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Cognitive Vulnerability to Depression:

Accessibility of Information Processing Biases in Remitted Depression

by

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ABSTRACT

A growing body of empirical literature suggests that a number of cognitive vulnerability factors associated with clinical depression may be mood-state dependent. The equivocal status of empirical literature focusing on cognitive styles in remitted depression may reflect problems of accessibility as opposed to availability. The majority of studies in this area have failed to employ priming procedures to activate latent cognitive structures, and subsequent information processing. Consequently, null results from these studies are inconclusive at best. The current study examined the mood-state dependence of cognitive operations among individuals identified as at risk for depression (i.e., those with depression in remission).

Twenty-three women meeting DSM-IV criteria for Major Depressive Disorder were compared with thirty-eight never depressed and forty-eight remitted depressed women in both negative and neutral mood states. All participants were administered a structured diagnostic interview as well as a self-report measure of depression symptomatology. Never depressed and remitted depressed participants were randomly assigned to either a neutral or negative mood condition. All participants completed self-report measures of sociotropic orientation and dysfunctional attitudes. Participants then completed the Emotional Stroop Task, the Deployment of Attention Task, the Self-Referent Endorsement Task, and the Incidental Recall Task. Negative mood boosts were administered periodically to maintain negative mood shifts. Currently depressed participants and remitted depressed participants in negative mood exhibited attentional biases resulting in a greater overall capture of negative information, while never

depressed participants and remitted depressed participants in neutral mood failed to demonstrate this attentional bias. Currently depressed participants exhibited even-handed endorsement of valenced adjectives, whereas, never depressed participants and remitted depressed participants, regardless of mood, demonstrated a self-referent endorsement pattern favoring positive over negative and neutral content. Currently depressed participants recalled a significantly greater proportion of negative than neutral content adjectives, whereas, never depressed participants and remitted depressed participants, regardless of mood, demonstrated superior recall for positive than neutral content adjectives. The *attention allocation* results support the existence of a stable negative self-referent schema in depression that becomes deactivated, but not inaccessible, as an episode of depression remits.

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GENERAL INTRODUCTION

Depression is often viewed as the "common cold" of psychopathology. Throughout their lives, many individuals experience transient symptoms of mild depression, or what is referred to as dysphoria. In contrast to subclinical depression, Major Depressive Disorder (MDD) is a persistent, recurrent, and often debilitating mental disorder. Individuals diagnosed with MDD frequently suffer from significant interpersonal, occupational, or cognitive impairment. MDD is among the most commonly observed disorders in mental health care facilities. Lifetime prevalence estimates of major depression range from 4.9% (Freedman, 1984) to 17.1% (Kessler et al., 1994). It is estimated that approximately 5% of the general population are currently clinically depressed (Kaelber, Moul, & Farmer, 1995; Joyce, 1994). The financial cost associated with MDD in Canada is estimated to be 4.4 billion dollars annually (Dozois, 1999).

The Diagnostic and Statistical Manual of Mental Disorder – Fourth Edition (DSM-IV; American Psychiatric Association [APA], 1994) offers the most widely accepted categorical conceptualization of MDD. The essential feature of MDD, as outlined in the DSM-IV, is depressed mood or diminished pleasure. Four of the following symptoms must also be present: significant weight change or appetite change, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness or excessive guilt, diminished ability to concentrate or indecisiveness, or recurrent thoughts of death or suicidal ideation. These symptoms must persist for most of the day, nearly every day, for a minimum of two consecutive weeks, and must signify a shift from previous functioning. These symptoms must result in clinically significant distress or impairment in social, occupational, or other domains of functioning. The

symptoms must not be a result of the direct physiological effects of a substance or a general medical condition. Finally, bereavement must not provide a sufficient account of the symptoms (DSM-IV; APA, 1994).

Epidemiological studies consistently reveal that adult women are two to four times as likely as adult men to develop Major Depressive Disorder (Kaelber, Moul, & Farmer, 1995; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Nolen-Hoeksema, 1987, 1991; Sprock & Yoder, 1997; Weissman & Klerman, 1977). Lifetime prevalence estimates of major depression for women range from 7% (Freedman, 1984) to 19% (Kaelber, Moul, & Farmer, 1995). Epidemiological studies suggest that approximately 11% of adult women experience major depression during a one-year period. Incidence estimates suggest that approximately 2% of adult woman develop new cases of major depression annually. Although depression is a pervasive mental disorder affecting men and women of all ages, the present study investigates Major Depressive Disorder in adult women in light of the disproportionate rate of morbidity.

The onset and course of Major Depressive Disorder is variable. The mean age of onset for the first episode of major depression among women is estimated to be twenty-four. The first episode of major depression is typically preceded by sub-clinical symptoms of depression. The majority of individuals with Major Depressive Disorder experience remission of symptoms, followed by recurrent episodes (Gotlib & Hammen, 1992). In fact, it is estimated that over 80% of individuals with major depression have experienced, or will experience, additional episodes (Belsher & Costello, 1988). Further, over 50% of individuals with major depression have been found to relapse within 2 years of recovery (Keller & Shapiro, 1981). Individuals not receiving some form of therapy

typically remain depressed for a six-month period or longer. In approximately 20% to 30% of cases, a sub-clinical constellation of symptoms persists. Only in 5% to 10% of cases do the full criteria for Major Depressive Disorder continue to persist beyond two years (DSM-IV; APA, 1994).

The ubiquity of depression, its devastating impact on psychosocial functioning, and its profound monetary liability have prompted the formulation of diverse etiological models of depression. Etiological models derived from biological, psychodynamic, interpersonal, life event, behavioral, and cognitive orientations have received empirical support to varying degrees (Beckham & Leber, 1995; Ingram, Scott, Siegle, 1999). Biological models of depression focus on neurochemical dysregulation (e.g., abnormal neurotransmitter levels) and neurophysiological abnormality (e.g., irregular sleep rhythms) (for review see Thase & Howland, 1995). Psychodynamic models emphasis object-relations, early attachment, and unconscious processes (for review see Bemporad, 1995; Bowlby, 1988). Interpersonal models highlight social skill deficits and dysfunctional interpersonal interaction (for review see Markowitz & Weissman, 1995). Life event models propose that negative external events (e.g., loss of a spouse, injury, job termination) predispose individuals to developing depression, particularly when matched with personality-congruent vulnerabilities (e.g., interpersonal versus achievement orientation) (Paykel & Cooper, 1992). Behavioral models propose that depression is a product of insufficient response-contingent positive reinforcement and subsequent reduction in pleasure-seeking behavior (Lewinsohn & Gotlib, 1995). Finally, cognitive models emphasize the role of distorted thinking in depression. These models typically

focus on maladaptive cognitive structures, processes, and products in depression (Beck, 1964; Ingram, Miranda, & Segal, 1998).

Contemporary models of depression are becoming increasingly integrative and multifactorial in response to a growing empirical database. Clearly, biochemistry, interpersonal interaction, life events, and cognition are to varying degrees implicated in the onset, maintenance, and relapse of depressive episodes (Ingram et al., 1999). Dobson (2000) has compiled a list of potentially erosive and propogatory factors in depression. Erosive factors are passive and reactive to previous depression (e.g., scars), while propogatory factors are active and occur prior to episodes of depression (e.g., vulnerabilities). Erosive factors associated with previous episodes of depression include attributional style, pessimism, problem solving ability, and social skills. Propogatory factors associated with vulnerability to depressive episodes include stress generation, negative feedback seeking, excessive reassurance seeking, interpersonal conflict avoidance, blame maintenance, interpersonal rejection, negative life events, daily hassles, and low social support. Factors believed to have both erosive and propogatory qualities include rumination, self-efficacy, cognitive distortions, information processing, helplessness/hopelessness, and cognitive schemata. Given the accumulating empirical research supporting both erosive and propogatory factors in depression, albeit disproportionately with respect to onset, maintenance, and relapse, it is apparent that multifactorial, transactional, and psychosocial models are necessary to understand depression fully.

This dissertation examines cognitive vulnerability to depression, and thus represents only one aspect of the integrative psychosocial model researchers are currently

working toward. The remainder of this introduction focuses on cognitive theory and research in depression. The first portion examines: a) cognitive classification systems, b) Beck's (1963, 1964, 1967; Beck, Rush, Shaw, & Emery, 1979) cognitive model, c) the congruency-hypothesis, d) contemporary information processing models, and e) relevant research in the area of attention bias, information encoding, and memory retrieval. The second portion examines a) cognitive vulnerability to depression (e.g., remitted depression), b) the mood-state dependence theory, c) information-processing theory in remitted depression, and d) attention bias, information encoding, and memory retrieval in remitted depression.

Cognitive Classification Systems

Cognitive theories of depression may be conceptualized in terms of structures, propositions, operations, and products (Ingram, 1984; Ingram & Hollon, 1986; Ingram et al., 1998; Kendall, 1991; Kendall & Dobson, 1993). Theories focusing on *cognitive structures* emphasize how information is stored and organized within the system. Short-term memory and long-term memory are classified as cognitive structures. Theories focusing on *cognitive propositions* emphasize the meaning of information stored and organized within a structure. Episodic knowledge, semantic knowledge, and stored beliefs are examples of cognitive propositions. The *cognitive schema* encompasses structures and propositions, and is assumed to be the critical architectural foundation within which information is meaningfully organized. The cognitive schema may be conceptualized as an interaction between stored knowledge and incoming stimuli, which influences selective attention and memory. Theories focusing on *cognitive operations* emphasize the processes underlying cognition. Constructs classified as cognitive

operations include: spreading activation, cognitive elaboration, encoding, retrieval, and attention. Theories focusing on *cognitive products* emphasize the thoughts an individual may experience in response to the interaction of information with cognitive structures, propositions, and operations. Constructs classified as cognitive products include: attributions, decisions, images, and beliefs.

The current study focuses primarily on cognitive operations. The experimental tasks tap various aspects of cognitive operations. The emotional Stroop task (EST) and the deployment of attention task (DOAT) assess attention, a preliminary form of cognitive processing. The self-referent endorsement task (SRET) requires attention and spreading of activation, while the incidental recall task (IRT) requires attention, cognitive elaboration, encoding, and memory retrieval. Because the EST and DOAT require less cognitive processing relative to the SRET and IRT, they represent the purest method for inferring maladaptive cognitive processing. Cognitive products are also considered. The Dysfunctional Attitude Scale (DAS) and the Sociotropy-Autonomy Scale (SAS) assess conscious decisions (see Table 1).

Table 1.

Cognitive Classification and Assessment

Cognitive Construct	Assessment
Structures	
Short-term memory	
Long-term memory	
Iconic/sensory storage	Self-Complexity
Neural networks	Multidimensional Scaling
Memory nodes	Subjective Organization
Associative linkages	Multidimensional Scaling
Propositions/Content	
Episodic knowledge	Organization via Self-Narratives
Semantic knowledge	Prime-Target Relatedness (Stroop)
Internally generated information	
Stored beliefs	
Operations	
Spreading activation	*Self-Referent Encoding Task*
Cognitive elaboration	*Incidental Recall Task*
Encoding	Memory-Load Paradigms
Retrieval	Lexical Decision Tasks
Attention	*Emotional Stroop Task*
	Deployment of Attention Task
Products	
Attributions	Automatic Thoughts Questionnaire
Decisions	*Dysfunctional Attitude Scale*
Images	Depressive Experiences Questionnaire
Thoughts	Cognitive Biases Questionnaire
Beliefs	*Sociotropy-Autonomy Scale*
	Attributional Style Questionnaire
Recognition/detection of stimuli	Thought Listing

Table 1 is adapted from Ingram, R. E., & Kendall, P. C. (1986, p. 11). Cognitive clinical psychology: Implications of an information processing perspective. In R. E. Ingram (Ed.), Information processing approaches to clinical psychology (pp. 3-21). London: Academic Press.

Beck's Cognitive Theory of Depression

Beck's (1963, 1964, 1967; Beck, Rush, Shaw, & Emery, 1979) diathesis-stress model of depression has received considerable empirical attention. The model postulates that dysfunctional cognitive processing mediates the relationship between stressful life events and depression. According to the model, how an individual perceives and subsequently interprets a situation critically influences his or her physiological, affective, and behavioral response. Three interconnected constructs are assumed to play a central role in depression: the cognitive triad (e.g., cognitive content), maladaptive schemata (e.g., cognitive structure and propositions), and faulty information processing (e.g., cognitive operations/processes).

The cognitive triad refers to depressed individuals' tendency to view themselves, the world, and the future in a negatively biased manner. For instance, a depressed individual may perceive him or herself to be inadequate despite contrary evidence. The individual may view the world as harsh and demanding. Further, the individual may believe the future is bleak and hopeless. A plethora of empirical research supports the cognitive triad hypothesis (for review see Haaga, Dyck, Ernst, 1991).

