.'s (1988) control group

that predictions made based on Gotlib et al.'s study would obscure findings for assessment of the DAH. Consequently, means for currently depressed subjects and the never depressed subjects in the neutral condition were used to make predictions for the never depressed subjects in the sad condition and previously depressed subjects in both mood conditions.

It was expected that previously depressed subjects in the sad mood condition, like currently depressed subjects, would perform the task in an unbiased fashion, exhibiting no differences from chance across the three types of word pairs by choosing the colour-bar replacing the target or non-target word equally often irrespective of the affective content of the target and non-target word. This is exactly what was found for the trait-like stimuli. Similarly, it was predicted that the previously depressed subjects in the neutral condition, like never depressed subjects, would demonstrate a protective bias resulting in means lower than .50 when negative-content target words were paired with either neutral- or positive-content words, and resulting in a proportion equal to .50 for the word pair containing a neutral- and positive-content word. The obtained findings also conformed to this hypothesis. Finally, never depressed subjects in the sad condition were also expected to perform the task demonstrating a protective bias. Indeed, for two of the three word pairs these subjects followed this prediction. However, on the word pair containing a negative- and positive-content word these subjects performed in an unbiased manner, contrary to the never depressed group in the neutral condition. Despite this, it is important to recognize that for trait-like stimuli, previously depressed subjects in both conditions and never depressed subjects in the sad condition performed as expected for eight of nine comparisons. This is the strongest support for the DAH achieved thus far in the studies conducted in this research. When examining the performance of subjects from what would be expected from unbiased attention, it is clear that previously depressed subjects in a sad mood performed the task in the same manner as currently depressed subjects. As well, the previously depressed subjects in a neutral mood performed the task in the same manner as the never depressed subjects in the neutral mood condition. Such findings support the notion that when remitted,

previously depressed subjects act much like never depressed subjects with respect to cognitive processing.

The results for state-like word pairs did not follow the predictions stemming from the DAH for subjects in the sad condition. Indeed, the previously depressed subjects demonstrated a bias for the word pair containing a negative- and positive-content word, attending less frequently to the negative-content target word, and the never depressed subjects were completely unbiased across the three types of word pairs. The previously depressed subjects in the neutral condition did, however, perform as was predicted from DAH.

Therefore, it appears that if one wishes to establish whether trait-like differences do exist between previously depressed and never depressed subjects, it is important to use trait-like stimuli, as well as mood priming to activate the schemata responsible for such differences. It is very interesting that at least for state-like stimuli, all people, regardless of depression history, fail to use a protective bias when they are currently in a sad mood. It may be that because state-like stimuli do not represent more enduring characteristics it is not necessary to avoid attending to them. Possibly, the trait-like stimuli are avoided by those who are less vulnerable for experiencing depression as they represent a more threatening obstacle to maintaining nondepressed status.

With regard to the DAH, none of the predicted differences were observed for currently nondepressed subjects when considering the emotional intensity stimuli. Recall that using the DAH it is predicted that vulnerable individuals, when in a sad mood, would evidence cognitive processing that resulted in more extreme negativity than nonvulnerable subjects. Therefore, one would expect that their attention should be drawn to more intense negative-content stimuli in comparison to less intensely negative stimuli. Whereas nondepressed subjects (i.e., both previously depressed and never depressed) in the sad condition attended equally to high- and low-intensity adjectives, nondepressed subjects in the neutral condition attended less frequently to high-intensity adjectives than would be expected by chance. Overall, nondepressed subjects attended equally to high- and low-intensity negative-content adjectives, while they attended less frequently to high-intensity positive-content words.

Currently depressed subjects performed in a fashion similar to nondepressed subjects with regard to emotional intensity. Results indicated that these currently depressed subjects were also unbiased for negative-content word pairs, while they were less likely to attend to high-intensity positive-content target words. Thus, even currently depressed subjects do not appear to be especially drawn to highly intense or extreme negative stimuli.

Clearly, in their performance on the deployment-of-attention task, with regard to high and low emotional intensity, subjects did not conform to expectations based on the DAH. It is interesting that all subjects, regardless of depression status (i.e., previously depressed, never depressed and currently depressed) attended to high- and low-intensity negative-content adjectives in an unbiased fashion while directing their attention away from the high-intensity positive-content adjectives.

None of the effects predicted by the DAH were found for the nondepressed subjects with respect to the free-recall task. It was expected that previously depressed in a sad mood and currently depressed subjects would recall stimuli with a bias towards negative-content material. Other subjects were not expected to demonstrate such a negative bias. Indeed, with regard to correct recall, both nondepressed as well as depressed subjects recalled more negative-content words than positive- or neutral-content words. Similar findings for incorrect words recalled were also observed. That is, nondepressed subjects made more negative intrusion errors than neutral errors while no significant differences were observed for currently depressed subjects. Interestingly, for both types of recall (i.e., correct and intrusion), subjects in the sad condition recalled fewer words than did subjects in the neutral condition. It may be that such differences are the result of volition rather than ability to recall words, such that while in negative moods, subjects are less likely to take chances on guessing words.

As with the free-recall task, none of the effects predicted by the DAH were found for the cued-recall task. However, similar to the free-recall task, subjects in the sad conditions recalled fewer words than did subjects in the neutral condition.

Main Effects Hypothesis

Although the results support the DAH when considering the state-trait stimuli and the actual existence of bias from what would be expected if subjects were even-handed in their attention, the results also demonstrate support for the main-effects hypothesis. Recall that the main-effects hypothesis regards sad mood as merely a symptom in depression, resulting from the effects of the cognitive triad. Therefore, the main-effects version of cognitive theory would lead to predictions that previously depressed subjects (i.e., vulnerable subjects) would perform tasks like currently depressed subjects irrespective of current mood (i.e., in a negatively biased fashion), and differently than never depressed subjects (i.e., less vulnerable or non-vulnerable subjects). In the current study, regardless of the mood condition, previously depressed subjects did not differ with respect to their attention toward targets across the trait-like word-pair types. In contrast, never depressed subjects in both the sad and neutral mood conditions differed across the three trait-like word-pair types. (Recall that this occurred when comparing subjects' mean proportions to each other; this was not the case wh subjects mean proportions were compared to the value expected by unbiased performance, that is, .50.) This indicates that once again, the previously depressed subjects differ from the never depressed subjects irrespective of current mood. Interestingly, the currently depressed subjects also did not differ in their choice of the target-word colour bar across the three word-pair types. Therefore, the currently depressed subjects performed the task in the same way as previously depressed subjects and both of these groups were unlike the never depressed subjects.

Results of the cued recall task further supported the main effects hypothesis in that previously depressed subjects recalled a greater number of negative-content words, relative to positive- and neutral-content words, than did the never depressed subjects, who recalled more positive- than negative- or neutral-content words. Between group comparisons revealed that previously and currently depressed subjects recalled equal proportions of negative-content words while both groups recalled significantly more negative-content words than did never depressed subjects.

Results from the current investigation therefore lend additional support to the main-effects model of cognitive theory. However, if one carefully considers the results within the context of actual biased performance, support for the DAH is also revealed. The results of this study suggest that both models are useful in considering what makes individuals vulnerable for depression; however, it appears that the findings for the DAH are less robust than those for the main-effects model. Thus, when considering vulnerability for depression in general, it appears that both hypotheses have something to contribute to our understanding of this complex disorder.

Correlations of Bias Scores, Depression and Anxiety

When conducting studies that examine the influence of depression on individuals' cognitive processing, researchers commonly assess the contribution of anxiety as well (e.g., Mogg et al., 1991). Such examination is further supported due to the suggestion by Williams et al. (1988) that attentional differences are primarily relevant in the anxiety disorders, and are not as important for depressive disorders. Given the strong correlation between depression and anxiety that is usually reported (e.g., Clark & Watson, 1991; Luteijn & Bouman, 1988; Steer, Ranieri, Beck & Clark, 1993; Watson, Clark & Carey, 1988), and the need for greater cognitive specificity in models of anxiety and depression (e.g., Beck et al., 1987; Beck & Clark, 1988; Clark et al., 1989; Dalgleish & Watts, 1990; Williams et al., 1988), it is important to determine whether the effects obtained on a given task are the result of depression or anxiety. In the current investigation, the correlations between the trait bias scores, self-reported levels of depression, trait anxiety and state anxiety revealed that the bias score was significantly and modestly correlated to all three self-report measures. Results of the partial correlation analyses indicated that the bias score was equally related to both depression level as well as the level of state anxiety. Mogg et al. (1991, Study 3) found that the results of the deployment-of-attention task were primarily related to levels of state anxiety when using the same depression-relevant stimuli that had been used by Gotlib et al. (1988). In contrast to Mogg et al., the current findings suggest that both depression and state anxiety are responsible for biases in attention. Anxiety and depression have long been known to be highly

correlated, both within the syndromes of clinical depression and clinical anxiety as well as in the correlations between severity measures of depression and anxiety (see Gotlib & Cane, 1989; Shaw, Vallis & McCabe, 1985). Strong correlations between self-report measures are not surprising given the degree of item overlap. For example, items from the STAI-S include: "I feel upset", "I feel satisfied", "I feel self-confident", "I feel indecisive", "I am worried", "I am confused", "I feel pleasant"--positive items are reversed for scoring. Given such overlap it is not clear that this is a "clean" measure of anxiety, distinct from depression (cf. Clarke & Watson, 1991). When conducting future research, in order to disentangle the effects of depression and anxiety, it may be important to use alternative measures of state anxiety that do not have items that are so similar to depression inventories, and to examine both depression and anxiety at the syndrome level. Indeed, one recently described anxiety assessment device by Endler, Cox, Parker and Bagby (1992) appears to have been able to s ate the effects of depression and state anxiety in college students' self-reports and may be helpful in future research.

Interestingly, the results of the correlations and partial correlation analysis revealed that the bias in state-like word pairs was most strongly related to state anxiety. When controlling for depression level, the correlation between the bias score and state anxiety remained virtually unchanged and significant. Considering that the results on the DOAT using state-like words do not follow predictions made using the DAH, and that they are more strongly related to current anxiety level, it may help explain the lack of expected findings. If the results of the deployment-of-attention task for state-like words are more dependent on anxiety than depression levels, it would not be surprising that a sad mood induction does not result in expected differences with respect to depressive vulnerability. Indeed, if the results are most strongly related to anxiety, then an induction that results in an anxious affect would be expected to influence performance on the task. Moreover, if previous studies have over-relied on state-like stimuli as some have suggested (e.g., Spielman & Bargh, 1990), then one would expect that the depressed-nondepressed group differences that have been frequently reported on cognitive tasks may be the result of differences in anxiety level. In a longitudinal study, when the depression has remitted, and anxiety

has lessened, researchers may fail to find group differences between the remitted and nondepressed subjects (e.g., Gotlib & Cane, 1987; McCabe & Gotlib, 1993) if these results were primarily related to anxiety. This further attests to the importance of using appropriate and theoretically refined stimuli when conducting information processing tasks (cf. Gotlib & McCabe, 1992). Such refinement would help us to understand the exact contributions of cognitive processes to the development of depressive episodes and vulnerability to relapse or recurrence.