The negative cognitive set, or underlying schemata, is a product of enduring negative self-referent core beliefs based on past experience (Beck, 1963, 1964, 1987). This schematic template actively filters, categorizes, and evaluates incoming stimuli. Thus, the idiosyncratic schema biases information processing, and ultimately shapes our perception and interpretation of life experiences. A critical assumption is that these maladaptive cognitive structures remain dormant until activated by stressful life events. When activated, these schemas are believed to provide access to an elaborate network of

depression-related themes, and consequently instigate a pattern of negative self-referent information processing (Ingram, et al., 1998; Segal & Ingram, 1994).

At an intermediate level, self-focused information processing may be characterized by ingrained attitudes, rules, and assumptions. For instance, a depressed individual may assume that it is unacceptable to fail and that he or she must perform optimally in every situation. This intermediate level of cognitive processing is hypothesized to give rise to a more superficial level of cognitive processing characterized by automatic thoughts. Automatic thoughts are conceptualized as brief, transient images or thoughts that rapidly materialize and decay. These automatic thoughts frequently go unrecognized; typically, it is the subsequent mood that is brought to awareness (J. Beck, 1995).

Typical information processing biases, or thinking errors, include: a) selective abstraction (e.g. attending to negative aspects of experience while blotting out positive aspects), b) overgeneralization (e.g., making sweeping generalizations that span far beyond a specific event or situation), c) dichotomous categorization (e.g., a situation or event is viewed as black or white as opposed to along a continuum), and d) personalization (e.g., attribute negative events to internal factors as opposed to more plausible explanations). See J. Beck (1995) for a complete review of typical thinking errors in depression.

The Temple-Wisconsin Cognitive Vulnerability to Depression project is a two-site prospective longitudinal study designed to test, among other models, Beck's cognitive vulnerability hypothesis (e.g., whether depressogenic cognitive styles do indeed confer a vulnerability for clinically significant depression). Scores on the Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978) and the Cognitive Style Questionnaire (CSQ;

Abramson, Metalsky, & Alloy, 1998) were used to classify individuals into high and low risk categories. Consistent with previous research (Alloy, Lipman, & Abramson, 1992; Alloy et al., 1998) it was found that high risk individuals showed greater lifetime prevalence of major depressive disorder, minor depressive disorder, depressive spectrum disorders and subaffective dysthymia relative to low risk individuals (Alloy et al., 1999). These results were specific to depression and suggest an association between depressogenic cognitive styles and depression. In terms of the prospective aspect of the review, it was found that high risk individuals showed a greater likelihood of a first onset of major depression relative to low risk individuals (Alloy et al., 1999). This pattern was obtained also in individuals who had experienced a previous episode of depression (Alloy et al., 1998). These prospective results represent the first demonstration that depressogenic cognitive styles (e.g., dysfunctional attitudes) confer a vulnerability to clinical significant depressive episodes.

The Congruency-Hypothesis

Beck's diathesis-stress model (1983, 1987) stipulates that vulnerability to depression depends heavily on the matching of personality configurations to congruent negative life experiences. Beck (1983) introduced two personality dimensions, sociotropy and autonomy, to describe this congruency-hypothesis. Sociotropy, also referred to as interpersonal dependence, represents invested beliefs and objectives pertaining to the establishment and maintenance of interpersonal attachments. Autonomy represents invested beliefs and objectives pertaining to the establishment and maintenance of independence, individuality, and achievement. The sociotropic individual fears rejection, interpersonal loss, and abandonment as a result of perceived threat to his or her identity

and self-worth. By contrast, the autonomous individual fears failure, dependency, or immobility as a result of perceived threat to his or her identity and self worth. According to this congruency-hypothesis, depression is more likely to develop when the nature or quality of a negative life event matches the individual's personality configuration. For instance, a sociotropically-oriented individual would be more likely to experience depression following a negative interpersonal event, as opposed to an achievement related failure. The reverse would be assumed for an autonomously oriented individual.

The congruency-hypothesis has received empirical support for the construct of sociotropy and inconsistent support for autonomy. An association between depression and interpersonal stress in sociotropically vulnerable individuals has been found (Clark, Beck & Alford, 1999; Dozois & Backs-Dermott, 2000). However, few studies have examined the applicability of the congruency-hypothesis to schema activation and maladaptive information processing in depression. Moore and Blackburn (1993) found that depressed sociotropic individuals recalled negative sociotropically-related autobiographical memories more quickly than autonomy-related ones. The congruency-hypothesis for autonomy was not supported. Dozois and Backs-Dermott (2000) found that highly sociotropic individuals endorsed more negative and less positive adjectives as self-descriptive following a negative *interpersonal* mood induction than individuals low on sociotropy. These effects were not found in the *failure* (e.g., autonomy) mood induction condition and thus support the sociotropy congruency-hypothesis in terms of adjective endorsement. Further, these researchers found that highly sociotropic individuals took longer to name the colors (e.g., emotional Stroop task) of self-relevant adjectives following a negative interpersonal mood induction than individuals low on

sociotropy. These effects were not found in the failure mood induction condition and thus support the sociotropic congruency-hypothesis in terms of attentional bias (e.g., Stroop interference).

In summary, it is presumed that the activation of maladaptive schemas during depression gives rise to maladaptive information processing in the form of distorted assumptions or expectations and produce situation-specific negative automatic thoughts, which consequently induce and/or reinforce depressive affect and behavior. However, the causal relationship between cognition, affect, and behavior remains somewhat controversial. For instance, a study investigating processes of change in cognitive therapy yielded results that failed to support the proposed model (DeRubeis & Feeley, 1990). The diathesis-stress vulnerability hypothesis postulates that latent maladaptive schemata and subsequent biased information processing are more likely to become operative when precipitating negative life events match an individual's specific personality configuration or vulnerability (e.g., sociotropy).

Empirical support for Beck's cognitive model of depression has been mixed partly due to inadequate study methodology and design (Coyne & Gotlib, 1983; Segal & Ingram, 1994). Much of the empirical literature is derived from studies employing mildly depressed or dysphoric university students as opposed to clinically depressed populations. This sampling strategy assumes that depression lies along a continuum of severity, and that sub-clinical and clinical depression do not differ qualitatively. However, it has been suggested that clinical depression does in fact differ from sub-clinical forms of the disorder (for review see Coyne & Gotlib, 1983; however, also see Vredenburg, Krames, & Flett, 1993 for a contrary position).

In addition, researchers frequently make inferences beyond the data. For instance, self report measures have been used to infer schematic organization and information processing, when in reality these measures tap cognitive content or thought (Segal & Dobson, 1992). It is unreasonable to assume that conscious and deliberate responses on a self-report measure could assess the existence of latent cognitive schemata and automatically activated information processing. Clearly, a problem of logical circularity arises when self-report measures are used to validate cognitive operations that are assumed to produce the negative self-report content (Gotlib & Krasnoperova, 1998; Segal, 1988).

Cognitive Operations/Processes in Depression

Valid inferences regarding cognitive schemata and operations have been derived from more recent cognitive information processing models of depression (Bower, 1981; Cohen, Dunbar, & McClelland, 1990; Gotlib & Krasnoperova, 1998; Ingram, 1984; Ingram et al., 1998; Mathews & Harley, 1996; Williams, Mathews, & MacLeod, 1996). These information processing models have incorporated constructs from experimental cognitive psychology (e.g., cognitive affective networks, spreading activation, and depth of processing) and typically emphasize cognitive biases in attention allocation, encoding, and memory retrieval. The *self-referent encoding task* is a widely accepted paradigm for examining information encoding and retrieval. The following experimental paradigms have been used frequently to examine attention allocation bias: the *emotional Stroop task*, the *deployment of attention task*, and the *dichotic listening task*. Literature derived from these information-processing paradigms will be reviewed. Although the dichotic listening task lends support to maladaptive information processing theories of depression, this

auditory task will not be included in the current study. Instead, for practical purposes, visual attention allocation tasks will be investigated.

Self-Referent Encoding and Incidental Recall. Cognitive experimental literature suggests that self-referent information is processed at a deeper level of analysis than semantic, phonemic, and structural information, and that this depth of processing translates into a relative recall superiority for self-referent information (Ingram, 1984). In a critical article, Rogers, Kuiper, and Kirker (1977) examined the relationship between depth of information processing and recall using the *self-referent encoding task.* Participants were required to rate a series of adjectives according to four encoding tasks: structural (e.g., how large is the print?), phonemic (e.g., does it rhyme with ...?), semantic (e.g., does it mean the same as ...?), and self-referent (e.g., does it describe you?). Incidental recall was superior in the self-referent encoding condition. The authors inferred that self-referent information activates well-elaborated memory structures, is processed at a deeper level of cognitive analysis, leaves a stronger memory trace, and thus is recalled more easily than non-self-referent information. This phenomenon has been replicated in a number of studies (Craik & Lockhart, 1972; Derry & Kuiper, 1981; for meta-analytic review see Symons & Johnson, 1996). In addition, it has been found that reaction time ratings for highly self-referent adjectives are significantly faster than for only moderately self-referent adjectives (Kuiper, 1981; Kuiper, Macdonald, & Derry, 1983). Taken together, these findings support the notion of an efficient self-prototype model.

An extension of this research supports Beck's proposal that depressed individuals possess efficient negative self-schemata, or self-prototype, through which information is

processed . Derry and Kuiper (1981) employed a *self-referent encoding task* to examine incidental recall of depressed and nondepressed-content adjectives among clinically depressed, never depressed, and nondepressed psychiatric controls. In accord with previous research, adjective recall was superior overall for the self-referent encoding condition relative to structural and semantic conditions. With reference to Beck's proposal, it was found that clinically depressed participants showed significantly enhanced recall only for depressed-content adjectives rated under the self-referent task. The authors inferred that depressed individuals exhibit well-elaborated depressogenic memory structures that enhance depth of negative information processing and subsequent recall. This phenomenon has been replicated (Ingram & Holle, 1992; Kuiper et al., 1983; for meta-analytic review see Matt, Vazquez, & Campbell, 1992).

Further, a number of researchers have documented that depressed individuals endorse a significantly greater number of negative than positive-content adjectives as being self-descriptive relative to non-depressed individuals (Derry & Kuiper, 1981; Dobson & Shaw, 1987; Davis, 1979a, 1979b; Greenberg & Alloy, 1989; MacDonald & Kuiper, 1985; Segal, Hood, Shaw, & Higgins, 1988). In a prospective longitudinal research study, Alloy et al. (1997) found that high risk individuals (e.g. those with very high scores on two dysfunctional attitude scales) showed greater endorsement, faster processing, and greater recall of negative-content adjectives than low risk individuals. In a subsequent review of this data, Alloy et al. (1999) found that high risk individuals developed first onset depressive disorders and experienced recurrent episodes significantly more than low risk individuals. Taken together, these results suggest the

existence of an efficient negative self-schema, or depressogenic self-prototype that is specific to depression.

In addition, positive information processing inhibition in depression (e.g., the 'even-handedness' hypothesis) and positive information processing facilitation (e.g., 'positive protective bias' hypothesis) in nondepressives has been documented. In a series of studies, Moretti et al. (1996) showed that dysphoric and clinically depressed individuals found positive and negative facial responses toward the self equally informative. In contrast, nondepressed individuals found positive facial responses toward the self more informative than negative facial responses. When the responses were directed toward others, dysphoric and clinically depressed individuals found positive facial responses more informative than negative facial responses. In contrast, nondepressed individuals found positive and negative responses directed toward others equally informative. These results support the role of the self in information processing among depressed individuals. With regard to self-referent information processing, it appears as though dysphoric and clinically depressed individuals fail to show the "protective bias" (e.g., positive information processing facilitation) observed among nondepressives.

The notion that a "protective bias" is reduced or missing among depressives is supported by an earlier study by Ingram, Smith, and Brehm (1983). These researchers found that dysphoric participants did not respond to success feedback by processing and recalling more favorable self-references as did non-depressed participants. The authors suggest that depressed individuals exhibit deficits in the ability to activate positive self-schemata with which to process positive self-referent information.

More recently, Dozois and Dobson (2001a, 2001b) found that clinically depressed participants recalled proportionally more self-referent negative and less self-referent positive adjectives than nonpsychiatric controls. Similarly, clinically depressed participants endorsed more negative and less positive adjectives as self descriptive than nonpsychiatric controls. Interestingly, content-specificity effects were found only for positive content adjectives; while clinically depressed and anxious groups similarly endorsed and recalled negative content, clinically depressed participants also endorsed and recalled less positive content than anxious controls. In addition, Khatri (2002) found that currently depressed participants and remitted depressed in negative mood remembered more negative/sociotropic/self-referential words than never depressed controls on an implicit memory task (i.e., word stem completion).

Empirical support for the integration of a developmental component to Beck's cognitive model of depression has been generated. According to this developmental account, the self-schema becomes a more efficient unit for the processing of personal information over time. A number of studies have found that long-term (e.g., stable) depressives and stable non-depressed individuals show significantly higher subjective organization (e.g., adjective ordering in multitrial free recall) of self-referent adjectives as compared to short-term depressives (Davis, 1979a, 1979b; Davis & Unruh, 1981). The results suggest that short-term depressives may lack stable depressogenic cognitive schemata for processing personal information.

In summary, there is evidence to suggest that depressed individuals exhibit both negative information processing biases (e.g., endorse and recall a significantly greater proportion of negative as opposed to positive adjectives relative to controls) and positive

information processing biases (e.g., fail to demonstrate protective biases observed among controls). These data support the existence of well-elaborated depressogenic memory structures in depression, which enhance depth of negative information processing and subsequent recall.

Emotional Stroop Task. The original Stroop task (Stroop, 1935) requires participants to name the color of ink in which color and non-color words are printed. Reliably, participants show longer response times for naming the ink colors of incongruent color words (e.g., "green" printed in blue ink) than for naming the ink colors of non-color words (e.g., "sock" printed in blue ink) (for review see MacLeod, 1991). This phenomenon is understood in terms of response interference – the automatic processing of the content of the color word interferes with the competing response of naming the different ink color and results in an increased latency for naming the ink color of color relative to non-color words. Modified versions of the original Stroop task have demonstrated an interference effect for semantically activated words. Emotion-relevant interference effects have been observed across various forms of psychopathology (for a review see Dozois & Dobson, 1996).

The emotional Stroop task for depression is typically comprised of positive, neutral, and negative affect words as opposed to color and non-color words used in the original Stroop task. According to Beck's cognitive theory, the operation of negative self-referent schemata should result in depressed individuals exhibiting greater response interference for negative content stimuli. This pattern of results has been observed. Gotlib and McCann (1984) found that dysphoric university students demonstrated longer response latencies for depressed-content words relative to manic and neutral-content

words. The non-dysphoric control group did not demonstrate this differential response pattern. In a second experiment, a mood induction was performed to test whether the emotional Stroop effect was due to transient mood disturbance, or as postulated, was the consequence of depressogenic information processing. Non-depressed participants showed no emotional Stroop effect across negative, neutral, or manic mood induction conditions. Thus, as postulated, it does not appear as though the emotional Stroop effect observed in the initial experiment can be attributed to transient mood disparity between dysphoric and non-dysphoric participants.

Williams and Nulty (1986) found that highly dysphoric community women demonstrated greater response latency for negative-content words relative to neutral content words. This differential response pattern became more pronounced when participants were categorized on the basis of depression levels ascertained 12 months previously. Specifically, 68% of stable dysphoric participants (past dysphoria/current dysphoria) showed longer color naming latency to negative affect words relative to neutral affect words. Only 17% of never depressed participants showed such an interference effect. Interestingly, 44% of unstable dysphoric participants (past dysphoria/no current dysphoria) showed the interference effect. These findings support the view that color naming interference of negative content words reflects stable biases in construct accessibility as opposed to transient mood. Klieger and Cordner (1990) replicated this differential response pattern for mildly dysphoric university students using a more conventional Stroop methodology (e.g., few stimuli repeated). Nondysphoric participants did not demonstrate this response pattern. Mildly and moderately dysphoric

participants did however show significantly longer color naming latency to negative affect words relative to non-depressed participants.

Similar findings have been generated in studies using clinically depressed individuals. Gotlib and Cane (1987) found that depressed psychiatric patients demonstrated longer response latency to name the colors of depressed-content words relative to nondepressed-content words. This differential response pattern was not observed for nondepressed controls. Carter, Maddock, & Maliozzi (1992) also observed clinically depressed individual's tendency toward response interference for negative-content words relative to other types of emotional stimuli. Again, this pattern was not observed in non-depressed controls. Similarly, Kinderman (1994) found that depressed psychiatric patients demonstrated longer color naming latency for negative affect words relative to positive and neutral-affect words. More recently Dozois and Dobson (2001b) found that depressed individuals take longer to name the colors of negative affect words relative to positive affect words. Nondepressed and anxious individuals did not show this differential response pattern.

In summary, it appears as though dysphoric and clinically depressed individuals exhibit negative attentional bias in response to negative affect information. Notably, however, a number of studies do not support this interpretation (Hill & Knowles, 1991; Mogg, Bradley, Williams, & Mathews, 1993). Methodological inconsistencies, described in a later section, may account for the apparent disparity in results.

Self-Referent Encoding in the Emotional Stroop Task. Segal et al. (1988) examined the accessibility of negative schemata using self-relevant affect Stroop stimuli with an emotionally congruent or incongruent priming procedure. Results revealed a

significant prime-target relatedness effect for depressed individuals. Specifically, longer color naming latencies were observed when the prime and Stroop target word were both self-referent than when only the Stroop target word, and not the prime, was self-referent. The effect was obtained for both negative and positive affect prime-target pairs. Notably, depressed individuals endorsed a significantly greater number of negative adjectives as being self-referent relative to controls. Results support the view that depressed individuals possess negative self-referent schemata that influence information processing and consequent interpretation of events in a negatively biased manner. Segal and Vella (1990) replicated these findings with the addition of a heightened self-awareness induction procedure. While looking into a mirror, participants listened to a recording of a passage from the General Record Examination test booklet. Individuals in the heightened self-awareness condition demonstrated significantly longer color naming latencies for self-relevant prime-target pairs relative to individuals not in the heightened self-awareness condition.

In a subsequent study, Segal et al. (1995) successfully replicated these findings using positive and negative affect priming phrases. Depressed individuals demonstrated longer color naming latencies for negative self-referent words primed with negative self-referent phrases relative to negative self-referent words primed with negative non-self-referent phrases and both self-referent and non-self-referent positive target-prime combinations. Non-depressed individuals did not show this prime-target effect. These findings suggest that depressed individuals possess highly accessible negative self-referent cognitive constructs. Thus, negative self-referent information may be more highly interconnected than generic negative affect information. In addition, the results

suggest that both self-referent and non-self-referent positive information may be less interconnected in depressed individuals.

Deployment of Attention Task. Gotlib, McLachlan, and Katz (1988) developed the deployment of attention task to examine selective attention in depression. The task consists of word pairs vertically presented. On each trial, different colored bars simultaneously replace the words. Participants are required to indicate which color bar they believe appeared first, thus revealing attention allocation. Gotlib et al. (1988) found that dysphoric individuals attended equally to depressed, manic, and neutral content words (e.g., 'even-handedness' hypothesis), whereas nondysphoric individuals attended more to manic-content than they did to either depressed or neutral-content words (e.g. 'positive protective bias' hypothesis). These findings have been replicated with dysphoric (McCabe & Toman, 2000) and clinically depressed individuals (McCabe & Gotlib, 1995). In sum, these studies suggest that depressed individuals do not demonstrate the automatic "positive protective bias" observed in nondysphoric individuals. Although these results appear to be dissimilar to those gathered from alternative paradigms (e.g., the EST), they do in fact suggest that depressed individuals exhibit a greater attentional "capture" for negative information. Hence, these results lend support to Beck's cognitive model purporting the existence of operative negative self-schemata in depression.

Dichotic Listening Task. Attentional bias for negative-content stimuli in depression has also been observed using a dichotic listening task. Participants are required to repeat stimuli presented to one ear while attempting to ignore different stimuli simultaneously presented to the other ear. Performance on a concurrent light-probe reaction-time task is then assessed. McCabe and Gotlib (1993) found that depressed

subjects took longer to respond to light probes when negative-content words were presented in the unattended listening channel than they did when either positive or neutral-content words were presented. This differential response pattern was not observed across nondepressed controls. Thus, negative self-referent information processing in depression has been observed in auditory as well as visual experimental paradigms.

Cognitive Vulnerability to Depression: Remitted Depression

The literature reviewed so far describes maladaptive cognitive functioning in depression while the individual is experiencing an episode of clinical depression. However, both Beck's cognitive model and more recent information processing models (e.g., Ingram & Segal, 1994; Ingram et al., 1998) also suggest that maladaptive cognitive structures and operations are causal agents in the development of depression, and thus represent vulnerability to the disorder. Remitted depression designs have been used to test cognitive vulnerability hypotheses. As previously noted, it is estimated that over 80% of individuals with major depression have experienced, or will experience, additional episodes (Belsher & Costello, 1988); further, over 50% of individuals with major depression have been found to relapse within 2 years of recovery (Keller & Shapiro, 1981).

Dozois and Dobson (2001b) examined the temporal stability of negative information processing and cognitive organization in depression. Forty-five clinically depressed participants completed 2 information processing tasks (i.e., EST, and SRET) and 2 cognitive organizational tasks at initial assessment (i.e., redundancy card-sorting task and psychological distance scaling task). The sample (23 remitted, 22 stable depressed) was re-administered the same tasks at 6-month follow-up. As hypothesized,

information processing indices (i.e., EST, SRET) shifted significantly in individuals who had improved symptomatically, while negative organization remained stable in both groups. One notably exception was a non-significant shift in incidental recall following symptomatic improvement. These findings lend support to Beck's (Beck et al., 1979) cognitive model as well as additional information-processing models (e.g. Bower, 1981; Ingram, 1984; Kuiper et al., 1982). Specifically, the data support the existence of stable negative self-referent cognitive organization in depression (i.e., schema). By contrast, information processing biases appear to be mood-state dependent, such that biases become undetectable upon remission of depressive symptoms.

Mood-State Dependence Theory: Priming

The negative schemata is presumed to be a product of enduring negative self-referent core beliefs based on past experience, and thus may be a stable underlying feature of the depression-prone individual. A critical assumption is that these maladaptive structures remain dormant until activated by stressful life events or negative mood. When activated, the schemata is hypothesized to provide access to an elaborate network of depression-relevant themes, and instigates an analogous pattern of negative self-focused information processing (Ingram et al., 1998; Segal & Ingram, 1994). Importantly, accessing these maladaptive cognitive operations requires a negative mood-state because information processing becomes undetectable when an episode of depression remits (Beck, 1987; Ingram et al., 1998; Segal & Ingram, 1994).

Priming as a method for activating latent depressogenic cognitive schemas, operations, and products has been empirically supported. Again, the critical assumption in priming theory is that cognitive vulnerability can only be adequately assessed when

putatively dormant negative self-referent schemata are activated. In the absence of schematic activation, non-significant research findings cannot be used to invalidate a particular cognitive variable as a risk factor – the question of whether a dormant vulnerability was operative during assessment cannot be addressed (Ingram et al., 1998). Although priming studies are designed to ensure that latent predisposition factors are operative during assessment, not all priming procedures are reliable or valid. Methodological flaws in early priming studies may account for non-significant findings.

Priming designs have been applied to studies tapping cognitive products (e.g., via self-report inventory) in individuals at risk for depression. Miranda and Persons (1988) examined the mood-state dependence of dysfunctional attitudes in remitted depressed and control participants. The Velten (1968) mood-induction procedure was employed. Participants were instructed to read, and attempt to feel the mood suggested by, sixty self-referent depression (e.g., I am discouraged and unhappy about myself) or elation (e.g., I am full of energy) statements or sixty neutral statements. Participants were asked to feel each statement as intensely as possible and recall past experiences congruent with these feelings. Following the negative mood induction, the remitted depressed participants endorsed significantly more dysfunctional attitudes than did control participants. A non-significant group difference was found in the no-induction condition. Miranda, Persons, Byers (1990) replicated these findings. These studies support the view that dysfunctional attitudes, or maladaptive cognitive products, are cognitive risk factors for depression. Furthermore, these dysfunctional attitudes appear to be mood-state dependent.

Extending this research, Roberts and Kassel (1996) examined dysfunctional attitudes, automatic positive and negative thoughts, and self-esteem. Naturally occurring

positive and negative affect, as assessed by the Multiple Affect Adjective Checklist (MAACL), were used as mood primes. Positive affect loads on MAACL items such as enthusiastic, tender, joyful, and loving; whereas, negative affect loads on MAACL items such as sad, afraid, lonely, and furious. Results revealed that negative affect was more strongly associated with negativity on all measured cognitive constructs in remitted-dysphoric participants as compared to never-dysphoric participants. Significant group differences were not found for positive affect or the combination of negative affect and positive affect. This study lends credence to the growing body of empirical research suggesting that at risk individuals possess maladaptive cognitive schemas, which when activated, give rise to dysfunctional attitudes.

Cognitive Operations/Processes in Remitted Depression

Early studies attempting to assess cognitive schemata and operations in depression have yielded inconsistent findings (Gotlib & Hammen, 1992; Haaga et al., 1991; Segal & Ingram, 1994). However, in the vast majority of these studies, a priming design was not utilized. A number of more recent studies have employed adequate priming methodology and do support the existence of latent cognitive components. These priming studies have utilized self-referent encoding, incidental recall, and information processing paradigms to investigate maladaptive cognitive processes or operations in individuals at risk for depression.