# Chapter VI--General Discussion

In this chapter, a general discussion of the findings across the two studies conducted in the current investigation will be presented with respect to the major issues outlined in the general introduction. First, a brief overview of the two major theories guiding the current investigation is presented (i.e., the Differential Activation Hypothesis of Teasdale (DAH; 1983; 1988) and the main-effects hypothesis (Hammen et al., 1985) of Beck's (Beck 1967; 1976; Beck et al., 1979) cognitive theory. Subsequently, the major predictions of these two hypothetical positions are briefly described and then the relevant research findings of the current investigation will be discussed. In addition, researchers have also suggested a number of stimulus characteristics that may have important implications for studies of cognition and depression and these ideas will be integrated into the discussion of the DAH and main-effects hypothesis.

This investigation examined the self-reports and information processing styles of women who had never experienced an episode of depression in their lifetimes, women who had experienced a previous episode of depression but were currently nondepressed and women who were currently experiencing a clinical depression. Previous history of depression has been found to represent an extraordinary vulnerability for experiencing a future episode of depression, amounting to a rate of almost three times that in the general population (see review by Belsher & Costello, 1988). Cognitive theory of depression (Beck 1967; 1976; Beck et al., 1979) suggests that this vulnerability exists due to an underlying negative schema, that was initially assumed to be either measurable between episodes of depression or quantifiable after interaction with life stressors. To date, longitudinal studies have been consistently unable to demonstrate evidence of negative schematic functioning between episodes of depression (i.e., assessing the main-effects hypothesis) and have been inconsistent with regard to the interaction of vulnerability and life stressors.

Later descriptions of cognitive theory have more strongly emphasized the interactive nature of cognitive vulnerability and life stressors resulting in depression

and have also de-emphasized main-effects models (e.g., Beck, 1991). Investigators have begun to examine two possible stressors that might activate negative schemata. One avenue that has been explored is the relationship of negative life events and history of depression (or some other method of identifying vulnerable individuals) and the ability of this interaction to predict current level of depression or account for depression onset (e.g., Miranda, 1992; Olinger, Kuiper & Shaw, 1987). This type of research has recently begun to focus more specifically on two classes of life events (i.e., interpersonal and achievement) and corresponding personality styles (i.e., sociotropic/dependent and autonomous/self-critical) and the relationship to depression and depressive onset or relapse (e.g., Hammen et al., 1989; Robbins, 1990; Robbins & Block, 1988; Rude & Burnham, 1993; Segal et al., 1989; Segal et al., 1992). This latter approach has been somewhat more successful at demonstrating a relationship between certain classes of life events, idiosyncratic vulnerabilities and depression, although consistent findings are still lacking.

The second avenue of research has examined current mood as a stressor or method of activation of negative schemata. Originally proposed by Teasdale (1983; 1988) this model, the Differential Activation Hypothesis (DAH), has received support in both self-referent recall studies (e.g., Teasdale & Dent, 1987) and self-report studies of dysfunctional attitudes (e.g., Miranda & Persons, 1988; Miranda et al., 1990; Persons & Miranda, 1992). In this model, cognitive schemata are purportedly activated in vulnerable individuals by current sad mood resulting in negative information processing typical of currently depressed individuals.

Hypotheses stemming from these two major theoretical positions (i.e., the main-effects hypothesis and the differential activation hypothesis) were as follows. First, according to the DAH, it is generally predicted that previously depressed subjects, while in a sad mood, would perform cognitive tasks in a manner equivalent to currently depressed subjects. Second, never depressed subjects are predicted to be unresponsive to sad moods in that they are expected to perform cognitive tasks unlike currently depressed subjects irrespective of current mood. Third, previously depressed subjects in a neutral or happy mood are expected to perform cognitive tasks just like the never depressed subjects and are expected to be different from currently

depressed subjects and previously depressed subjects in a sad mood. Finally, Teasdale (1983; 1988) also suggested that according to the DAH, previously depressed subjects in a sad mood and currently depressed subjects would be differentially responsive to high intensity negative-content stimuli. That is, vulnerable and currently depressed individuals should process such high intensity negative stimuli in a more efficient manner making them more likely to attend to such information than other individuals (i.e., never depressed subjects and previously depressed subjects in a neutral or happy mood).

According to Beck's cognitive theory (1967; 1976; Beck et al., 1979), sad mood is merely a symptom of depression and should not have causal status as a stressor in the development of depressive information processing and hence depressive episodes. Given that sad mood is predicted to develop after the occurrence of a relevant negative event, inducing a sad mood should not result in previously depressed subjects evidencing cognitive processing in a fashion equivalent to currently depressed subjects. In the main-effects version of cognitive theory, previously depressed subjects should continue to evidence cognitive processing that is different from never depressed subjects and similar to currently depressed subjects. Such continuous differences in cognitive processing are hypothesized to result in the heightened vulnerability for later depressive episodes. Consequently, with respect to the current investigation, previously depressed subjects, irrespective of current mood, should evidence cognitive processing that is similar to currently depressed subjects and different from the never depressed subjects.

Main-effects Model

In the current investigation, consistent evidence across both studies and both information processing tasks and the associated recall tasks was obtained for the main-effects hypothesis. On a number of points, the previously depressed group performed tasks like the currently depressed group and both were unlike the never depressed group. To briefly reiterate the major findings: 1) in the first study consistent differences on the self-report measures of dysfunctional attitudes and parenting stress were found such that previously depressed subjects endorsed a greater number of dysfunctional attitudes and reported that the task of parenting was more stressful and

their children were more difficult than never depressed subjects. 2) In the emotional Stroop task, in the second order, previously depressed subjects negative interference scores were greater than their positive interference scores, and were greater than both the negative and positive interference scores for the never depressed group; as well, in the cued recall task, previously depressed subjects recalled more incorrect negative-content words than never depressed subjects. Finally, 3) in the deployment-of-attention task, previously depressed subjects were different from the never depressed subjects when comparing their mean proportions against one another such that overall, the previously depressed subjects were less biased than were the never depressed subjects, and, in the cued recall task, previously depressed and currently depressed subjects both correctly recalled proportionally more negative-content words than did the never depressed subjects.

The consistent findings for a main-effects hypothesis are very interesting given the consistent negative findings for the main-effects hypothesis in both cross-sectional as well as longitudinal studies in the past and therefore deserve further consideration. The major question arises: What is different about this series of studies than others that have ben conducted that were unable to demonstrate differences between previously depressed subjects and control groups? First, the control group in the current investigation differs radically from other studies' control groups. When other studies have defined a control group in longitudinal studies, they are typically those that are simply nondepressed at both Time 1 and 2. Most studies have not taken care to include only never depressed subjects in the control group. Indeed, using epidemiological figures, one would expect approximately 25% of a control group to be comprised of subjects who would have experienced a depressive episode in the past. However, the majority of this percentage is unlikely to experience a depression during the few months that researchers typically have between Time 1 and 2 measurement periods. Consequently, the control group is likely to have a large percentage of individuals who have been previously depressed. In contrast, the current investigation used multiple measurement points to ensure that the never depressed subjects had not had a previous episode of depression. This was a unique sample in that they were followed longitudinally in the Gotlib lab for between 2 and 5

years. In this association, subjects were assessed on multiple occasions during and after pregnancy, a total of 5 times for the childbirth study. In addition, many of the children born during that study also participated with their mothers in child development studies between 2 and 4 years of age. In each of these contacts, mothers were assessed with regard to depression severity using the Beck Depression Inventory (Beck et al., 1979) and participated in diagnostic interviews. The women selected for the never depressed group in the current investigation never obtained a BDI score greater than 9 (scores greater than 9 indicate mild depression severity) and were never diagnosed with a depressive disorder. Considering that the period of life that these assessments were made (pregnancy and early childhood) are typically some of the most stressful times and emotionally difficult periods in the parent's life, the fact that the never depressed group was never even seriously dysphoric is quite remarkable. Given that the women defined as "never depressed" in this study were never even mildly dysphoric at any measurement period, it reduces the likelihood that they had ever experienced a depressive episode in their lifetime. This does not completely rule out the possibility that they never had an episode before this time period; however, given that they were asked specifically about previous depression and remained psychologically healthy during such a stressful period it greatly reduces the likelihood that they had previously had an episode of depression.

In addition to the control group in the current investigation being very different from other studies, the previously depressed group was also assessed carefully in comparison to cross-sectional studies that attempted to assess previous depression (e.g., Miranda & Persons, 1988; Miranda et al., 1990). In the current investigation, a large percentage of the previously depressed subjects denied having been previously depressed, even though they had been diagnosed during their association with this laboratory (no subjects were told of the diagnosis during the childbirth study, however they were informed of services that could be of benefit for them as it was evident that they were having some emotional difficulties). These findings suggest that, in studies where subjects are simply asked about previous depressive episodes, a sizable proportion of those assigned to the control group may be misclassified. If subjects are questioned about their past history of depression and

no other evidence is available to confirm or deny their assertion, about one quarter of them will apparently deny the previous episode and would consequently be included in the control group. As was seen in the comparison of previously depressed subjects who did not deny the past diagnosis and those who did, no differences were obtained on self-report measures. Consequently, most studies would have therefore included them in the control group. This would clearly elevate the control group's mean scores making it more difficult to obtain significant differences between them and the previously depressed group. Clearly researchers must carefully define their never depressed and previously depressed groups carefully in order to make group assignment accurate. Taken together, it is likely that this investigation revealed differences between previously depressed and never depressed groups, partly because of very careful group definitions.