Self-Referent Encoding and Incidental Recall. Teasdale and Dent (1987) investigated incidental recall of self-descriptive positive and negative adjectives in remitted depressed and never depressed participants. The priming procedure consisted of a standard music induction. Participants listened to a depressing piece of music ('Russia

under the Mongolian Yoke'; see Clark, 1983) for seven minutes, with instructions to try hard to get into a depressed mood. Statistical analysis of scores on a Visual Analogue Scale (VAS) demonstrated that the negative mood priming procedure was effective. Remitted depressed participants and never depressed participants did not differ significantly on measures of adjective recall in the normal mood condition. However, in the negative mood priming condition, remitted depressed participants relative to never depressed participants: 1) endorsed as self-descriptive more negative adjectives, and 2) recalled significantly more negative self-descriptive adjectives. These recall patterns, putatively representing operating maladaptive cognitive schemas, appear to be vulnerability factors.

Gilboa and Gotlib (1997) investigated the differential influence of negative and positive affect priming procedures on remitted depressed and never depressed individuals with respect to incidental recall. The priming procedure involved a five-minute autobiographical re-experiencing task focusing on positive or negative events while listening to negative affect or positive affect music (Beethoven's string quartet op. 131 and Vivaldi's "Spring" violin concerto op. 12). Remitted depressed individuals demonstrated superior memory for negative affect information relative to never depressed individuals. The two groups did not differ significantly in terms of their memory for positive or neutral affect words. In addition, Hedlund and Rude (1995) found that remitted depressed individuals recalled a significantly greater number of negative affect words relative to never depressed individuals following a self-focus manipulation. No significant group differences were observed for positive affect words.

In a related study, Moretti et al. (1996) showed that remitted depressed individuals found positive facial responses more informative than negative facial responses, regardless of whether they were directed toward the self or toward others. It is important to note that these remitted individuals were not primed, and thus the results are somewhat inconclusive. As anticipated based on recent mood priming theory (Ingram et al., 1998), these non-primed individuals responded much in the same way that nondepressed individuals performed with respect to self-referent information processing. In the absence of a mood prime, it is impossible to determine whether these results reflect inaccessibility of latent cognitive schemata.

The Emotional Stroop Task. Few studies have employed remitted depressed priming designs to assess information processing biases on the emotional Stroop task. Remitted depressed priming designs simulate the diathesis-stress model of depression by putatively activating through negative mood manipulation (stress) latent cognitive vulnerability factors (diathesis) among at risk individuals. What results have emerged are equivocal (Gilboa & Gotlib, 1997). As previously noted, Hedlund and Rude (1995) observed a negative information processing bias among remitted depressed participants on a primed incidental recall task. However, the researchers did not observe a negative bias effect on a primed emotional Stroop task. Specifically, the remitted depressed group did not differ significantly from the never depressed group in terms of response latency to negative affect stimuli. These findings must be interpreted cautiously given the nature of the self-focused manipulation. This priming procedure was not designed to activate latent negative self-referent schemata; rather, it was simply a brief self-focused induction to increase self-awareness. Thus, it is impossible to determine whether the null results

reflect a lack of disparity between remitted depressed and never depressed information processing styles, or more plausibly, a failure to activate latent vulnerability factors.

Gotlib and Cane (1987) examined attention bias and construct accessibility in depressed participants during an episode of depression and again at discharge using a modified Stroop task consisting of depressive, manic, and neutral content words. The priming procedure involved the participants listening to, and repeating, lists of positive or negative prime words. As anticipated while in episode, depressed participants, relative to non-depressed controls, demonstrated longer response latencies with depressive content words than with non-depressive content words. However, at discharge this group difference was non-significant. It remains unclear whether treatment effects successfully altered maladaptive cognitive structures, and also whether the prime was adequate. Segal and Gemar (1997) provide a unique and compelling case in support of Beck's model purporting that depressed individuals possess highly interconnected negative self-referent information. The authors used the emotional Stroop task, primed with varying levels of self-referent phrases, to investigate cognitive organization and information processing in depressed individuals before and after cognitive behavioral therapy. As anticipated, the authors found that less depressed individuals at post-treatment showed significantly less color naming interference for self-referent negative affect words primed by self-referent negative affect phrases as compared to non-self-referent primes. By contrast, non-treated depressed individuals and treatment non-responders showed higher levels of negative interference. Only Gotlib and Cane (1987) have investigated the cognitive malleability of depressogenic constructs (assessed via a primed self-referent Stroop task) following therapy; however, in their study treatment modality (e.g.,

psychotherapy and/or pharmacotherapy) was not systematically controlled. Theoretically, cognitive therapy for depression should reduce or modify maladaptive knowledge constructs (Beck, 1967).

A number of explanations for reduced Stroop interference following cognitive therapy are plausible. Perhaps cognitive therapy successfully modified the organization of maladaptive cognitive schemata. However, cognitive reorganization is not specific to cognitive therapy; interpersonal therapy as well as pharmacotherapy have been shown to alter unprimed Stroop interference (Cooper & Fairburn, 1994; Mattia, Heinberg, & Hope, 1993). It may be the case that depressed individuals in cognitive therapy learn to generate and evaluate alternative interpretations of events, and hence have less accessible cognitive networks for negative information. In keeping with this view, it is the level of activation, and not necessarily the cognitive structure that is altered. Regardless, it is apparent that some form of cognitive organizational change, as measured by the emotional Stroop task, occurs in response to successful cognitive therapy. Future research is needed to determine whether cognitive therapy alters underlying cognitive structures and/or accessibility, and whether such change is treatment specific (e.g., cognitive therapy, interpersonal therapy, pharmacotherapy).

Deployment of Attention Task. McCabe, Gotlib, & Martin, (2000) examined the performance of remitted depressed individuals on a primed deployment of attention task to determine whether vulnerable individuals, like depressed individuals (McCabe & Gotlib, 1995), exhibit a failure to demonstrate a "positive protective bias". Consistent with past research using currently depressed participants, remitted depressed participants in the negative mood induction condition performed the task in an unbiased fashion –

they attended equally to positive, neutral, and negative-content stimuli. As anticipated, previously depressed participants in the neutral mood induction condition and never depressed participants in both mood induction conditions directed their attention away from negative stimuli (e.g., they exhibited a "protective bias"). These findings support the mood-state dependence hypothesis. Remitted depressed individuals do not typically exhibit depressogenic cognitive styles; rather maladaptive cognitive patterns emerge in remitted depression when the individual is in a sad or negative mood. The authors suggest that remitted depressed individual's tendency to lose this "protective bias" while in a negative mood may represent one pathway by which vulnerable individuals develop subsequent episodes.

Dichotic Listening Task. Further support for the mood-state dependence hypothesis comes from a study by McCabe and Gotlib (1993). As previously noted, these researchers found that depressed subjects took longer to respond to light probes when negative-content words were presented in the unattended listening channel than they did when either positive or neutral-content words were presented. This differential response pattern was not observed across nondepressed controls. During a second assessment held three months later, it was found that recovered, or remitted, participants no longer demonstrated attentional biases. These findings suggest that accessibility to negative information processing in depression is facilitated only during periods of depression, and its attendant negative mood. Unfortunately, the study design did not include a priming condition to activate the putatively latent depressogenic cognitive styles for remitted depressed individuals. Again, we are unable to determine whether these null results reflect a lack of information processing disparity among remitted depressed and never

depressed individuals, or more reasonably, a failure to activate negative self-referent schemata.

A priming design was employed in a study by Ingram et al. (1994) to investigate attentional allocation processes in individuals at risk for depression. A dichotic listening task was used to assess attention to negative and positive stimuli. The priming procedure consisted of a standard eight-minute music induction ('Russia under the Mongolian Yoke'; see Clark, 1983) followed by an autobiographical induction (participants were instructed to think about the saddest event in their lives and write a paragraph of two describing this event). Statistical analysis of MAACL scores revealed a negative mood priming effect. In the no-priming condition, remitted depressed and never depressed participants did not differ significantly in terms of tracking errors. However, in the negative mood condition, remitted depressed participants made significantly more tracking errors in response to the negative and positive stimuli compared to the never depressed participants. The authors suggest that individuals at risk for depression possess a reactive, but diffuse, schema activating process.

In a replication of the above research, Ingram and Ritter (1998) found a specific schematic activation process in remitted depressed participants. Specifically, in the negative mood condition, the remitted depressed participants compared to the never depressed participants made significantly more tracking errors in response to the negative stimuli but not the positive stimuli. Non-significant group differences in the no-priming condition were replicated. These findings provide empirical support for construct accessibility through priming; however, they contradict the emotionally diffuse nature of attentional allocation patterns in at risk individuals.

Inconsistencies across Studies

Although promising research has been generated in the area of cognitive vulnerability to depression, the literature has yielded inconsistent findings. A number of factors may account for information processing discrepancies across studies. First, content specificity is now recognized as a necessary prerequisite for detecting information-processing biases (Gotlib & Neubauer, 1999). More specifically, experimental stimuli must be both self-descriptive and depressogenic in nature. Unfortunately, much of the extant literature is based on studies using stimuli that are neither self-descriptive nor depression-relevant (e.g., general negative-affect stimuli). The present study uses sociotropically-oriented adjectives known to be associated with depression, and controls for degree of self-descriptiveness.

Second, remitted depressed paradigms must include a priming component. Again, it is critical that the priming procedure be both self-referent (e.g., autobiographical) and depression-relevant (e.g., pertaining to loss or failure). Further, remission designs provide a more robust test of the cognitive vulnerability hypothesis when a primed never depressed group is included to assess the effects of transient mood. Specifically, evidence suggests that remitted and never depressed individuals differ in their styles of information processing while in a dysphoric mood state (Ingram, Bernet, and McGlaughlin, 1994; Ingram & Ritter, 1998; McCabe & Gotlib, 1995; Teasdale & Dent, 1987).

Third, failure to assess for comorbid anxiety is problematic. Anxiety is characterized in terms of future-focused *attention* toward threat or impending danger (e.g., enhanced schematic integration) . By contrast, depression is characterized in terms of past-oriented *memory* for loss and failure experiences (e.g., enhanced schematic

elaboration) (Gotlib & MacLeod, 1997). Thus, comorbid anxiety, when not assessed and controlled for, may confound the results of attention allocation processing tasks in depression research. The present study, unlike much of the extant literature, assessed comorbid anxiety.

Fourth, depression stability is a potentially confounding factor in research. Research suggests that the stability of a depressive episode influences the degree of information processing bias (Davis, 1979a, 1979b; Davis & Unruh, 1981; Williams & Nulty, 1986). The significance of depression stability makes intuitive sense from a developmental perspective – the more chronic or persistent the depression, the more integrated and elaborated depressogenic schemata. Many studies have not considered, or at least have not reported, information pertaining to depression stability in their samples. In the current study, depression stability information (i.e., estimated total number of previous episodes) was collected.

Finally, studies differ in terms of the specific experimental tasks selected. Various studies include tasks that do not involve the presentation of more than one stimulus (e.g., emotional Stroop task). The difficulty involves differentiating input (e.g., attention) from output (e.g., response) biases. Other studies include tasks that require guessing (e.g., deployment of attention task). Group differences may reflect decision making strategies as opposed to attentional processing styles. The present study included both the emotional Stroop task and the deployment of attention task to circumvent the limitations of the using one task exclusively.

PILOT STUDY

Development of a Neutral Adjective Stimulus Set

Empirically derived positive and negative sociotropic stimulus sets (Dozois, 1999) were selected as experimental stimuli in the main portion of this dissertation research. The purpose of this pilot study was to derive a comparison set of 30 neutral-valence adjectives. Ninety subjectively generated adjectives were chosen for inclusion in this pilot study.

Method

Participants

Thirty undergraduate students were recruited from the University of Calgary Psychology Department bonus credit pool for participation in this pilot investigation.

Measures

Thirty positive and 30 negative sociotropic adjectives (Dozois, 1999) were combined alphabetically with 90 subjectively derived adjectives. Participants were required to rate each adjective on the degree to which it reflected a positive, neutral, or negative trait. A 7-point Likert scale was used to anchor responding. The anchors "extremely negative" and "extremely positive" appeared at either ends of the scale. The word "neutral" appeared in the middle of the scale. The stimuli were not rated for emotional intensity, imaginability, or frequency of word use and word length.

Procedure

Informed consent was obtained (Appendix A). Participants were then administered the adjective rating task (Appendix B). Participants were debriefed before leaving the lab.

Results/Discussion

Thirty neutral adjectives were extracted from the pool of 90 subjectively derived adjectives on the basis of mean valence ratings (i.e., neutral ≈ 4). Mean valence ratings for the positive, negative, and neutral stimuli sets are presented in Table 2. A one-way analysis of variance (ANOVA) revealed statistically significant differences across stimuli sets, $F(2, 89) = 537.35$, $p < .001$. Follow-up analyses revealed statistically discrepant mean valence ratings between positive, negative, and neutral adjectives: positive versus negative, $t(58) = 39.36$, $p < .001$; positive versus neutral, $t(58) = 13.07$, $p < .001$; and negative versus neutral, $t(46.11) = 17.54$, $p < .001$. A separate error variance estimate for the negative versus neutral comparison was used in response to significant heterogeneity of variance.