Differential Activation Hypothesis

With respect to the DAH, findings from the current series of studies provide inconsistent evidence supporting this hypothesis. Specifically, in the first study the interactive nature of current mood and depression history did not predict subjects' responses to the Dysfunctional Attitude Scale nor their responses to the Parental Stress Inventory. The limitations of experimental control were suggested to be responsible for this failure to conceptually replicate the findings of Miranda and colleagues (Miranda & Persons, 1988; Miranda et al., 1990). However examination of the findings on the emotional Stroop task in Study 2 also failed to conform to expectations stemming from the DAH. In this study however, there was some evidence of the importance of personal relevance of stimuli for performance on the task. Specifically, currently depressed subjects differed from never depressed subjects on a weighted reaction time measure (i.e., where subjects reaction time was weighted by their estimate of the stimulus adjectives' self-relevance). Such findings support the notion of the importance of personal meaningfulness as an important factor in studies attempting to evaluate the self-schema notion of cognitive theories (cf., Segal et al., 1988). However, in assessing the weighted reaction times with respect to predictions from the DAH, no support was obtained. However, once more, it may be that procedural limitations may have accounted for this failure. Specifically, the design

employed did not allow subjects to make self-referent ratings during a time when their self-schemata were activated by sad mood. As has been suggested in the general introduction of this dissertation, studies that fail to prime mood at both measurement periods limit one's ability to directly assess stress-diathesis models like the DAH. Therefore, future research could profitably examine this notion by taking care to prime at both initial self-evaluation of experimental stimulus materials and again later during experimental procedures in order to assess this idea. Therefore, it appears that the DAH was not supported generally by the first study and the Stroop task in the second study. However, the second phase of the information processing study did provide modest support for the DAH.

In the deployment-of-attention task some support was garnered for the predictions of the DAH. This was only found when subjects performance was assessed with what would be expected from completely unbiased performance using apriori hypothesis testing and planned t-test procedures. Specifically, when examining trait-like stimuli, subjects who were previously depressed and in a sad mood performed in an unbiased fashion like the currently depressed subjects. The never depressed subjects in a neutral mood and previously depressed subjects in a neutral mood performed the task exactly the same and differently from the currently depressed subjects and previously depressed subjects in a sad mood. As well, the never depressed subjects in a sad mood performed like the never depressed subjects in a neutral mood in two of the three word-pair conditions. These findings are all consistent with predictions stemming from the DAH. Further, the results of these analyses bring up two other important considerations that have been discussed previously in the literature, that is the state versus trait-like characteristics of stimuli and their ability to distinguish trait-like vulnerability, and second, the source of cognitive biases (i.e., Are biases present in nondepressed or depressed groups?).

First, in assessing trait-like cognitive vulnerability using the deployment-of-attention task, it appears that responses to trait-like stimuli provide support for the use of such stimuli when investigating vulnerability hypotheses. Examination of the state-like stimuli revealed that in the sad condition, previously and never depressed subjects were unbiased in 5 of 6 comparisons and in the one comparison that demonstrated

biased performance it was the previously depressed subjects who were biased, not the never depressed subjects as was predicted. Therefore, use of trait-like stimuli resulted in findings consistent with predictions stemming from the DAH, while the use of state-like stimuli resulted in a failure to obtain predicted results.

The reason why such differences in the responses to cognitive tasks for state- and trait-like stimuli are observed deserves further consideration. First, when subjects are in a temporary sad mood, it is likely that their attention is consistently drawn to similar stimuli in the environment. Indeed, this was generally the case for subjects in the sad mood conditions of the deployment-of-attention task, and was also the case for currently depressed subjects on the emotional Stroop task when weighted reaction times were analyzed. It appears that subjects who are both currently depressed and subjects who are in a transient sad mood are all likely to respond with greater attention to state-like mood-congruent stimulus aspects of their environment. It may be that state-like evaluations are not as personally threatening to enduring positive affectivity and therefore subjects may not continue to need to use a protective bias as was demonstrated for trait-like stimuli on the deployment-of-attention task. Consequently, subjects may focus their attention towards state-like stimuli as was the case in the deployment-of-attention task. However, if one considers that trait-like negative evaluations would be more personally threatening with regard to long-term psychological health, indeed possibly leading one to develop more enduring negative affects like depression, it would be most prudent for one to avoid environmental stimulus characteristics that would be consistent with trait-like negative or self-devaluative aspects of one's self. Therefore, with respect to depression in general, it may be that vulnerable individuals are more likely to lose a protective attentional bias when they experience even transient sad moods, thereby making them more vulnerable to frequent episodes. In contrast, less vulnerable individuals appear to maintain a protective bias when it comes to trait-like characteristics of the environment even during periods of transient sadness. This type of bias may serve to protect the individual's positive sense of self, making them less vulnerable to enduring negative affects like depression. In both cases, state-like qualities may be less

threatening to the individual's enduring positive sense of self and therefore do not need to be defended against by avoiding attending to them.

Recently, Ingram, Partridge, Scott & Bernet (1994) have provided information suggesting that, at least for mild levels of depression, state-like and trait like stimuli are also recalled differentially dependent upon whether the self-referent recall task was presented incidentally (automatic processing) or with specific recall instructions (i.e., effortfully). Results of this investigation revealed that subclinically depressed individuals recalled negative state-like information more frequently than nondepressed subjects in both automatic and effortful tasks while recalling trait-like stimuli more frequently than nondepressed subjects only for effortful processing. These results are also consistent with the notion presented above that trait-like stimuli may be more threatening to an enduring positive sense of self (and assuming those individuals who are currently depressed have lost the protective bias). Specifically, the subjects in Ingram et al's study who were mildly depressed recalled more trait-like negative stimuli than nondepressed subjects when they were told there would be a recall task. Despite having information regarding the future occurrence of a recall task, nondepressed subjects in this task were unable to recall as many trait-like negative-content stimuli as mildly depressed subjects. If one was to maintain an enduring positive affect it may be wise to avoid both attending to and recalling stimuli that would be consistent with trait-like negativity. In both the current investigation and Ingram et al's study, depressed individuals responded with heightened processing of trait-like negative-content stimuli (i.e., increased attention and recall) and clearly each of these groups is experiencing an enduring episode of negative affectivity. The fact that previously depressed subjects in a transient sad mood evidence the same heightened processing of such information while less vulnerable individuals do not, suggest that this may be one pathway whereby individuals become vulnerable to more frequently occurring episodes of depression.

A second important consideration concerns the source of bias in depressive vulnerability. Clearly, cognitive models (both the Teasdale and Beck theories) place the source of biased cognitive processing squarely in the realm of the depressed or vulnerable groups. The deployment-of-attention task used in this research is unique in

its ability to determine actual biases in attention. Although other paradigms allow one to determine, through group comparison processes, which group attends to or recalls negative-content stimuli more frequently or efficiently than another, the deployment-of-attention task allows one to determine if an actual bias exists by comparing the obtained target word proportion to the value expected by chance (i.e., .50). Consistent with the review of Alloy & Abramson (1988) the current investigation found that depressed versus nondepressed differences were the result of control group (i.e., nondepressed) biases. Not only was the bias evident in the control group (in this case the never depressed subjects in the neutral condition), but the bias was also evident in the vulnerable group who was in a neutral mood (the previously depressed subjects in the neutral condition). Therefore, the vulnerability to experience future episodes of depression may not rest so much in the vulnerable individuals actual objective bias towards negative interpretation as is suggested by Beck (Beck et al., 1979) but rather their lack of a protective bias that results in nonvulnerable individuals ignoring negative trait-like aspects of their environment and failing to recall such stimuli, even when they know they will be asked to do so.

A component of the differential activation hypothesis concerns the intensity of cognitions that would be aroused in vulnerable individuals when they become sad. Teasdale (1983; 1988) suggested that for vulnerable individuals, the type of cognitions that would be aroused would be strongly derogatory and intense. Such intensity would be more likely to result in more enduring and more severe episodes of depression. Consequently, when examining the information processing of vulnerable and currently depressed individuals, one would expect that these individuals would both attend to and recall more intensely negative information. No support for this proposal was obtained in either of the two information processing tasks conducted in this investigation. Specifically, on the deployment-of-attention task, intensity was not a significant factor in theoretically relevant ways. On the emotional Stroop task, although intensity was a significant factor involved in a theoretically relevant interaction, it did not follow predictions derived from the DAH in that previously depressed subjects in a sad mood did not attend more to the negative word content if it was intense than if it was mild (i.e., less intense). Indeed, in this instance it was

the previously depressed subjects in the neutral condition that had the longest negative interference score. It may be that these types of attentional paradigms do not reveal differences that are suggested by Teasdale. As one example, it may be that subjects do not attend differently to high- or low-intensity stimuli, but there may be differences in their recall of high- and low-intensity information. Unfortunately, due to the small number of words recalled in the current investigation, it is not possible to assess the severity dimension within the current data set. However, both clinical and experimental observations suggest that people with depressive disorders are highly ruminative with regard to negative information. Such ruminations may be more intensely negative for depressed and vulnerable individuals. Indeed, Williams et al., (1988) have suggested that depressed versus nondepressed group differences are more likely to exist on recall tasks than on tasks of attention. Therefore, future research may be able to tease this out by having subjects complete some sort of recognition recall tasks where both high- and low-intensity words are present. Note that in the current investigation, the findings consistent with theoretical predictions for recall tasks occurred only on the cued-recall tasks (although these were not assessed with respect to the intensity hypotheses due to low numbers overall). This would suggest that one might profitably avoid free recall tasks and present subjects either with cued tasks or recognition tasks. This would assist in overcoming the low overall number of words recalled in free recall tasks. Consequently, one might expect higher recognition of high intensity negative stimuli for vulnerable individuals who were appropriately primed. As well, one could speculate that such primed vulnerable individuals might endorse more high intensity negative stimuli as having been present on previous tasks than was actually the case in comparison to less vulnerable subjects. Such questions could be answered in future research.

To summarize, modest support was obtained in the current study for the differential activation hypothesis. Specifically, previously depressed subjects in a sad mood and currently depressed subjects performed an attentional task in an unbiased manner and were both different from the nonvulnerable group and previously depressed subjects in a neutral mood. However, this was obtained only for trait-like stimuli and not for state-like stimuli. The importance of the distinction between state-

like and trait-like stimuli with regard to vulnerability was discussed and one possible reason for heightened vulnerability and trait-like stimulus characteristics was elaborated. Thus, the current investigation found consistent support for the main-effects hypothesis (Hammen et al., 1985) of Beck's cognitive theory (Beck 1967; 1976; Beck et al., 1979) and modest support for Teasdale's differential activation hypothesis (1983; 1988). Given that both theories appear to be accurate to some degree, it is important to now consider what this means for depression in general and depressive vulnerability specifically.

Implications for Understanding Depression

The findings of the current investigation certainly support the notion that depression is a multifaceted problem and likely has multiple pathways leading towards the development of a depressive episode. Within this investigation, results concur with other reviews suggesting that having a history of depression results in a greater vulnerability for future episodes. Specifically, within this investigation it is clear from the results that previously depressed subjects differ from never depressed subjects on each of the tasks assessed and in a manner similar to the currently depressed subjects. This suggests that one pathway for vulnerability for future depression is the cognitive differences between previously depressed and never depressed subjects. Previously depressed subjects who are not currently depressed still endorse more dysfunctional attitudes, parenting stress and child difficulty than never depressed subjects. Having such consistently negative views on one's self, children and attitudes or beliefs would likely make one more likely to experience negative affects like depression. In addition, being more distracted than never depressed subjects by negative-content stimuli in the environment and recalling more negative-content stimuli, as seen in the information processing tasks, would also heighten the likelihood of future depressive episodes.