Table 2.

Pilot Study: Mean Valence Ratings (Standard Deviations) for Positive, Negative, and Neutral Stimuli Sets

Stimuli Set	M	SD
Positive	5.98	(.42)
Negative	2.06	(.33)
Neutral	4.24	(.59)

EXPERIMENT

Introduction

The primary purpose of this study was to examine the mood-state dependence of cognitive operations/processes in individuals identified as at risk for depression, with risk operationalized as remitted depression. This objective came in response to a growing body of empirical literature suggesting that many cognitive capacities may be mood-state dependent. The equivocal status of the extant literature concerning cognitive styles in remitted depression may reflect problems of accessibility as opposed to availability. The majority of studies in this area have failed to employ priming procedures to activate latent cognitive structures, and subsequent information processing. Consequently, null results from these studies are inconclusive at best. The present study offered a more stringent test of the cognitive vulnerability hypothesis by examining maladaptive cognitive processing in primed remitted depressives. Using this paradigm, we were able to test the mood-state-dependence of cognitive vulnerability factors in vulnerable individuals (e.g., those with remitted depression). A secondary purpose of the study was to examine cognitive operations/processes in currently depressed individuals. This component represented not only an attempt to replicate existing cognitive research in depression, but also an attempt to compare findings from distinct paradigms (i.e., EST, DOAT, SRET, IRT).

Research Design

A 2(Stroop Content: Positive vs. Negative) by 2(Depression History: Remitted Depressed vs. Never Depressed) by 2(Mood Induction: Negative vs. Neutral) split-plot repeated measures analysis of variance (ANOVA) design was used to investigate

emotional Stroop interference. In addition, a 2 (Stroop Content: Positive vs. Negative) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was employed to examine emotional Stroop Interference. Depression History and Mood Induction served as between-subject factors. Stroop Content served as a within-subject factor. Interference scores (e.g., negative latency minus neutral latency and positive latency minus neutral latency), as opposed to raw latency scores, were used to analyze the emotional Stroop effect.

A 3 (Target: Positive-Neutral; Negative-Neutral; Negative-Positive) by 2 (Depression History: Remitted Depressed vs. Never Depressed) by 2 (Mood Induction: Negative vs. Neutral) split-plot repeated measures ANOVA was used to investigate deployment of attention. In addition, a 3 (Target: Positive-Neutral; Negative-Neutral; Negative-Positive) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was employed to examine deployment of attention. Depression History and Mood Induction served as between-subject factors. Target served as a within-subject factor.

A 3 (Stimulus Content: Positive vs. Negative vs. Neutral) by 2 (Depression History: Remitted Depressed vs. Never Depressed) by 2 (Mood Induction: Negative vs. Neutral) split-plot repeated measures ANOVA was used to investigate self-reference endorsement. In addition, a 3 (Stimulus Content: Positive vs. Negative vs. Neutral) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was employed to examine

self-referent endorsement. Depression History and Mood Induction served as between-subject factors. Stimulus Content served as a within-subject factor.

Finally, a 3 (Stimulus Content: Positive Proportion vs. Negative Proportion vs. Neutral Proportion) by 2 (Depression History: Remitted Depressed vs. Never Depressed) by 2 (Mood Induction: Negative vs. Neutral) split-plot repeated measures ANOVA was used to investigate incidental recall. In addition, a 3 (Stimulus Content: Positive Proportion vs. Negative Proportion vs. Neutral Proportion) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was employed to examine incidental recall. Depression History and Mood Induction served as between-subject factors. Stimulus Content served as a within-subject factor. In the interest of examining incidental recall of self-referential information, the above analyses were replicated using only self-descriptive stimuli (i.e., those which yielded SRET scores ≥ 5).

Statistically significant interactions were followed up using tests of simple effects. An alpha level of .05 was used for all planned comparisons. Type 1 error rates were controlled within each family of post hoc statistical tests using a Bonferroni adjustment (α/c, where α denotes alpha and c denotes the number of contrasts).

Hypotheses

Attention Allocation. It was hypothesized that currently depressed, and remitted depressed participants in a sad mood state, would exhibit a negative attentional bias on the EST (i.e., greater Stroop interference for negative content adjectives). By contrast, it was hypothesized that never-depressed participants in both sad and neutral mood, and remitted depressed participants in neutral mood, would exhibit positive or protective

attention biases on the EST (i.e., greater Stroop interference for positive content adjectives).

It was hypothesized that currently depressed participants, and remitted depressed participants in a sad mood state, would perform the DOAT in an unbiased fashion attending equally to positive, negative, and neutral content stimuli. It was hypothesized that never depressed participants in either a negative or neutral mood state, and remitted depressed participants in a neutral mood state, would exhibit a protective bias against the perception of negative stimuli by avoiding such material in favor of positive or neutral stimuli.

Results derived from the EST and the DOAT were expected to be conceptually consistent. Specifically, it was anticipated that currently depressed participants, and remitted depressed participants in a sad mood state, would exhibit maladaptive information processing styles such that a greater overall negative information "capture" would be observed. This negative information processing style was not expected of never depressed participants, nor remitted depressed participants in a neutral mood state.

Endorsement and Incidental Recall. It was hypothesized that currently depressed participants, and remitted depressed participants in a sad mood state, would generate significantly higher self-endorsement ratings for negative as opposed to positive and neutral sociotropic words. By contrast, it was hypothesized that never depressed participants in either a sad or neutral mood state, and remitted depressed participants in a neutral mood state, would generate significantly higher self-referent endorsement ratings for positive as opposed to negative and neutral sociotropic words.

It was hypothesized that currently depressed participants, and remitted depressed participants in a sad mood state, would recall a greater proportion of negative as opposed to positive and neutral sociotropic words. By contrast, it was hypothesized that never depressed participants in either a negative or positive mood state, and remitted depressed participants in a neutral mood state, would recall a greater proportion of positive as opposed to negative and neutral sociotropic words.

Method

Participants

Twenty-three clinically depressed, 48 remitted depressed, and 38 never depressed women, solicited through community agencies and public advertisement, participated in this study. Female participants were chosen in response to disproportionate rates of morbidity. Participants were between the ages of 18 and 65 years. Inclusion criteria for the clinically depressed group included: a) current diagnosis of Major Depressive Disorder according to the Structured Clinical Interview for DSM-IV Axis I Disorders – Research Version (SCID-I, Version 2.0; First, Gibbon, Spitzer, & Williams, 1996), and b) Beck Depression Inventory-II (BDI-II: Beck, Steer, & Brown, 1996) scores above 12. Inclusion criteria for the remitted depressed group included: a) history of Major Depressive Disorder according to the SCID-I within the past three years, and b) no current diagnosis of Major Depressive Disorder. Inclusion criteria for the never depressed group included: a) no history of Major Depressive Disorder or Dysthymia, and b) BDI-II scores below 13. Exclusion criteria for all groups included: a) prior or current diagnosis of Bipolar Disorder, b) current Alcohol/Substance Dependence or Abuse, c) prior or current evidence of Psychosis according to the SCID-I.

Measures

Sociodemographic Information. The following demographic information was collected: age, marital status, education, employment status, ethnicity, and psychotherapy/pharmacotherapy history.

Depression. The Structured Clinical Interview for DSM-IV Axis I Disorders – Research Version (SCID-I, Version 2.0; First et al., 1996) was used to establish group

status (e.g., depressed, remitted depressed, never depressed) and exclusion requirements. The SCID-I is a semi-structured interview designed to assess a wide spectrum of DSM-IV Axis I disorders (e.g., mood disorders, anxiety disorders, psychotic disorders, substance use disorders, eating disorders, somatoform disorders, etc). The following modules were included in this study: mood disorders, anxiety disorders, substance use disorders, and psychosis. The SCID-I instrument operates as a diagnostic decision tree. Open-ended DSM-IV criterion-based questions are posed, and depending upon the participant's response, subsequent sections of each module may be elaborated or skipped. Moderate interrater reliability has been reported for general mood disorders (kappa coefficient of .72) (Groth-Marnat, 1990).

The Beck Depression Inventory II (BDI-II; Beck et al., 1996; Dozois, Dobson, & Ahnberg, 1998) was used to confirm group status (e.g., depressed, remitted depressed, never depressed). The BDI-II is a 21-item self-report measure of depressive symptomatology presented in multiple choice format. Each item is answered on a 0 – 3 point intensity scale with total scores ranging from 0 – 63. A cut-score of 13 was used for this study (e.g., the depressed group must score above 12, while the remitted depressed and never depressed groups must score below 13). The BDI-II has been found to demonstrate high internal consistency (coefficient alpha equals .92 among outpatients and .93 among university students). Content validity, factorial validity, and diagnostic discrimination have been established (Dozois et al., 1998).

Interpersonal Vulnerability. The Sociotropy-Autonomy Scale (SAS; Beck, Epstein, Harrison, and Emery, 1983) was used to assess interpersonal vulnerability. The SAS is a 60-item self-report scale measuring two personality dimensions developed by

Beck (1983): sociotropy (e.g., interpersonal orientation) and autonomy (e.g., achievement orientation). Half of the items comprise the sociotropy dimension and half comprise the autonomy dimension. Each item is rated on a 5-point scale indicating how much each statement applies to them. Coefficient kappas of .94 for the sociotropy scale have been reported (Robins, Block, and Peselow, 1989). Adequate test-retest reliability and high internal consistency have also been reported (Hammen, Ellicott, & Gitlin, 1989).

Dysfunctional Thinking. The Dysfunctional Attitude Scale (DAS: Weissman, 1979; Weissman & Beck, 1978) was used to assess dysfunctional thinking. The DAS consists of two equivalent 40-item measures of dysfunctional thinking (e.g., perfectionistic performance standards, rigid ideas about the world, concern regarding evaluation). Each item is rated on a 7 – point scale. Form A was used in the current study. The DAS demonstrates good internal consistency (e.g., alphas range from .89 to .93), stability over time, and test-retest reliability from .71 to .84 (Hamilton, & Abramson, 1983; O'Hara, Rehm, & Campbell, 1982; Weissman, 1979). The DAS is presented in Appendix C.

Mood-State. The Visual Analogue Scale (VAS) was used to assess current mood-state. Participants rated instantaneous mood on a 100-point scale (10 centimeters in length) labeled 0 (positive mood) to 100 (depressed mood). A 20-point increase on the VAS served as the criterion for a mood induction effect. The negative, neutral, and positive VAS mood measures are presented in Appendices D, E, and F.

Attentional Bias. The Emotional Stroop Task (EST) was used to assess attentional bias. Thirty positive and 30 negative interpersonally-oriented sociotropic adjectives – matched on degree of valence, emotionality, imaginability, word frequency, and word

length (Dozois, 1999) – were used. Thirty neutral adjectives generated from the pilot study (see Appendix D) were used as baseline data for the calculation of Stroop interference scores (e.g., negative latency minus neutral latency and positive latency minus neutral latency). The adjectives were displayed in capital letters (8 mm high) on a 15" computer monitor. Each adjective was displayed in 1 of 5 colors (e.g., white, yellow, green, purple, or blue). Six positive adjectives, 6 negative adjectives, and 6 neutral adjectives were printed in each color. The adjectives were presented in a random intermixed fashion to each participant. A microphone, connected to a voice-activated relay system, was situated 3 centimeters from the participant's mouth. Initiation of the participant's verbal response triggered the computer timer to stop and record the response in milliseconds. Participants were informed that 5 colors would be presented, and they were given 10 practice trials with a randomly selected subset of adjectives (Myers, 1980). Data from these trials was not analyzed. Participants were provided with oral and written instructions to name the color of the words as they were presented on the computer screen. Each trial began with the presentation of fixation point (1 second) followed by a blank screen (250 milliseconds), and then the presentation of the adjective (voice-activated termination). Color-naming errors were recorded manually.

The Deployment of Attention Task (DOAT) was used to assess attentional bias. DOAT stimuli were a subset of those used in the EST (e.g., 20 positive, 20 negative, and 20 neutral adjectives). These categories of adjectives were paired together to form 60 adjective pairs comprising three adjective-pair types: Negative-Positive, Negative-Neutral, and Positive-Neutral. These adjective pairs were displayed in the center of a 15" computer screen for 750 milliseconds, one word above the other, and 8 centimeters apart.