In addition to having a history of depression and resultant trait-like negative differences between previously depressed and never depressed subjects, examination of actual biased attention revealed that previously depressed subjects, when primed by sad mood, fail to use a protective bias that allows them to avoid attending to negative trait-like stimuli. Currently depressed subjects also failed to use this protective bias.

Combining the trait-like differences between previously depressed and never depressed subjects, the addition of sad moods appears to result in biases that would potentially amplify the attention directed towards negative-content information in the environment for vulnerable individuals. This represents another pathway somewhat distinct from the trait-like differences in that it is only evident when vulnerable individuals experience a sad mood. Consequently, when vulnerable subjects experience a sad mood, for whatever reason, they make less use of a bias in attention that might protect them from experiencing sustained negative moods.

It is important to recognize that the main-effects hypothesis and the differential activation hypothesis do not preempt the interaction effects model, which was not directly investigated in the current studies. Indeed, these permanent cognitive differences or mood-primed differences may serve to also heighten the results of the interaction between stressful life events and depressive vulnerability. Recall that the interaction effects model suggests that certain classes of events become incorporated into the individual's self-schema during childhood through repeated exposure. As an adult, similar events purportedly trigger or activate negative self-evaluative schemata, resulting in depression. It may be that these events make the individual sad, thereby exacerbating already existing cognitive differences and resulting in a loss of a protective bias. It is not unlikely that certain classes of events may be particularly sadness-evoking for an individual based on their developmental history. Therefore, the occurrence of such events can be seen to work in concert with both enduring cognitive differences and mood-activated losses of certain protective biases.

Indeed, research examining life events and depression has also had some success in predicting depressive response to negative life events. However, the findings have not been consistent with regard to personality subtypes and category of life events. For example, whereas some investigators have found that achievement related failures or negative life events are predictive of depression in those individuals with a predominantly autonomous or self-critical personality style (e.g. Hammen et al., 1989; Segal et al., 1992), others have not (e.g., Clark, Beck & Brown, 1992; Robbins, 1990; Robbins & Block, 1988; Segal et al., 1989). Similar inconsistencies have been observed for interpersonal negative events in combination with sociotropic

or dependent personality styles. Whereas some researchers have found that dependent or sociotropic personality style in combination with interpersonal losses is related to increased depression (e.g., Clark et al., 1992; Robbins, 1990; Robbins & Block, 1988; Segal et al., 1989), others have not (e.g., Hammen et al., 1989; Segal et al., 1992).

One should also recognize that the instructions used in the sad mood induction conditions of the current investigation might also have resulted in an activation of the negative self-schema through the same pathway as specified by the interaction-effects model just described in the previous paragraph. Specifically, the instructions encouraged subjects to try and get in a sad mood in whatever way they could. They were further told that people often find it useful to recall an event from their past that made them sad and to try and get into the same mood. In this case, individuals may actually be cognitively re-living the type of life event that the interaction effects model would suggest activates the negative schema. Therefore, this may be analogous to actually experiencing the event. Neither the actual use of remembered events, nor the potential category that it would be subsumed under (i.e., sociotropic or autonomous), was assessed in this study. Indeed, no subjects were even asked if they used the method of recalling past events in order to get into the sad mood. However, future research might vary an instructional set to determine if the same interaction-effects pathway can be duplicated by the person simply remembering that event. Indeed, some support for this possibility has been reported by Zuroff and Mongrain (1987) where they had subjects listen to an audiotaped situation that was specific to interpersonal loss or achievement related loss (i.e., rejection by a boyfriend or failure to get into graduate school). They found that subjects with high scores on dependency (similar to sociotropy) became more depressed in response to the loss scenario than did those subjects who scored high on autonomy. Thus, it is possible that the sad mood induction instructions in the current investigation mimicked this process and further research would be necessary to determine this. In conclusion, it would not be particularly surprising to find that there are many pathways leading to the development of depression and that this included personality factors, trait-like cognitive vulnerabilities and mood-activated vulnerabilities.

Finally, the current investigation has some relatively minor implications for the treatment of depressed individuals when using cognitive therapy (Beck et al., 1979; Burns, 1989) . In cognitive therapy, depressed individuals are educated as to the most common types of thinking errors or cognitive distortions that depressed people typically engage in. For example, there are two common thinking errors that depressed people purportedly engage in that cause depressogenic information processing. These are using a mental filter or magnification/minimization errors (Burns, 1989). The mental filter, described by Beck et al. as selective abstraction, results in the individual focusing on a negative detail in the environment, often taken out of context. Magnification and minimization occur when the depressed individual purportedly magnifies negative environmental information and minimizes the positive information. The depressed individual is counselled regarding their use of such cognitive distortions and efforts aimed at helping them focus more on positive information are encouraged. The results of the current investigation suggest that depressed individuals may not actually be biased towards negative information in their attentional strategies, but rather that they lose a protective bias. Therefore, when conducting treatment, the therapist may potentiate the impact of therapy by attempting to train the depressed individual to focus on positive information rather than suggesting to them that they are overly focused on negative information. This would help avoid the often inevitable unproductive discussions regarding the depressed individual's insistence that these negative aspects in their environment exist. Rather the focus could be on the attention towards positive information. Before concluding it is important to acknowledge the general limitations of the current investigation.

Limitations and Future Research

Specific weaknesses related to unique aspects of each of the studies presented here have already been discussed and will not be presented again. However, more general limitations are presented in this section. First, the current investigation assessed only women who were primarily in their early thirties. Further research would be needed to see how men and people of different ages performed on these tasks. However, one must also recognize that it is women, precisely in this age bracket, who demonstrate susceptibility to experiencing depression. Thus, although

the current investigation studied only women they do indeed make up the greatest proportion of individuals with this disorder.

A second important limitation is that the current investigation speaks only to depressive episodes that would occur after a first episode. The information obtained in the current study may suggest that the same information processing styles might be present in individuals who have not yet had a clinically significant depression but this is only speculation at this point. In contrast, Lewinsohn and colleagues (e.g., Zeiss & Lewinsohn, 1988) have speculated about a "scar" hypothesis whereby individuals would be permanently altered by the experience of a depressive episode and thus make them more vulnerable to relapse (although research findings are not completely consistent with this suggestion, Lewinsohn, Zeiss & Duncan, 1989; Zeiss & Lewinsohn, 1988). For now, the results of the current investigation speak only to the cognitive vulnerability of individuals who have already experienced a previous episode of depression.

Finally, it is important to recognize that assessment of the main-effects model has some statistical power advantages over assessment of the DAH or interaction-effects models. In this regard, in order to obtain support for the main-effects model, one needs to obtain only a two-way interaction. In contrast, the DAH would require significance of a three-way interaction in order to be supported. Consequently, one could argue that one should reasonably expect to obtain more support for a main-effects model in a series of studies than an interaction-effects model simply because of the statistical power advantage.

With respect to future research, findings from the current investigation lead to some specific and general recommendations. Specifically, future studies should choose stimuli carefully so they are both representative of depressed individuals and also reflect trait-like characteristics. Subjects selected for research must be screened very carefully for past history of depression, and wherever possible, actual diagnostic history should be obtained. Over twenty-five percent of the previously depressed subjects in the current investigation denied a previous history of depression, despite the fact they had been previously diagnosed on clinical interview. Finally, subjects' self-referent ratings and experimental results should all be assessed during periods of

dysphoria and when in normal moods in order to distinguish those effects that are trait-like from those that are activated by some stressor like sad mood.

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# Appendix A -- Explanation Sheets & Consent Forms

Information Form--University Form
Perceptions & Colour-naming Tasks

We are conducting a research study at the University of Western Ontario looking at perception in general and perceptions of parenthood specifically. The study will require that you to fill out seven questionnaires at home which will take about one hour. These questionnaires concern your opinions and attitudes about yourself and your relationships with others, your perceptions of parenthood, and your current mood. The university portion of the study will require your participation in one 90-minute session. Rather than paying subjects to participate in this research, all subjects who participate will be eligible for one of two $100 draws to be held at the conclusion of the study. The study involves no significant discomfort or risk; we will simply ask you to name the colours of words presented on a computer screen and to decide which of two colour-bars appears first on the computer screen. Subsequent to this part of the task you will be asked to complete two short questionnaires and a short interview. The questionnaires concern your attitudes and opinions about yourself and your child. The interview consists of questions concerning your current and past mood. Before beginning each of these aspects of the study you will listen to some music and may be asked to get yourself into a sad mood in whatever way you can. The quality of mood that you will likely experience will be similar to that which you might feel if you were to watch a sad movie on television and lasts only about 20 minutes.

All information from this study is confidential and will be numerically coded. There will be no disclosure of your name, and no identifying data will be released on you. Further, all information on questionnaires will be kept in a locked area which only the experimenter has access to. You may refuse to participate in this study, and if you do agree to participate you are free to withdraw from the study at any time, for any reason, without prejudice. Also, you may leave any questions blank which you feel uncomfortable answering on the questionnaires and may refuse to answer any questions you are uncomfortable with.

We shall be pleased to answer any further questions you may have concerning this study. If you should have any questions now or in the future, please contact Scott B. McCabe at 679-2111 ext. 4717.

Thank you for your participation.

Scott B. McCabe, M.Ed , M.A.
Doctoral Candidate

Kim Ewing
Research Assistant

Consent Form

Perception & Colour-naming Tasks

I, _____, have read the description of the research project on the information form and have had all questions answered to my satisfaction and agree to be involved in the study described.

_____ _____

Date Signature of Participant

Information Form--Hospital Form

Perceptions & Colour-naming Tasks

We are conducting a research study at the University of Western Ontario and the Hospital looking at perception in general and perceptions of parenthood specifically. The study is comprised of two components. One part of the study will take about 70 minutes and will be conducted in one of our research offices. In this part of the study you will be asked to name the colours of words presented on a computer screen and to decide which of two colour-bars appears first on the computer screen. Subsequent to this part of the task you will be asked to complete three short questionnaires and a short interview. The questionnaires concern your attitudes and opinions about yourself and your child. The interview consists of questions concerning your current and past mood. The other part of the study, which will take about one hour, will require that you to fill out six questionnaires on the ward. These questionnaires concern your opinions and attitudes about yourself and your relationships with others, your perceptions of parenthood, and your current mood. Rather than paying subjects to participate in this research, all subjects who participate will be eligible for one of two $100 draws to be held at the conclusion of the study. The study involves no discomfort or risk.