A button box, connected through the game port of the computer, was situated directly in front of the participant. Participants were informed that each word would be replaced quickly by a color bar (either red or green). Participants were told that one color bar would appear first, but that the disparity would be very subtle. In reality, the two bars were displayed simultaneously. Participants were given oral and written instruction to look at both words and indicate which color bar they believe was presented first by pressing a button corresponding to the color of that bar. In theory, this choice reveals which word the participant was attending to at the time. For each type of adjective pair, the content types were represented equally often at the top and bottom of the display. In addition, each color of bar was equally likely to replace a given content of word. Each trial began with a fixation point (1 second) followed by a blank screen (100 millisecond), and then the presentation of a word pair (750 milliseconds). The color bars immediately replaced the adjectives, and remained on the screen until the participant responded by pressing one of the buttons. The computer recorded the participant's response and reaction time in milliseconds for each trial. Participants completed 10 practice trials with a randomly selected set of adjectives (Myers, 1980). Data from these practice trials was not analyzed.

Self-Reference. The Self-Referent Endorsement Task (SRET; see Dobson & Shaw, 1987 for a review) was used to assess the self-concept. Thirty positive, 30 negative, and 30 neutral adjectives identical to those used in the EST were presented in paper and pencil format. Participants were instructed to rate each adjective for degree of self-descriptiveness on a 7-point Likert scale. Anchor points were presented at each end of the scale: "Not Like Me" versus "Like Me". Reaction time data was not collected.

Incidental Recall. The Incidental Recall Task (IRT) was administered following the SRET. Participants were instructed to recall, in any order, as many of the adjectives presented during the SRET as possible in a free-recall format. They were told that correct spelling is not critical.

Procedure

Participants were recruited from various community settings and media announcements. Twenty-one never depressed participants, 17 remitted depressed participants, and 7 currently depressed participants were recruited through poster advertisement (e.g., community health care sites, fitness centers, libraries, coffee shops, supermarkets). Four never depressed participants, 18 remitted depressed participants, and 8 currently depressed participants were recruited through the Calgary Women's Show. Five remitted depressed participants and 4 currently depressed participants were recruited through a CFCN news advertisement. Three never depressed participants, 2 remitted depressed participants, and 4 currently depressed participants were recruited through entertainment newspapers (e.g., Calgary Straight and Fast Forward). Two never depressed participants and 6 remitted depressed participants were referrals from previous depression laboratory research projects. Finally, 8 never depressed participants were recruited through the University of Calgary bonus credit system.

Individuals interested in the study were contacted to set up an initial assessment interview. During the first portion of the study, all participants received background information regarding the study and signed an informed consent to participate (see Appendix H). The consent form indicated that participation may involve experiencing unpleasant emotions. The consent form highlighted that participants were able to end the

experiment at any point without penalty. All participants were interviewed to determine group status and eligibility. Interviews were conducted by Ph.D. level researchers with appropriate training. Assessment interviews were taped and approximately 15 percent were reviewed by Dr. Keith Dobson to ensure high diagnostic interrater reliability.

During the second portion of the study, all participants completed the BDI-II to confirm group status. Scores above 12 on the BDI-II were used to confirm "currently depressed" status, whereas scores below 13 were used to confirm "never depressed" status. Remitted depressed and never depressed participants were assigned randomly at this point to either a neutral or negative mood induction.

The negative mood induction consisted of an autobiographical prime and a music prime (*Adagio in G minor* by Albinoni; McCabe, Gotlib, & Martin, 2000). Participants assigned to this condition were required to imagine the sudden death of a loved one for approximately four minutes while listening to the music, which played throughout the study. The neutral mood induction consisted of a distraction task. Participants assigned to this condition were required to draw a simple map of a driving route from any Calgary hospital to the University of Calgary. A VAS was used to assess mood in remitted depressed and negative depressed participants. A minimum negative mood shift of 20-points was used to verify the efficacy of the negative mood induction. Participants who failed to meet this standard were given a second opportunity to achieve a negative mood state, and if unsuccessful, were excluded from the study. A maximum mood shift of 20-points was used to verify the efficacy of the neutral mood induction. Participants who exceeded this standard were excluded from the study. No mood induction was conducted on the currently depressed group.

All continuing participants completed the SAS, DAS, EST, DOAT, SRET, and IRT. The SAS and DAS, as well as the EST and DOAT were presented in a counterbalanced order. Mood inducted participants completed the VAS. Mood checks were conducted throughout the study and mood induction booster sessions were administered to enhance mood effects if necessary. Finally, participants assigned to the negative mood induction were given the opportunity to receive a positive mood induction before leaving the laboratory. The positive mood induction involved writing a paragraph about a positive event, while listening to an uplifting piece of music (Vivaldi, "Spring"). Participants were debriefed and thanked for their participation. Care was taken to ensure that all participants received referral information.

Results

Preliminary Analyses

Statistical Assumptions. Preliminary analyses were conducted to ensure that the assumptions underlying split-plot repeated measures analysis of variance were met (i.e., sphericity, homogeneity of variance, normality, and independence of subjects). The assumption of sphericity for within-subjects factors having more than two levels was investigated using the Mauchly's test of sphericity. The Greenhouse-Geisser ε adjustment, as opposed to the standard F-test, was used when the assumption of sphericity was violated. The Levene test for homogeneity of variance was used to examine the assumption of homogeneity of variance for analyses involving between-subject factors with more than two levels. Separate variance estimates, as opposed to the pooled mean-square error term, were used for follow-up t-tests when the assumption of homogeneity of variance was violated. The assumption of normality was examined using

tests of kurtosis and skewness. The split-plot repeated measures analysis of variance is generally robust to violations of the normality assumption (Maxwell and Delaney, 1990). In cases where assumptions were not met, the specific adjustments made are noted. In all other cases, it may be assumed that no such adjustments were required.

Interrater Reliability. Dr. Keith Dobson reviewed a randomly selected subset (approximately 15%) of the SCID-I interviews to establish interrater reliability. This reviewer was blind to the previously established diagnoses. Diagnoses were established categorically as either present or absent. The Kappa coefficient was used to determine interrater agreement (Cohen, 1960). Interrater agreement for group status (e.g., currently depressed, remitted depressed, never depressed) was exact (Kappa coefficient = 1.00). Interrater reliability across comorbid diagnoses was 86.7%, which yielded a Kappa statistic of 0.77.

Exclusionary Criteria. A total of 123 prospective participants were identified for this study. Fourteen of these participants were excluded from the study. Two participants met criteria for Bipolar Disorder, 2 participants met criteria for Psychosis, and 1 participant met criteria for current substance abuse. Four remitted depressed participants had been in remission for more than 3 years. One never depressed participant yielded a BDI-II score above 13. Four never depressed participants in the negative mood induction condition failed to demonstrate a negative 20-point shift on the VAS. The final sample consisted of 109 participants.

Sample Characteristics. Sociodemographic information across experimental conditions (never depressed/neutral mood; never depressed/negative mood; remitted depressed/neutral mood; remitted depressed/negative mood; and currently depressed) is

presented in Table 3. A one-way ANOVA, examining the continuous variable of age, and chi-square analyses, examining the dichotomous variables of marital status, education, employment, and ethnicity, were conducted to determine whether significant group differences existed across these demographic variables. Statistically significant group differences were found on age, $\underline{F}(104,4) = 3.54$, $\underline{p} < .05$, and marital status, $\chi^2(12, \underline{N} = 109) = 22.47$, $\underline{p} < .05$. No statistically significant group differences were found on education, $\chi^2(28, \underline{N} = 109) = 39.48$, $\underline{p}$ = ns; employment, $\chi^2(12, \underline{N} = 109) = 16.37$, $\underline{p}$ = ns; or ethnicity $\chi^2(12, \underline{N} = 110) = 8.91$, $\underline{p}$ = ns.

Statistical analyses were conducted to investigate the relationship of each dependent variable (Stroop interference, deployment of attention, self-referent endorsement, and incidental recall) with age and marital status. Age was not significantly correlated with Stroop interference, $\underline{r}(109) = .16$, $\underline{p}$ = ns; deployment of attention, $\underline{r}(106) = .18$, $\underline{p}$ = ns; self-referent endorsement, $\underline{r}(107) = .07$, $\underline{p}$ = ns; or incidental recall, $\underline{r}(107) = .17$, $\underline{p}$ = ns. Using marital status as a between subjects factor, one-way analyses of variance revealed no significant relationships for marital status with Stroop interference, $\underline{F}(3, 105) = .86$, $\underline{p}$ = ns, deployment of attention, $\underline{F}(3, 102) = 1.66$, $\underline{p}$ = ns, self-reference endorsement, $\underline{F}(3, 103) = .81$, $\underline{p}$ = ns, or incidental recall, $\underline{F}(3, 105) = .46$, p = ns. Hence, demographic covariates were not employed in this study.

Mean (standard deviation) BDI-II, DAS, and SAS (sociotropy) scores across experimental conditions are presented in Table 4. Mean BDI-II scores among currently depressed participants fell within the "severe" range (Beck et al., 1996). Mean BDI-II scores among remitted depressed participants, regardless of mood condition, fell within

Table 3.

Sociodemographic Information across Experimental Conditions

Variable	Currently Depressed M (SD)/n (%)	Remitted Depressed/ Negative Mood M (SD)/n (%)	Remitted Depressed/ Neutral Mood M (SD)/n (%)	Never Depressed/ Negative Mood M (SD)/n (%)	Never Depressed/ Neutral Mood M (SD)/n (%)
Age	34.39 (10.44)	36.00 (10.17)	40.39 (10.53)	30.47 (9.41)	30.95 (7.54)
Marital Status					
Married/Common Law	8 (13.8%)	18 (31%)	13 (22.4%)	11(19%)	8 (13.8%)
Single	13 (31.7%)	3 (7.3%)	6 (14.6%)	8 (19.5%)	11(26.8%)
Divorced/Separated	2 (25%)	3 (37.5%)	3 (37.5%)		
Widowed			1 (100%)		
Education					
High School-partial	1 (100%)				
High School-complete	3 (50%)	1 (16.7%)	1 (16.7%)	1 (16.7%)	
Technical-partial	3 (30%)	2 (20%)	4 (40%)	1 (10%)	
Technical-complete	1 (8.3%)	5 (41.7%)	5 (41.7%)	1 (8.3%)	
University-partial	6 (33.3%)	5 (27.8%)	2 (11.1%)	3 (16.7%)	2 (11.1%)
University-complete	8 (18.6%)	9 (20.9%)	7 (16.3%)	6 (14%)	13 (30.2%)
Post Graduate-partial		1 (7.7%)	2 (15.4%)	6 (46.2%)	4 (30.8%)
Post Graduate-complete	1 (20%)	1 (20%)	2 (40%)	1 (20%)	
Employment Status					
Full Time	7 (13.5%)	14 (26.9%)	10 (19.2%)	8 (15.4%)	13 (25%)
Part Time	5 (29.4%)	3 (17.6%)	4 (23.5%)	3 (17.6%)	2 (11.8%)
Unemployed	9 (39.1%)	5 (21.7%)	6 (26.7%)	2 (8.7%)	1 (4.3%)
Student	2 (12.5%)	2 (12.5%)	3 (18.8%)	6 (37.5%)	3 (18.8%)
Ethnicity					
Caucasian	21 (20.4%)	25 (24.3%)	21 (20.4%)	18 (17.5%)	18 (17.5%)
Asian	1 (25%)		1 (25%)	1 (25%)	1 (25%)
First Nations	1 (100%)				
Hispanic			1 (100%)		

Currently Depressed, n = 23; Remitted Depressed/Negative Mood, n = 24; Remitted Depressed/Neutral Mood, n = 23; Never Depressed/Negative Mood, n = 19; Never Depressed/ Neutral Mood, n =19

Table 4.

Mean Self-Report Inventory Scores (Standard Deviations) across Experimental Conditions

Variable	Currently Depressed M (SD)	Remitted Depressed/ Negative Mood M (SD)	Remitted Depressed/ Neutral Mood M (SD)	Never Depressed/ Negative Mood M (SD)	Never Depressed/ Neutral Mood M (SD)
BDI-II	32.65 (9.29)	10.08 (8.98)	9.65 (8.53)	3.42 (3.32)	3.00 (3.37)
DAS	143.13 (39.61)	122.96 (40.58)	113.43 (37.62)	98.63 (25.06)	87.47 (17.91)
SAS (Sociotropy)	76.83 (16.04)	68.50 (22.03)	59.00 (18.39)	57.32 (14.48)	47.58 (12.49)

Currently Depressed, n = 23; Remitted Depressed/Negative Mood, n = 25; Remitted Depressed/Neutral Mood, n = 23; Never Depressed/Negative Mood, n = 19; Never Depressed/ Neutral Mood, n = 19

the "non-depressed" range. Mean BDI-II scores among never depressed participants, regardless of mood condition, fell at the low end of the "non-depressed" range.

A one-way ANOVA revealed statistically significant differences among these three groups, $F(2, 105) = 15.81$, $p < .001$. As anticipated based on inclusion/exclusion criteria, currently depressed participants produced significantly higher BDI scores relative to never depressed, $t(25.41) = 14.65$, $p < .001$, and remitted depressed participants, $t(69) = 10.12$, $p < .001$. A separate error variance estimate was used to analyze the contrast between currently depressed and never depressed participants due to heterogeneity of variance (Levene's $F = 30.44$, $p < .001$). Notably, remitted depressed participants generated significantly higher BDI-II scores as compared to never depressed participants, $t(63.12) = 4.89$, $p < .001$. A separate error variance estimate was used to analyze the contrast between remitted depressed and never depressed participants due to heterogeneity of variance (Levene's $F = 22.72$, $p < .001$). Differences remained significant after controlling for Type I error via the Bonferroni adjustment ($p_{criteria} = .017$).

A one-way ANOVA revealed statistically significant experimental group differences on DAS scores, $F(4, 103) = 8.38$, $p < .001$. Currently depressed participants produced significantly higher DAS scores relative to never depressed individuals irrespective of mood condition (negative mood condition, $t(40) = 4.24$, $p < .001$; neutral mood condition, $t(28.92) = 6.53$, $p < .001$), and remitted depressed participants in the neutral mood condition, $t(44) = 2.61$, $p < .05$. A separate error variance estimate was used to analyze the contrast between currently depressed participants and never depressed participants in neutral mood due to heterogeneity of variance (Levene's $F = 13.35$, $p < .001$). No statistically significant differences were observed on DAS scores between

currently depressed participants and remitted depressed participants in negative mood, $t(45) = 1.72$, p = ns. Thus, in terms of dysfunctional attitudes, currently depressed participants and remitted depressed participants in negative mood were statistically indistinguishable. Remitted depressed participants in negative mood produced significantly higher DAS scores as compared to never depressed participants in neutral mood, $t(30.15) = 4.26$, $p < .001$). A separate error variance estimate was used to analyze the contrast between remitted depressed participants in negative mood and never depressed participants in neutral mood due to heterogeneity of variance (Levene's F = 24.55, $p < .001$). Differences remained significant after controlling for Type I error via the Bonferroni adjustment ($p_{criteria} = .008$), with the exception of the comparison between currently depressed participants and remitted depressed participants in neutral mood.

Statistically significant experimental group differences on sociotropy scores were also observed, $F(4, 103) = 8.86$, $p < .001$. Currently depressed participants generated significantly higher sociotropy scores relative to never depressed individuals regardless of mood condition (negative mood condition, $t(40) = 4.10$, $p < .001$; neutral mood condition, $t(39) = 6.48$, $p < .001$), and remitted depressed participants in neutral mood, $t(44) = 3.50$, $p < .001$. No statistically significant differences were observed on sociotropy scores between currently depressed participants and remitted depressed participants in negative mood, $t(45) = 1.47$, p = ns. Thus, with respect to endorsement of sociotropic values, remitted depressed participants in the negative mood condition resembled currently depressed participants. Remitted depressed participants in negative mood produced significantly higher sociotropy scores relative to never depressed participants in neutral mood, $t(37.71) = 3.99$, $p < .001$. A separate error variance estimate

was used to analyze the contrast between remitted depressed participants in negative mood and never depressed participants in neutral mood (Levene's $\underline{F} = 5.39$, $\underline{p} < .05$). Differences remained significant after controlling for Type I error via the Bonferroni adjustment ($p_{criteria} = .008$).

Mean (standard deviation) number of participant estimated major depressive episodes (MDEs) among remitted depressed and currently depressed participants is presented in Table 5. As required by inclusion criteria, never depressed participants experienced no major depressive episodes, and thus were not included in these analyses. A one-way ANOVA revealed statistically significant group differences, $\underline{F}(2, 69) = 3.54$, $\underline{p} < .05$. Follow-up tests revealed that currently depressed participants experienced significantly more MDEs as compared to remitted depressed participants in negative mood, $\underline{t}(45) = 2.59$, $\underline{p} < .05$. This difference became non-significant after controlling for Type I error via the Bonferroni adjustment ($p_{criteria} = .017$). No further analyses of depression chronicity were conducted given the observed non-significant difference for number of estimated MDEs between experimental groups.

Comorbid disorder status as well as psychotherapy and pharmacotherapy history across experimental conditions are presented in Table 5. Twenty-two percent of currently depressed participants met criteria for at least one Anxiety Disorder. Ten percent of remitted depressed participants met criteria for at least one Anxiety Disorder. Three currently depressed participants met criteria for Dysthymic Disorder. No never depressed participants met criteria for any Axis I disorder. No statistically significant group differences for comorbid anxiety were observed between currently depressed and remitted depressed participants, $\chi^2(18, \underline{N} = 71) = 22.88$, $\underline{p}$ = ns. No further analyses of

Table 5.

Clinical Factors across Experimental Conditions

Variable	Currently Depressed n (%)	Remitted Depressed/ Negative Mood n (%)	Remitted Depressed/ Neutral Mood n (%)	Never Depressed/ Negative Mood n (%)	Never Depressed/ Neutral Mood n (%)
Comorbid Disorders					
None	12 (12.9%)	23 (24.7%)	20 (21.5%)	19 (20.4%)	19 (20.4%)
Dysthymia	3 (100%)				
PD/Agoraphobia	2 (66.7%)	1 (33.3%)			
PTSD	1 (50%)		1 (50%)		
GAD	1 (100%)				
Social Phobia	2 (66.6%)		1 (33.3%)		
Specific Phobia	2 (66.6%)	1 (33.3%)			
OCD			1 (100%)		
Psychotherapy					
None	3 (7.3%)	3 (7.3%)	2 (4.9%)	16 (39%)	17 (41.5%)
Current	1 (16.7%)	5 (83.3%)			
Past	7 (18.9%)	12 (32.4%)	14 (37.8%)	3 (8.1%)	1 (2.7%)
Current & Past	12 (52.2%)	4 (17.4%)	7 (30.4%)		
Pharmacotherapy					
None	5 (10.4%)	3 (6.3%)	3 (6.3%)	19 (39.6%)	18 (37.5%)
Current	1 (12.5%)	6 (75%)	1 (12.5%)		
Past	1 (10.2%)	9 (40.9%)	3 (40.9%)		
Current & Past	13 (43.4%)	7 (23.3%)	10 (33.3%)		
Number of MDEs	5.39 (3.12)	3.29 (2.40)	3.91 (2.74)		

Currently Depressed, n = 23; Remitted Depressed/Negative Mood, n = 25; Remitted Depressed/Neutral Mood, n = 23; Never Depressed/Negative Mood, n = 19; Never Depressed/ Neutral Mood, n = 19

comorbid anxiety were conducted given the observed non-significant difference between experimental groups. Eighty-seven percent of currently depressed participants, 89% of remitted depressed participants, and 11% of never depressed participants had sought some form of psychological intervention. Seventy-five percent of currently depressed participants and 82% of remitted depressed participants had used some form of antidepressant medication.

Mood Induction Paradigm. Visual analogue scale (VAS) scores representing subjective mood ratings are presented in Table 6. A 2 (VAS: Pre-Mood Induction vs. Post-Mood Induction) by 2 (Mood Induction: Negative vs. Neutral) by 2 (Depression History: Remitted Depressed vs. Never Depressed) split-plot repeated measures ANOVA was conducted to examine mood manipulation effects. A significant main effect of VAS was observed, $F(1, 82) = 172.17$, $p < .001$. A significant main effect of Mood Induction was also observed, $F(1, 82) = 13.16$, $p < .001$. These main effects were qualified by significant VAS x Mood Induction, $F(1, 82) = 153.66$, $p < .001$, and VAS x Depression History, $F(1, 82) = 7.48$, $p < .01$, two-way interactions.

Deconstruction of the VAS x Mood Induction interaction revealed significant negative versus neutral mood induction group differences on VAS ratings pre-mood induction, $F(1, 84) = 5.49$, $p < .05$. Specifically, individuals in the neutral mood induction group ($M = 2.40$, $SD = 1.59$) produced significantly greater negative VAS ratings as compared to individuals in the negative mood induction group ($M = 1.26$, $SD = 1.25$). Significant negative versus neutral mood induction group differences on VAS ratings post-mood induction were also observed, $F(1, 84) = 57.27$, $p < .001$. Specifically, the negative mood induction procedure ($M = 5.71$, $SD = 2.32$) generated significantly greater

Table 6.

Mean Visual Analogue Scale (VAS) Scores (Standard Deviations) across Experimental Conditions

Variable	Remitted Depressed/ Negative Mood M (SD)	Remitted Depressed/ Neutral Mood M (SD)	Never Depressed/ Negative Mood M (SD)	Never Depressed/ Neutral Mood M (SD)
VAS 1 (pre-mood induction)	1.65 (1.02)	2.48 (1.69)	1.72 (1.51)	2.28 (1.50)
VAS 2 (post-mood induction)	6.20 (2.35)	2.67 (1.64)	5.03 (2.10)	2.20 (1.09)
VAS 3 (post-DAS)	4.18 (1.94)	2.90 (1.65)	4.19 (1.78)	2.19 (1.25)
VAS 4 (post-SAS)	4.25 (2.06)	2.84 (1.74)	4.24 (1.64)	2.12 (1.18)
VAS 5 (post-Stroop/DOAT)	4.39 (2.22)	3.00 (1.75)	4.03 (1.79)	2.27 (1.32)
VAS 6 (post-SRET/IRT)	3.92 (2.08)	3.03 (1.80)	4.03 (1.84)	2.24 (1.28)

Remitted Depressed/Negative Mood, n=25; Remitted Depressed/Neutral Mood, n=23; Never Depressed/Negative Mood, n=19; Never Depressed/Neutral Mood, n=20

negative mood ratings on the VAS relative to the neutral mood induction procedure (M = 2.54, SD = 1.47). Examination of the VAS x Depression History interaction revealed no significant never depressed versus remitted depressed group differences on VAS ratings pre-mood induction, F(1, 84) = .01, p = ns , or post-mood induction, F(1, 84) = 2.63, p = ns.

A 2 (VAS: Pre-Mood Induction vs. Post-Experiment) by 2 (Mood Induction: Negative vs. Neutral) by 2 (Depression History: Remitted Depressed vs. Never Depressed) split-plot repeated measures ANOVA was conducted to examine the stability of mood manipulation effects. Post-experiment VAS ratings correspond to VAS 6 mood ratings in Table 6. A significant main effect of VAS was observed, F(1, 82) = 74.66, p < .001. No significant main effect of Mood Induction, F(1, 82) = .87, p = ns , or Depression History, F(1, 82) = .37, p = ns, was observed. A significant VAS x Mood Induction, F(1, 82) = 46.68, p < .001 two-way interaction was observed. No VAS x Depression History interaction was observed, F(1, 82) = 1.14, p = ns. Finally, no VAS x Mood Induction x Depression History interaction was observed, F(1, 82) = 1.35, p = ns.

Deconstruction of the VAS x Mood Induction interaction revealed significant negative versus neutral mood induction group differences on VAS ratings post-experiment, F(1, 84) = 10. 52, p < .01. Specifically, the negative mood induction procedure (M = 3.97, SD = 1.98) generated significantly greater negative mood ratings on the VAS relative to the neutral mood induction procedure (M = 2.71, SD = 1.62). Thus, participants in the negative mood condition generated and maintained significantly higher VAS scores (indicating sad mood) relative to participants in neutral mood. However, a series of paired t-tests revealed that the negative mood induction effects decayed

significantly from Post-Mood Induction (VAS #2) to Post-Experiment (VAS #6): remitted depressed/negative mood, $t(24) = 6.24$, $p < .001$; and never depressed/negative mood, $t(18) = 3.62$, $p < .01$. Thus, although the negative mood prime produced significant negative mood shifts (i.e., pre-induction versus post-induction and pre-induction versus post-experiment), there is evidence to suggest that the observed negative mood shift decayed over time (i.e., post-induction versus post-experiment).

Experimental Analyses

The previous analyses examined interrater reliability, sample characteristics, and mood prime efficacy. Exact interrater reliability (Kappa = 1.00) for depression group status, and high interrater reliability (Kappa = .77) for comorbid disorder status was observed. With respect to sample characteristics, currently depressed participants generated significantly higher BDI-II scores than remitted depressed and never depressed participants. Remitted depressed participants also generated significantly higher BDI-II scores than never depressed participants. Currently depressed and remitted depressed participants in negative mood were statistically indistinguishable on measures of dysfunctional attitudes and sociotropic values. No statistically significant differences for either participant estimated total number of MDEs or comorbid anxiety disorder status were observed between currently depressed and remitted depressed participants. Although significant negative mood shifts were observed both post-induction and post-experiment, evidence suggests that the negative mood effect decayed over the course of the experiment.

The following analyses examine experimental hypotheses. First, the attention allocation tasks (i.e., EST and DOAT) are presented. Second, the endorsement and recall

tasks (i.e., SRET and IRT) are presented. Finally, statistical analyses addressing the conceptual distinction between "partial remission" versus "full remission" are presented.