All information from this study is confidential and will be coded and subjected to statistical analyses. There will be no disclosure of your name, and no identifying data will be released on you. Further, all information obtained will be kept in a locked area which only the experimenter has access to. Your participation is voluntary and you may refuse to participate in this study, without prejudice. If you do agree to participate, you are free to withdraw from the study at any time, without jeopardy to your future care. Also, you may leave any questions blank which you feel uncomfortable answering on the questionnaires and may refuse to answer any questions you are uncomfortable with.

I shall be pleased to answer any further questions you may have concerning this study. If you should have any questions now or in the future, please contact Scott B. McCabe at 679-2111 ext. 4717.

Thank you for your participation.

---

Scott B. McCabe, M.Ed., M.A.
Doctoral Candidate

Consent Form

Perception & Colour-naming Tasks

I, _____, have read the description of the research project on the information form and have had all questions answered to my satisfaction and agree to be involved in the study described.

_____ _____

Date Signature of Participant

# Appendix B -- PSI

PSI

In answering the following statements, please think about your child (child who participated in the childbirth study). Please indicate the degree to which you agree or disagree with each of the following statements by circling the number which best matches how you feel. If any statement doesn't apply to your child, please circle number 3. Your first reaction to each statement should be your answer.

| | 1<br>Strongly<br>Agree | 2<br>Agree | 3<br>Not Sure | 4<br>Disagree | 5<br>Strongly<br>Disagree |
|---|---|---|---|---|---|

1. My child usually avoids a new toy for a wnile before beginning to play with it. 1 2 3 4 5

2. My child doesn't seem to learn as quickly as most children. 1 2 3 4 5

3. During the past six months I have been sicker than usual or have had more aches and pains than I normally do. 1 2 3 4 5

4. I feel alone and without friends. 1 2 3 4 5

5. There are some things my child does that really bother me a lot. 1 2 3 4 5

6. My child seems to cry or fuss more often than most children. 1 2 3 4 5

7. My child is so active that it exhausts me. 1 2 3 4 5

8. My child rarely does things for me that make me feel good. 1 2 3 4 5

9. Being a parent is harder than I thought it would be. 1 2 3 4 5

10. I expected to have closer and warmer feelings for my child than I do and this bothers me. 1 2 3 4 5

11. I find myself giving up more of my life to meet my children's needs than I ever expected. 1 2 3 4 5

12. Since having my child, my spouse (or male/female friend) has not given me as much help and support as I expected. 1 2 3 4 5

13. It takes a long time and it is very hard for my child to get used to new things. 1 2 3 4 5

14. My child is much more active than I expected. 1 2 3 4 5

15. Compared to most, my child has more difficulty concentrating and paying attention. 1 2 3 4 5

16. When my child misbehaves or fusses too much I feel responsible, as if I didn't do something right. 1 2 3 4 5

17. I feel trapped by my responsibilities as a parent. 1 2 3 4 5

18. Having a child seems to have increased the number of problems we have with in-laws and relatives. 1 2 3 4 5

19. Sometimes I feel my child doesn't like me and doesn't want to be close to me. 1 2 3 4 5

20. My child is not able to do as much as I expected. 1 2 3 4 5

21. My child gets upset easily over the smallest thing. 1 2 3 4 5

22. I often feel that my child's needs control my life. 1 2 3 4 5

23. I feel that I am:

    1. a very good parent,
    2. a better than average parent,
    3. an average parent,
    4. a person who has some trouble being a parent,
    5. not very good at being a parent. 1 2 3 4 5

24. When I go to a party I usually expect not to enjoy myself. 1 2 3 4 5

25. Since having my child, my spouse (or male/ female friend) and I don't spend as much time together as a family as I had expected. 1 2 3 4 5

26. Physically, I feel good most of the time. 1 2 3 4 5

27. My child's sleeping or eating schedule was much harder to establish than I expected. 1 2 3 4 5

28. I felt sadder and more depressed than I expected after leaving the hospital with my baby. 1 2 3 4 5

29. I have had many more problems raising children than I expected. 1 2 3 4 5

30. My child doesn't seem comfortable when meeting strangers. 1 2 3 4 5

31. My child has had more health problems than I expected. 1 2 3 4 5

32. After my child had been home from the hospital for about a month, I noticed that I was feeling more sad and depressed than I had expected. 1 2 3 4 5

33. I often have the feeling that I cannot handle things very well. 1 2 3 4 5

34. I feel that my child is very moody and easily upset. 1 2 3 4 5

35. My child turned out to be more of a problem than I had expected 1 2 3 4 5

36. Sometimes my child does things that bother me just to be mean. 1 2 3 4 5

37. My child looks a little different than I expected and it bothers me at times. 1 2 3 4 5

38. Since having a child I feel that I am almost never able to do things that I like to do. 1 2 3 4 5

39. My child smiles at me much less than I expected. 1 2 3 4 5

40. I am not as interested in people as I used to be. 1 2 3 4 5

41. Having a child has caused more problems than I expected in my relationship with my spouse (or male/female friend). 1 2 3 4 5

42. Since I've had my child:

    1. I have been sick a great deal,
    2. I haven't felt as good,
    3. I haven't noticed any change in my health,
    5. I have been healthier. 1 2 3 4 5

# Appendix C -- Diagnostic Interview

MPD-Axis I Screening Interview

I'm going to be asking you about problems or difficulties you may have had, and I'll be making some notes as we go along. You'll likely find that many of the questions do not have anything to do with you, however please answer each one carefully. Do you have any questions before we begin?

**DEMOGRAPHICS**

1. How old are you? Age: ___

2. Are you married? Marital Status: 1 married (or living together 1+yrs)
(most recent) 2 separated
3 divorced/annulled
4 widowed
5 never married

3. Number of years married: _____ 00 for never married.

4. Is this your first marriage? Yes 1 No 2 N/A 3

5. Names, sex and ages of children indicate for each whether natural or step-child)
Age, Sex (1 Male, 2 Female), Natural (1 Natural, 2 Stepchild)

6. Highest education level completed: 1 Pre Public school (less than Grade 8)
2 Public school (Grade 8)
3 High school (Grade 12 or 13)
4 College (Diploma)
5 University (B.A. or equivalent)
6 Graduate Student (M.A., Ph.D)

7. What kind of work do you do? _____
0 Unemployed
1 Homemaker
2 Employment in home
3 Employment outside home
4 Student

8. Have you ever seen anybody for emotional or psychiatric problems?
1 Yes 2 No

IF YES: What was that for? (What treatments did you get? Any medications?)
Skip # 9

9. Was there ever a time when you, or someone else, thought you should see someone because of the way you were feeling or acting? 1 Yes 2 No

10. Have you ever been a patient in a psychiatric hospital? 1 Yes 2 No
(What for & Length)

**Major Depressive Syndrome (CURRENT):**

1. (Depressed Mood) In the last month has there been a period of time when you were feeling sad, blue, down in the dumps or depressed most of the day nearly every day? (If yes) How long did it last? (As long as two weeks?) *for (3) depressed mood most of the day, nearly every day, as indicated either by subjective account or observation by others.*

2. (Loss of interest-anhedonia) Do you notice that you are less interested in or get less pleasure out of things that you usually enjoy; like friends, family, hobbies, etc.? (If yes) Was it nearly every day? How long did it last? (As long as two weeks?) *for (3) markedly diminished interest or pleasure in all, or almost all, activities most of the day nearly every day (as indicated either by subjective account or observation by others of apathy most of the time).*

(If yes to 1 and/or 2, i.e., coded "3") continue else skip to **PAGE 4, MDS-PAST**

3. (Weight) During this time did you lose or gain any weight? (How much) (Were you trying to lose weight?) (If no) (Appetite) How was your appetite? (What about compared to your usual appetite? (Did you have to force yourself to eat?) (Eat [less/more] than usual? (Was that nearly every day?) *significant weight loss or weight gain when not dieting (e.g., more than 5% of body weight in a month rough guide 7-10 lbs) or decrease or increase in appetite nearly every day.*

4. (Insomnia/hypersomnia) During this time how ere you sleeping? (trouble falling asleep, waking frequently, trouble staying asleep, waking too early, OR sleeping too much? How many hours a night compared to usual? Was that nearly every night?) *insomnia or hypersomnia nearly every day,lasting at least 1 hour.*

5. (Psychomotor agitation/retardation) During this time were you so fidgety or restless that you were unable to sit still? (Was it so bad that other people noticed it? Was that nearly every day?) IF NO: What about the opposite -- talking or moving more slowly than is normal for you? (Was it so bad that other people noticed it? Was that nearly every day?) *psychomotor agitation or retardation nearly every day (observable by others and not merely subjective feelings of restlessness or being slowed down) NOTE: CONSIDER BEHAVIOUR DURING THE INTERVIEW.*

6. (Fatigue) During this time what was your energy like? (Tired all the time? Nearly every day?) *fatigue or loss of energy nearly every day.*

7. (Worthlessness/guilt) During this time how did you feel about yourself? (Worthless?) (Nearly every day?) IF NO: What about feeling guilty about things you had done or not done? (Nearly every day?) *feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick) NOTE: CODE "1" OR "2" IF LOW SELF ESTEEM BUT NOT WORTHLESSNESS.*

8. (Thinking/concentrating) During this time did you have trouble thinking or concentrating? (Nearly every day?) IF NO: Was it hard to make decisions about everyday things? (Nearly every day?) *diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).*

9. (Suicide) During this time were things so bad that you were thinking a lot about death or that you would be better off dead? What about thinking of hurting yourself? IF YES: Did you do anything to hurt yourself? *recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide NOTE: CODE "1" FOR SELF-MUTILATION W/O SUICIDAL INTENT.*

AT LEAST 5 OF THE ABOVE 9 ARE CODED 3 AND AT LEAST 1 OR 2 IS INCLUDED.

10. (Etiologic role of organic factors). Just before this began, were you physically ill? (What did the doctor say?) *B. (1) It cannot be established that an organic factor initiated and maintained the disturbance.* Were you taking any street drugs or medicines? (any change in the amount you were taking?) *IF YES TO ANY OF THESE QUESTIONS, DETERMINE IF THE DEPRESSIVE EPISODE WAS INITIATED AND MAINTAINED BY AN ORGANIC FACTOR (code as a 1). Established organic factors include: hypothyroidism, hyper- and hypoadrenocorticolism, substances such as reserpine, methyldopa (both for hi blood pressure), PCP, and other hallucinogens.*

11. (Uncomplicated Bereavement) Did this begin soon after someone close to you died? *B.(2) the disturbance is not a normal reaction to the death of a loved one (code 3). (NOTE: morbid preoccupation with worthlessness, suicidal ideation, marked functional impairment or psychomotor retardation, or prolonged duration suggest bereavement complicated by Major Depression.) If is due to death code 1 and go on to past depression on page 4.*

Minor Questions, Only if #1 or #2 and less than 2 others from 3-9 resulting in no diagnosis for MDS.

12. (Discouragement) What kind of future do you see for yourself? (Have you felt discouraged or uncertain about the future?)(How do you think ... is going to work out) *feels quite pessimistic about the future, doubts will ever reach goals.*

13. (Irritability) Have you been feeling easily annoyed or irritated? (If Yes) How did you show your ...? (Did you get into arguments? Did you lose your temper? Did you throw or break something? What about hitting someone?) How often did you feel this way? *often aware of feeling quite angry, or occasionally very angry, shouts at other adults, loses temper.*

14. (Dependency) Do you notice that you have been looking for more emotional support from the people you're close to? *most of the time feels she would like extra support.*

15. (Physical complaints) Have you had any aches or pains? Have you been worrying much about your health? (If yes) Is this on your mind a lot? *>25% of time preoccupied with thinking about body, symptoms, or illness.*

**Major Depressive Syndrome-PAST**

1(a). IF NOT CURRENTLY DEPRESSED: Have you ever had a period when you were feeling depressed or down most of the day nearly every day? (What was that like?)

1(b). IF CURRENTLY DEPRESSED BUT FAILED TO MEET FULL CRITERIA, SCREEN FOR PAST MDS: Has there ever been another time when you were depressed and had even more of the problems that I just asked you about?

IF YES TO 1 (a) OR (b): When was that? How long did it last? (As long as two weeks?) *(1) depressed mood most of the day, nearly every day, as indicated either by subjective account or observation by others.*

2(a). IF PAST DEPRESSED MOOD: During that time, were you a lot less interested in most things or unable to enjoy the things you used to enjoy? (What was that like?)

2(b). IF NO PAST DEPRESSED MOOD: What about a time when you were a lot less interested in most things or unable to enjoy the things you used to enjoy? (What was that like?)

IF YES TO 2 (a) OR (b): When was that? Was it nearly every day? How long did it last? (As long as two weeks?) *(2) markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated either by subjective account or observation by others of apathy most of the time).*

**If NO to both 1 and 2 parts a & b, skip to page 6, SCREENING**

Have you had more than one time like that? How many separate times have you been like that? FOCUS ON THE WORST EPISODE THAT THE SUBJECT CAN REMEMBER.

3. (Weight) During this time did you lose or gain any weight? (How much) (Were you trying to lose weight?) (If no) (Appetite) How was your appetite? (What about compared to your usual appetite? (Did you have to force yourself to eat?) (Eat [less/more] than usual? (Was that nearly every day?) *significant weight loss or weight gain when not dieting (e.g., more than 5% of body weight in a month rough guide 7-10 lbs) or decrease or increase in appetite nearly every day.*

4. (Insomnia/hypersomnia) During this time how ere you sleeping? (trouble falling asleep, waking frequently, trouble staying asleep, waking too early, OR sleeping too much? How many hours a night compared to usual? Was that nearly every night?) *insomnia or hypersomnia nearly every day,lasting at least 1 hour.*

5. (Psychomotor agitation/retardation) During this time were you so fidgety or restless that you were unable to sit still? (Was it so bad that other people noticed it? Was that nearly every day?) IF NO: What about the opposite -- talking or moving more slowly than is normal for you? (Was it so bad that other people noticed it? Was that nearly every day?) *psychomotor agitation or retardation nearly every day (observable by others and not merely subjective feelings of restlessness or being slowed down) NOTE: CONSIDER BEHAVIOUR DURING THE INTERVIEW.*

6. (Fatigue) During this time what was your energy like? (Tired all the time? Nearly every day?) *fatigue or loss of energy nearly every day.*

7. (Worthlessness/guilt) During this time how did you feel about yourself? (Worthless?) (Nearly every day?) IF NO: What about feeling guilty about things you had done or not done? (Nearly every day?) *feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick) NOTE: CODE "1" OR "2" IF LOW SELF ESTEEM BUT NOT WORTHLESSNESS.*

8. (Thinking/concentrating) During this time did you have trouble thinking or concentrating? (Nearly every day?) IF NO: Was it hard to make decisions about everyday things? (Nearly every day?) *diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).*

9. (Suicide) During this time were things so bad that you were thinking a lot about death or that you would be better off dead? What about thinking of hurting yourself? IF YES: Did you do anything to hurt yourself? *recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide NOTE: CODE "1" FOR SELF-MUTILATION W/O SUICIDAL INTENT*

AT LEAST 5 OF THE ABOVE 9 ARE CODED 3 AND AT LEAST 1 OR 2 IS INCLUDED.

10. (Etiologic role of organic factors). Just before this began, were you physically ill? (What did the doctor say?) *B. (1) It cannot be established that an organic factor initiated an maintained the disturbance.* Were you taking any street drugs or medicines? (any change in the amount you were taking?) *IF YES TO ANY OF THESE QUESTIONS, DETERMINE IF THE DEPRESSIVE EPISODE WAS INITIATED AND MAINTAINED BY AN ORGANIC FACTOR. Established organic factors include: hypothyroidism, hyper- and hypoadrenocorticolism, substances such as reserpine, methyldopa (both for hi blood pressure), PCP, and other hallucinogens.*

11. (Uncomplicated Bereavement) Did this begin soon after someone close to you died? *B.(2) the disturbance is not a normal reaction to the death of a loved one (code 3). (NOTE: morbid preoccupation with worthlessness, suicidal ideation, marked functional impairment or psychomotor retardation, or prolonged duration suggest bereavement complicated by Major Depression.)*

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Minor Questions, Only if #1 or #2 and less than 2 others from 3-9 resulting in no diagnosis for MDS.

12. (Discouragement) During this time, what kind of future did you see for yourself? (Did you feel discouraged or uncertain about the future?)(How did you think ... was going to work out) *felt quite pessimistic about the future, doubted would ever reach goals.*

13. (Irritability) During this time, were you feeling easily annoyed or irritated? (If Yes) How did you show your ...? (Did you get into arguments? Did you lose your temper? Did you throw or break something? What about hitting

someone?) How often did you feel this way? *was often aware of feeling quite angry, or occasionally very angry. shouted at other adults, loses temper.*

14. (Dependency) During this time, did you notice that you were looking for more emotional support from the people you were close to? *most of the time felt she would like extra support.*

15. (Physical complaints) During this time, did you have any aches or pains? Had you been worrying much about your health? (If yes) Was this on your mind a lot? *>25% of time preoccupied with thinking about body, symptoms, or illness.*

**SCREENING**

If essential symptom of disorder is identified, establish how long the symptom has been present. Next assess severity.

Alcohol Abuse/Dependence: Has heavy drinking, or drinking, ever caused you problems in your life? (If yes) Has heavy drinking, or drinking, ever been a problem to you over a period of at least a month?

Psychoactive Substance Abuse/Dependence: Have you ever used pot, speed, heroin, or any other drugs to make yourself feel good? (If yes) Have you used any of these drugs more than once over a period of at least a month?

Schizophrenia: 1. Have you ever heard voices or seen things that no one else could hear or see?

2. Have you ever felt your mind or body was being secretly controlled, or controlled somehow against your will?

3. Have you ever felt others wanted to hurt you or really get you for some special reason, maybe because you had secrets or special powers of some sort?

4. Have you eve had any other strange, odd, or very peculiar things happen to you? (If yes) Please tell me what they were.

5. (If yes to any of the above) Did this happen even when you were not drinking or taking drugs?

Mania: 1. Have there eve been times when you felt unusually high, charged up, excited, or restless for several days at a time?

2. Have there ever been times when other people said that you were too high, too charged up, too excited, or too talkative? (If yes) have you felt this way since you were 15 years old?

3. How long do these mood changes usually last? (If less than 1 week) What is the longest they have ever lasted? (If less then one week) Have these high, excitable moods ever stayed with you most of the time for at least one week?

Panic Disorder: 1. Have you ever had sudden spells or attacks of nervousness, panic, or strong fear that just seem to come over you all of a sudden, out of the blue, for no particular reason?

2. (If yes) Did you have your first nervous attack before you were 40 years old?

3. (if yes on 1) Did you have these attacks even though a doctor said that there was nothing seriously wrong with your heart? (If not) Tell me what the doctor said was wrong with your heart.

Phobic Disorder: 1. Have you ever been much more afraid of things the average person is not afraid of? Like heights, animals, needles, certain small places, thunder, lightning, things like this? (If yes) What were you afraid of?

2. Have you ever been so afraid to leave home by yourself that you wouldn't go out, even though you knew it was really safe?

3. Have you ever been afraid to go into places like supermarkets, airplanes, tunnels, or elevators because you were afraid of not getting out?

4. Have you ever been so afraid of embarrassing yourself in public that you would not do certain things most people do? Like eating in a restaurant, using a public rest room, or speaking out in a room full of people?

5. (If yes to any of the above) When your fears were the strongest, did you try to avoid or stay away from (name the feared stimulus) whenever you could?

6. Did the fear (any of these fears) first start before you were 40 years old?

Generalized Anxiety Disorder: 1. Have there ever been days at a time when you felt extremely nervous, anxious, or tense for no special reason? (If yes)

Have you sometimes felt this way even when you were at home with nothing special to do?

2. (If yes) Have these nervous or anxious feelings ever bothered you off and on for as long as six months or more at a time?

Anorexia Nervosa: 1. Have you ever deliberately lost so much weight on a diet that people started to seriously worry about your health? (If yes) Were you afraid of getting fat even when other people said you were thin enough?

2. (if yes) Did this first happen before you were 25 years old?

Bulimia Nervosa: 1. Did you ever have a problem with binge eating, when you would eat so much food so fast that it made you feel sick?

2. (If yes) When you were doing this, did you feel your eating binges were not really normal?

3. (If yes) Was the urge to binge sometimes so strong that you could not stop, even though you wanted to?

4. (If yes) After you had binged, did you often feel depressed, ashamed, and disgusted with yourself?

Social Impact Questions

1. Has (essential symptom, like drinking, drug use, mood changes etc.) ever interfered with your school, your work, or your job?

2. Has ... ever caused you any problems with your family, or caused your family to worry about you?

3. Has ... ever interfered with your social activities or friendships?

4. Have you ever gotten into trouble with the authorities because of your ... ?

5. Has your health ever suffered from ... ?

6. Have you ever received medication or treatment for your ... ?

7. Were you ever hospitalized for ... ?

8. When you had ..., were you able to live alone?

These 8 questions are empirically tested (Othmer et al., 1981) and if yes to any of them then 90% likelihood that they will also fill associated symptoms necessary for diagnosis (Othmer & Othmer, 1989).

# Appendix D -- Current and Past Diagnostic Information

Past and Present Diagnoses of Subjects. Currently depressed subjects all met DSM-III-R Criteria for major depressive disorder (MDD). As previously described, subjects were also screened for current and past diagnoses of Alcohol Abuse/Dependence, Psychoactive Substance Abuse/Dependence, Schizophrenia, Mania, Panic Disorder, Phobic Disorder, Generalized Anxiety Disorder, Anorexia Nervosa and Bulimia Nervosa. The current and past diagnoses for subjects who contributed data to Study 2 are presented in Table 4-10.

As previously described in Study 1, a number of subjects with a past history of depression denied having such a history. As the original childbirth study used RDC criteria, allowing for both minor and major depression, and the current study examined only major depression, it is possible that those subjects who claim no history of depression were subjects who had a previous diagnosis of minor depression and therefore would not meet current, more stringent DSM-III-R criteria. This is not a viable explanation however, as one can see in Table 4-11, in the sad mood condition of the six subjects who reported no past depression, three had a previous diagnosis of major depression and three had a previous diagnosis of minor depression. Of the five previously depressed subjects in the neutral condition who reported no history of depression, two were previously diagnosed with major depression and three with minor depression. A chi square analysis performed on these data indicate no relationship between type of previous depression and the condition to which they were assigned in the current investigation, $\chi^2(1, \underline{N}=11) < 1$, ns.

Table 4-10. *Current and Past Psychiatric Diagnoses in All Subjects Contributing Data to Study 2.*

| | Subjects | | | | | |
|---|---|---|---|---|---|---|
| | Currently Depressed N = 20 | | Never Depressed N = 40 | | Previously Depressed N = 40 | |
| Diagnoses | Current | Past | Current | Past | Current | Past |
| Depression (MDD)[a] | 20 (100) | 16 (80) | 0 | 0 | 0 | 29 (72.5) |
| Depression (Minor)[b] | 0 | 2[e] (10) | 0 | 0 | 0 | 11 (27.5) |
| Mean # Lifetime Episodes[c] | ____ | 6.38[g] [1-20][f] | 0 | 0 | ____ | 3.52[g] [0-10][f] |
| Alcohol Abuse/Dependence[d] | 0 | 1 (5) | 0 | 0 | 0 | 0 |
| Psychoactive Substance Abuse/Dependence[d] | 0 | 0 | 0 | 0 | 0 | 0 |
| Schizophrenia[d] | 0 | 0 | 0 | 0 | 0 | 0 |
| Mania[d] | 0 | 1 (5) | 0 | 0 | 0 | 1 (2.5) |
| Panic Disorder[d] | 5 (25) | 5 (25) | 1 (2.5) | 0 | 1 (2.5) | 3 (7.5) |
| Phobic Disorder[d] | 5 (25) | 1 (5) | 0 | 1 (2.5) | 0 | 1 (2.5) |
| Generalized Anxiety Disorder[d] | 5 (25) | 1 (5) | 0 | 0 | 1 (2.5) | 0 |
| Anorexia Nervosa[d] | 0 | 1 (5) | 0 | 0 | 0 | 0 |
| Bulimia Nervosa[d] | 0 | 0 | 0 | 0 | 0 | 1 (2.5) |

*Note.* Numbers presented in brackets are percentage of subjects in that group. All current diagnoses other than depression could co-exist in the same individual. However, all subjects whose current diagnosis was MDD had this as a primary diagnosis. [a] Determined by SCID interview. [b] Determined by SADS interview in Postpartum Study of Gotlib et al (1989). [c] Subject reports of number of episodes of depression in their lifetime. [d] Determined by Othmer & Othmer (1989) social impact question method. [e] Two subjects claimed first incidence in lifetime, not verifiable from postpartum records. [f] Range. [g] When subjects reported too many episodes to remember, 10 was used (7 subjects reported 10 or more, one subject reported 20 or more).

Table 4-11. *Frequency of Previously Depressed Subjects' Reporting of Past Episodes of Depression in Each Condition According to RDC Criteria.*

| | Sad Condition (N = 20) | | Neutral Condition (N = 20) | |
|---|---|---|---|---|
| Depression Type | Actual | Reported | Actual | Reported |
| Major | 16 | 13 | 13 | 11 |
| Minor | 4 | 1 | 7 | 4 |

# Appendix E -- Self-descriptiveness ratings (SEQ)

# SEQ

On the following pages you will find a set of words that can be used to describe people. Beside each word you will see the numbers one through five. Please circle the number which indicates how much the word describes you. Please work through the words quickly without spending too much time on any one word. Note that you are permitted to use the entire range of numbers one through five in making your ratings.

---

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Not at all like me. | | Moderately like me. | | Completely like me. |

---

| | | | |
|---|---|---|---|
| 1 2 3 4 5 | achieving | 1 2 3 4 5 | contented |
| 1 2 3 4 5 | active | 1 2 3 4 5 | convincing |
| 1 2 3 4 5 | agreeable | 1 2 3 4 5 | cooperative |
| 1 2 3 4 5 | aimless | 1 2 3 4 5 | courteous |
| 1 2 3 4 5 | alert | 1 2 3 4 5 | creative |
| 1 2 3 4 5 | ambitious | 1 2 3 4 5 | crushed |
| 1 2 3 4 5 | amorous | 1 2 3 4 5 | damned |
| 1 2 3 4 5 | anguished | 1 2 3 4 5 | decisive |
| 1 2 3 4 5 | apathetic | 1 2 3 4 5 | defeated |
| 1 2 3 4 5 | appreciative | 1 2 3 4 5 | deficient |
| 1 2 3 4 5 | approving | 1 2 3 4 5 | dejected |
| 1 2 3 4 5 | aspiring | 1 2 3 4 5 | delighted |
| 1 2 3 4 5 | assertive | 1 2 3 4 5 | dependent |
| 1 2 3 4 5 | assisting | 1 2 3 4 5 | depressed |
| 1 2 3 4 5 | attentive | 1 2 3 4 5 | deserted |
| 1 2 3 4 5 | awful | 1 2 3 4 5 | despairing |
| 1 2 3 4 5 | bright | 1 2 3 4 5 | desperate |
| 1 2 3 4 5 | brisk | 1 2 3 4 5 | despondent |
| 1 2 3 4 5 | calm | 1 2 3 4 5 | destroyed |
| 1 2 3 4 5 | carefree | 1 2 3 4 5 | devastated |
| 1 2 3 4 5 | caring | 1 2 3 4 5 | discouraged |
| 1 2 3 4 5 | cautious | 1 2 3 4 5 | disgraced |
| 1 2 3 4 5 | chummy | 1 2 3 4 5 | doomed |
| 1 2 3 4 5 | comforting | 1 2 3 4 5 | downhearted |
| 1 2 3 4 5 | complying | 1 2 3 4 5 | dreary |
| 1 2 3 4 5 | composed | 1 2 3 4 5 | dull |
| 1 2 3 4 5 | confiding | 1 2 3 4 5 | dynamic |
| 1 2 3 4 5 | conscious | 1 2 3 4 5 | ecstatic |
| 1 2 3 4 5 | considerate | 1 2 3 4 5 | efficient |
| 1 2 3 4 5 | consistent | 1 2 3 4 5 | elated |

1 2 3 4 5 empty
1 2 3 4 5 encouraged
1 2 3 4 5 enterprising
1 2 3 4 5 enthusiastic
1 2 3 4 5 exceptional
1 2 3 4 5 exhausted
1 2 3 4 5 exhilarated
1 2 3 4 5 expressive
1 2 3 4 5 extraordinary
1 2 3 4 5 exuberant
1 2 3 4 5 exultant
1 2 3 4 5 facilitating
1 2 3 4 5 fearful
1 2 3 4 5 forceful
1 2 3 4 5 fortunate
1 2 3 4 5 gentle
1 2 3 4 5 giving
1 2 3 4 5 glad
1 2 3 4 5 glorious
1 2 3 4 5 glowing
1 2 3 4 5 glum
1 2 3 4 5 guilty
1 2 3 4 5 hollow
1 2 3 4 5 hopeless
1 2 3 4 5 inadequate
1 2 3 4 5 incompetent
1 2 3 4 5 industrious
1 2 3 4 5 inferior
1 2 3 4 5 inquiring
1 2 3 4 5 insignificant
1 2 3 4 5 inspired
1 2 3 4 5 intelligent
1 2 3 4 5 inventive
1 2 3 4 5 jovial
1 2 3 4 5 joyful
1 2 3 4 5 jubilant
1 2 3 4 5 lazy
1 2 3 4 5 lifeless
1 2 3 4 5 listless
1 2 3 4 5 loathsome
1 2 3 4 5 loving
1 2 3 4 5 loyal
1 2 3 4 5 lucky
1 2 3 4 5 maternal
1 2 3 4 5 merry
1 2 3 4 5 morbid
1 2 3 4 5 neat
1 2 3 4 5 nurturing
1 2 3 4 5 optimistic
1 2 3 4 5 orderly
1 2 3 4 5 oriented
1 2 3 4 5 outgoing
1 2 3 4 5 overwhelmed
1 2 3 4 5 peaceful
1 2 3 4 5 pessimistic
1 2 3 4 5 pleased
1 2 3 4 5 polite
1 2 3 4 5 privileged
1 2 3 4 5 productive
1 2 3 4 5 protective
1 2 3 4 5 proud
1 2 3 4 5 purposeful
1 2 3 4 5 puzzled
1 2 3 4 5 quiet
1 2 3 4 5 rational
1 2 3 4 5 refreshed
1 2 3 4 5 rejected
1 2 3 4 5 relaxed
1 2 3 4 5 remorseful
1 2 3 4 5 renewed
1 2 3 4 5 repulsive
1 2 3 4 5 resourceful
1 2 3 4 5 respected
1 2 3 4 5 sad
1 2 3 4 5 satisfied
1 2 3 4 5 shattered
1 2 3 4 5 showy
1 2 3 4 5 shy
1 2 3 4 5 skilful
1 2 3 4 5 sluggish
1 2 3 4 5 solemn
1 2 3 4 5 spontaneous
1 2 3 4 5 striving
1 2 3 4 5 strong
1 2 3 4 5 stupid
1 2 3 4 5 subdued
1 2 3 4 5 submissive
1 2 3 4 5 suffering
1 2 3 4 5 suicidal
1 2 3 4 5 supportive
1 2 3 4 5 sympathetic
1 2 3 4 5 systematic

1 2 3 4 5 talented
1 2 3 4 5 tearful
1 2 3 4 5 terrific
1 2 3 4 5 thrilled
1 2 3 4 5 tired
1 2 3 4 5 tolerant
1 2 3 4 5 tragical
1 2 3 4 5 triumphant
1 2 3 4 5 trivial
1 2 3 4 5 trusting
1 2 3 4 5 unwanted
1 2 3 4 5 useless
1 2 3 4 5 valuable
1 2 3 4 5 vibrant
1 2 3 4 5 vigorous
1 2 3 4 5 vile
1 2 3 4 5 weak
1 2 3 4 5 weary
1 2 3 4 5 worried
1 2 3 4 5 worthless
1 2 3 4 5 wretched

# Appendix F -- Judges State-Trait Ratings Instructions

On the following pages you will find a set of adjectives that can be used to describe people. While the adjectives designate different feelings, characteristics, and dispositions, they may also differ on whether they describe state- or trait-like dimensions. Beside each word you will see two columns of numbers 1 through 9 which represent scales to be assessed. On the first scale the number 1 indicates "Not at all state-like", and number 9 indicates "Extremely state-like". On the second scale the number 1 indicates "Not at all trait-like", and number 9 indicates "Extremely trait-like". For example:

| | State-like | Trait-like |
|---|---|---|
| THRIFTY | 1 2 3 4 5 6 7 8 9 | 1 2 3 4 5 6 7 8 9 |

Your task is to rate the degree to which you feel each adjective represents a trait-like or state-like feeling, characteristic, or disposition. When you have decided upon a rating, indicate your choice by circling a number from 1 to 9 for <u>both</u> how state-like and how trait-like the adjective is according to your perceptions. Note that a given adjective may be neither state-like or trait-like in your opinion, and would therefore receive a rating of 1 on both scales. Please use the following definitions when making your decisions. It may be useful to remove this first page and use it as a reference when making your decisions.

<u>State-like</u>: A transitory characteristic, feeling, or disposition, lasting a relatively short period of time, not typically associated with an individual across situations in the long-term.

<u>Trait-like</u>: Traits are distinguishable, relatively enduring ways in which one individual varies from another. Therefore, trait-like words would refer to a characteristic, feeling, or condition which is enduring and stable in an individual across situations, (e.g., personality trait or character trait, a chronic condition).

Please work through the adjectives in order without skipping any. Work quickly and note that you are permitted to use the entire range of numbers 1 through 9 in making your ratings. As long as your individual ratings are conscientiously completed, do not be concerned if you make several similar ratings in a row. There are no correct or incorrect answers so put down what you honestly feel to be true.

When making the ratings please ensure that you are not rating severe conditions, feelings, or characteristics as state-like simply because of the severity of the descriptor.

# Appendix G -- Words

NEGATIVE STATE WORDS
anguished
weary
defeated
dejected
deserted
despondent
devastated
discouraged
disgraced
downhearted
listless
empty
exhausted
hopeless
remorseful
sad
tearful
tired
trivial
worried

POSITIVE STATE WORDS
alert
brisk
delighted
elated
encouraged
amorous
fortunate
glad
glowing
jovial
joyful
jubilant
lucky
merry
pleased
glorious
refreshed
thrilled
renewed
triumphant

NEGATIVE TRAIT WORDS
aimless
cautious
dependent
dull
hollow
inadequate
incompetent
inferior
lazy
morbid
pessimistic
repulsive
shy
stupid
submissive
tragical
unwanted
useless
vile
worthless

POSITIVE TRAIT WORDS
achieving
ambitious
assertive
bright
creative
dynamic
exceptional
expressive
extraordinary
industrious
intelligent
inventive
optimistic
outgoing
respected
skilful
striving
strong
talented
valuable

NEUTRAL STATE WORDS
attentive
calm
comforting
composed
peaceful
relaxed
satisfied

NEUTRAL STATE WORDS FROM ALLPORT
appreciative
approving
aspiring
oriented
chummy
complying
confiding
conscious
convincing
facilitating
giving
nurturing
puzzled

NEUTRAL TRAIT WORDS
agreeable
caring
considerate
consistent
contented
cooperative
courteous
gentle
loyal
maternal
neat
orderly
polite
protective
rational
supportive
sympathetic
systematic
tolerant
trusting

NEGATIVE LOW INTENSITY WORDS
aimless
apathetic
deficient
dependent
dreary
dull
shy
glum
hollow
inadequate
inferior
insignificant
lifeless
quiet
sluggish
solemn
subdued
submissive
tired
weak

HIGH INTENSITY NEGATIVE WORDS
awful
crushed
damned
depressed
despairing
desperate
destroyed
devastated
disgraced
doomed
fearful
guilty
loathsome
overwhelmed
rejected
repulsive
shattered
suffering
suicidal
wretched

LOW INTENSITY POSITIVE WORDS

assisting
talented
decisive
efficient
enterprising
fortunate
industrious
inquiring
intelligent
inventive
privileged
productive
purposeful
active
carefree
resourceful
respected
showy
skilful
valuable

HIGH INTENSITY POSITIVE WORDS

dynamic
ecstatic
elated
enthusiastic
inspired
exhilarated
exuberant
exultant
forceful
glorious
joyful
jubilant
loving
proud
spontaneous
terrific
thrilled
triumphant
vibrant
vigorous

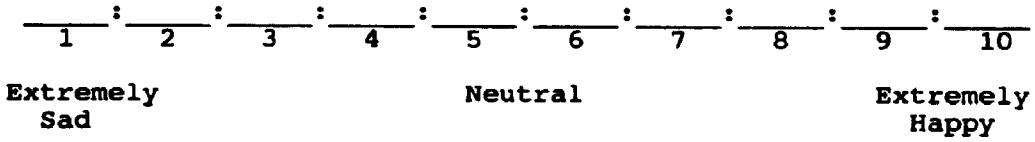
Table G-1. *Judges' Mean Ratings for Stimulus Words.*

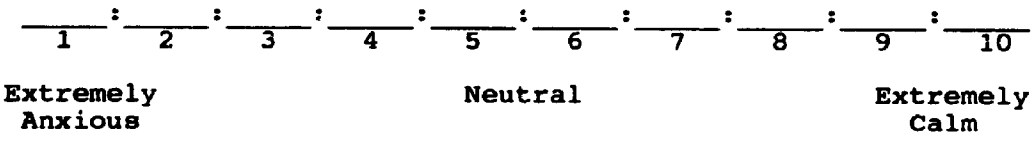
| Word Categories | Ratings | | | | | | |
|---|---|---|---|---|---|---|---|
| | Positive | Negative | State | Trait | Intensity | Kucera Francis | Imagery |
| Negative | | | | | | | |
| State | 2.4 (.48) | 8.2 (.46) | 7.7 (.70) | 2.7 (.66) | 5.8 (1.31) | 15.1 (17.59) | 6.0 (.89) |
| Trait | 2.4 (.42) | 7.7 (.80) | 3.5 (.81) | 7.4 (.65) | 5.1 (1.32) | 11.3 (11.13) | 5.6 (.98) |
| Low Intensity | 2.1 (.44) | 7.9 (.45) | 4.8 (1.86) | 6.2 (1.62) | 4.0 (.64) | 16.8 (19.87) | 5.6 (1.24) |
| High Intensity | 2.8 (.60) | 7.9 (.45) | 6.5 (1.24) | 3.8 (1.54) | 7.4 (.49) | 13.7 (13.39) | 6.1 (.72) |
| Positive | | | | | | | |
| State | 7.6 (.32) | 1.6 (.38) | 7.6 (.67) | 2.5 (.81) | 5.9 (1.08) | 14.0 (12.88) | 6.1 (1.01) |
| Trait | 7.9 (.32) | 2.1 (.56) | 2.7 (.82) | 7.9 (.61) | 5.5 (.86) | 20.5 (20.70) | 6.2 (.83) |
| Low Intensity | 7.5 (.61) | 2.1 (.53) | 3.6 (1.45) | 6.9 (1.55) | 4.2 (.47) | 16.7 (20.47) | 5.7 (1.03) |
| High Intensity | 7.9 (.44) | 1.7 (.59) | 6.2 (1.76) | 4.5 (2.21) | 7.1 (.44) | 12.1 (12.70) | 6.2 (.80) |
| Neutral | | | | | | | |
| State | 4.3 (.71) | 3.1 (.61) | 6.8 (.96) | 3.7 (1.70) | 4.3 (.57) | 17.9 (23.69) | 6.5 (.60) |
| Trait | 5.1 (.52) | 4.6 (.95) | 3.4 (1.46) | 7.6 (.93) | 4.5 (1.29) | 14.9 (9.16) | 5.7 (1.08) |

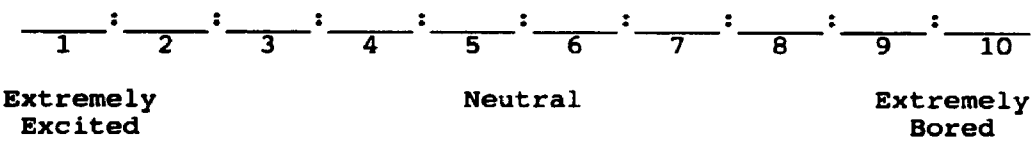
# Appendix H -- Visual Analogue Scales

Stroop-T1

Please use the following scales to rate your current feelings by placing a mark above the number which best represents your current feelings. Note that you are permitted to use the entire range of numbers 1 through 10 in making your ratings.



# Appendix I -- Backwards Counting Task

On this sheet please write out the numbers from 100 going backwards by 1's (e.g., 100 99 98...) **when the experimenter tells you to begin.**

# Appendix J -- Free Recall Task

On this sheet please try and recall as many of the words that were presented as possible. Don't include the practice number words at the beginning (e.g., ONE, TWO etc).

# Appendix K -- Cued Recall Tasks

## Stroop Task Cued Recall

On this page please try complete the word beginning with the following letters by using a word that was presented in the last group of words.

C_____ W_____

N_____ L_____

G_____ A_____

O_____ P_____

M_____ T_____

DOAT Cued Recall

On this page please try complete the word beginning with the following letters by using a word that was presented in the last group of words.

| | |
|---|---|
| I_____ | D_____ |
| C_____ | T_____ |
| A_____ | A_____ |
| O_____ | J_____ |
| D_____ | E_____ |
| S_____ | D_____ |
| C_____ | G_____ |
| C_____ | R_____ |
| V_____ | O_____ |
| D_____ | C_____ |