Emotional Stroop Task. It was hypothesized that currently depressed, and remitted depressed participants in negative mood, would exhibit a negative attentional bias on the Stroop (i.e., greater cognitive interference for negative as compared to positive adjectives). By contrast, it was hypothesized that never-depressed participants in both negative and neutral mood, and remitted depressed participants in neutral mood, would exhibit a positive or protective attention biases on the Stroop, favoring positive content stimuli over negative content stimuli. Stroop interference scores (e.g., negative latency minus neutral latency and positive latency minus neutral latency) served as the dependent measure. Mean reaction times (Stroop latency) for negative affect, positive affect, and neutral affect Stroop stimuli across experimental conditions are presented in Table 7. Extreme reaction time outliers (below 100 milliseconds or above 4000 milliseconds) were treated as missing data (Bradley, Mogg, White, & Miller, 1995). Fewer than 1% of all Stroop data points were treated as missing. Error rates did not differ significantly between groups, $F(4, 109) = 2.35$, p = ns.

A 2 (Stroop Content: Positive vs. Negative) by 2 (Depression History: Remitted Depressed vs. Never Depressed) by 2 (Mood Induction: Negative vs. Neutral) split-plot repeated measures ANOVA was used to investigate emotional Stroop interference. This analysis revealed a significant main effect of Stroop Content, $F(1, 82) = 13.52$, $p < .001$. Specifically, participants demonstrated significantly higher Stroop effects for negative as compared to positive Stroop stimuli, $t(108) = 4.88$, $p < .001$. No main effect of Depression History was observed, $F(1, 82) = .57$, p = ns. No main effect of Mood

Table 7.

Mean Reaction Times (Standard Deviations) for Positive, Negative, and Neutral Stroop Stimuli across Experimental Conditions

Variable	Currently Depressed M (SD)	Remitted Depressed/ Negative Mood M (SD)	Remitted Depressed/ Neutral Mood M (SD)	Never Depressed/ Negative Mood M (SD)	Never Depressed/ Neutral Mood M (SD)
Positive	749.54 (155.38)	729.07 (89.14)	717.75 (82.24)	709.34 (88.13)	665.14 (87.39)
Negative	785.93 (186.86)	758.89 (107.56)	723.20 (89.33)	719.56 (106.64)	675.82 (75.79)
Neutral	749.39 (109.24)	730.90 (87.94)	717.75 (86.28)	713.07 (104.42)	666.35 (81.05)

Currently Depressed, n = 23; Remitted Depressed/Negative Mood, n = 25; Remitted Depressed/Neutral Mood, n = 23; Never Depressed/Negative Mood, n = 19; Never Depressed/ Neutral Mood, n = 19

Induction was observed, $F(1, 82) = .52$, p = ns. None of the interaction effects was significant: Stroop Content x Depression History, $F(1,82) = .97$, p = ns; Stroop Content x Mood Induction $F(1, 82) = 1.85$, p = ns; nor Stroop Content x Mood Induction x Depression History, $F(1,82) = 2.02$, p = ns.

In addition, a 2 (Stroop Content: Positive vs. Negative) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was employed to examine emotional Stroop Interference. A significant main effect of Stroop Content was observed, $F(1, 64) = 21.77$, $p < .001$. No significant main effect of Group was observed, $F(2, 64) = 1.33$, p = ns. No significant Stroop Content x Group interaction was observed, $F(2, 64) = 1.91$, p = ns.

Notably, a one-way ANOVA revealed non-significant group differences for neutral content Stroop latency (i.e., raw reaction time) across never depressed, remitted depressed, and currently depressed participants, $F(2, 108) = 2.34$, p = ns. Thus, it does not appear as though currently depressed participants demonstrated a general Stroop latency impairment relative to controls.

A series of t-tests examining within-subjects effects were conducted to investigate a priori hypotheses pertaining to emotional Stroop interference. As hypothesized, currently depressed and remitted depressed participants in negative mood demonstrated significantly greater Stroop effects for negative as compared to positive adjectives: currently depressed, $t(22) = 3.26$, $p < .01$; remitted depressed in negative mood, $t(24) = 3.47$, $p < .01$. Never depressed participants in both negative and neutral mood, as well as remitted depressed participants in neutral failed to demonstrate a statistically significant

difference in response to negative versus positive Stroop content: never depressed in neutral mood, $t(18) = 1.63$, p = ns; never depressed in negative mood, $t(18) = 1.38$, p = ns; remitted depressed participants in neutral mood, $t(22) = 0.75$, p = ns. EST data were re-analyzed using only self-referent adjectives (i.e., SRET scores ≥ 5). In terms of statistical significance, the findings were identical.

Deployment of Attention Task. Three types of word-pairs were presented in this task: positive-neutral; negative-neutral; and negative-positive. In pairs containing a negative-content word, this word served as the target, whereas, in pairs containing a neutral-content and a positive-content word, the positive word served as the target. The proportion of times participants identified the color bar replacing the target word in each pair as having appeared first served as the dependent measure. It was hypothesized that currently depressed participants, and remitted depressed participants in a sad mood state, would perform the DOAT in an unbiased fashion attending equally to positive, negative, and neutral content stimuli. It was hypothesized that never depressed participants in either a negative or neutral mood state, and remitted depressed participants in a neutral mood state, would exhibit a protective bias against the perception of negative stimuli by avoiding such material in favor of positive or neutral stimuli. Mean word-pair proportion scores across experimental conditions are presented in Table 8.

A 3 (Target: Positive-Neutral; Negative-Neutral; Negative-Positive) by 2 (Depression History: Remitted Depressed vs. Never Depressed) by 2 (Mood Induction: Negative vs. Neutral) split-plot repeated measures ANOVA was used to investigate deployment of attention. The Greenhouse-Geisser ε adjustment was used in response to a significant Mauchley's sphericity statistic ($W = .791$, $p < .001$) for the within-subject

Table 8.

Mean Deployment of Attention Task Word-Pair Proportion Scores (Standard Deviations) across Experimental Conditions

Target	Currently Depressed M (SD)	Remitted Depressed/ Negative Mood M (SD)	Remitted Depressed/ Neutral Mood M (SD)	Never Depressed/ Negative Mood M (SD)	Never Depressed/ Neutral Mood M (SD)
Positive/ Neutral	0.48 (0.13)	0.51 (0.12)	0.51 (0.11)	0.56 (0.12)	0.48 (.15)
Negative/ Neutral	0.47 (0.15)	0.46 (0.13)	0.44 (0.09)*	0.47 (0.13)	0.47 (.13)
Negative/ Positive	0.50 (0.11)	0.45 (0.11)	0.44 (0.11)*	0.38 (0.13)*	0.43 (.14)*

Currently Depressed, n = 23; Remitted Depressed/Negative Mood, n = 25; Remitted Depressed/Neutral Mood, n = 23; Never Depressed/Negative Mood, n = 19; Never Depressed/ Neutral Mood, n = 19. An asterisk indicates the mean was significantly different from .5, the value expected by chance for unbiased deployment of attention.

factor Target. A significant main effect for Target was observed, $F(1.65, 125.76) = 10.10$, $p < .001$. Specifically, the mean Positive-Neutral word pair proportion was significantly higher than the mean Negative-Neutral, $t(80) = 2.41$, $p < .05$, and the mean Negative-Positive, $t(80) = 3.96$, $p < .001$, word pair proportions. In addition, the Negative-Neutral word pair proportion was significantly larger than the Negative-Positive word pair proportion, $t(80) = 2.33$, $p < .05$. No main effect of Depression History was observed, $F(1,76) = .31$, p = ns. No main effect of Mood Induction was observed, $F(1,76) = .31$, p = ns. No Target x Depression History two-way interaction was observed, $F(1.65, 125.76) = 1.39$, p = ns. No Target x Mood Induction two-way interaction was observed, $F(1.65, 125.76) = 1.21$, p = ns. Finally, no Target x Depression History x Mood Induction three-way interaction was observed, $F(1.65, 125.76) = .1.66$, p = ns.

A 3 (Target: Positive-Neutral; Negative-Neutral; Negative-Positive) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was also employed to examine deployment of attention. A significant main effect of Target was observed, $F(2, 126) = 5.51$, $p < .01$. This main effect was qualified by a significant Target x Group two-way interaction, $F(4, 126) = 3.38$, $p < .05$. Three one-way ANOVAs at fixed levels of the within-subject variable were conducted to decompose this two-way interaction. No significant effect of Group at the Positive-Neutral level of the within-subject variable was observed, $F(2, 63) = 2.09$, p = ns. Likewise, no significant effect of Group was observed at the Negative-Neutral level of the within-subject variable, $F(2, 63) = .031$, p = ns. However, a significant effect of Group at the Negative-Positive level of the within-subject variable was observed, $F(2, 63) = 6.01$, $p < .01$. Simple effects tests using the

Bonferroni (alpha = .017) procedure revealed that never depressed participants in negative mood produced a significantly lower mean Negative-Positive proportion than currently depressed participants, $t(40) = 3.44$, $p < .017$. Thus, never depressed participants in negative mood attended significantly less to negative-content targets as compared to currently depressed participants.

The previous analyses indicate group differences with respect to mean proportions of target words to which participants attended in the three types of word pairs. By contrast, the following analyses address experimental hypotheses directly by indicating whether the observed proportions differ from chance. Biased deployment of attention was defined as a significant discrepancy from 0.5. A series of planned t-tests examined the difference between the observed means and 0.5 (i.e., the mean expected for unbiased performance), in order to test a priori hypotheses.

As predicted, currently depressed participants demonstrated no attentional bias, attending equally to positive, negative, and neutral-content stimuli. This pattern was reflected by a non-significant difference between the observed three word-pair means and chance: Positive-Neutral, $t(22) = .74$, p = ns; Negative-Neutral, $t(22) = .85$, p = ns; Negative-Positive, $t(22) = 0$, p = ns. As anticipated, the remitted depressed participants in negative mood demonstrated a similar pattern: Positive-Neutral, $t(23) = .25$, p = ns; Negative-Neutral, $t(23) = 1.31$, p = ns; Negative-Positive, $t(23) = 2.05$, p = ns. As predicted, never depressed participants in negative mood demonstrated an avoidance of negative-content stimuli in favor of positive-content stimuli: Negative-Positive, $t(18) = 4.31$, $p < .001$. Similarly, never depressed participants in neutral mood evidenced a significant attentional bias favoring positive-content stimuli: Negative-Positive, $t(17) =$

2.35, $p < .05$. Likewise, remitted depressed participants in neutral mood demonstrated the expected attentional bias favoring both positive-content and neutral-content stimuli: Negative-Positive, $t(18) = 2.16$, $p < .05$; Negative-Neutral, $t(18) = 2.73$, $p < .05$. Thus, currently depressed and remitted depressed participants in negative mood demonstrated the hypothesized "even-handed" deployment of attention; whereas, never depressed participants and remitted depressed participants in neutral mood favored positive-content stimuli over negative-content stimuli.

Self Referent Endorsement Task. It was hypothesized that currently depressed participants, and remitted depressed participants in a sad mood state, would generate higher self-referent endorsement ratings for negative as opposed to positive and neutral sociotropic words. It was also hypothesized that never depressed participants in either a sad or neutral mood state, and remitted depressed participants in a neutral mood state, would generate higher self-referent endorsement ratings for positive as opposed to negative and neutral sociotropic words. Mean self-referent endorsement ratings served as the dependent measure. Ratings for positive, negative, and neutral affect stimuli across experimental conditions are presented in Table 9.

A 3 (Stimulus Content: Positive vs. Negative vs. Neutral) by 2 (Depression History: Remitted Depressed vs. Never Depressed) by 2 (Mood Induction: Negative vs. Neutral) split-plot repeated measures ANOVA was used to investigate self-referent endorsement. The Greenhouse-Geisser ε adjustment was used in response to a significant Mauchley's sphericity statistic ($W = .397$, $p < .001$) for the within-subjects factor Stimulus. A significant effect of Stimulus Content was observed, $F(1.25, 101.09) = 141.27$, $p < .001$. No significant Stimulus Content x Mood Induction interaction was

Table 9.

Mean Self-Referent Endorsement Scores (Standard Deviations) for Positive, Negative, and Neutral Stimuli across Experimental Conditions

Variable	Currently Depressed M (SD)	Remitted Depressed/ Negative Mood M (SD)	Remitted Depressed/ Neutral Mood M (SD)	Never Depressed/ Negative Mood M (SD)	Never Depressed/ Neutral Mood M (SD)
Positive	4.14 (0.75)	4.65 (1.01)	4.67 (0.84)	5.03 (0.61)	5.17 (0.44)
Negative	4.09 (0.90)	3.26 (0.90)	3.33 (0.75)	2.67 (0.73)	3.20 (0.83)
Neutral	4.43 (0.34)	4.21 (0.61)	4.11 (0.41)	4.18 (0.39)	4.30 (0.36)

Currently Depressed, n = 23; Remitted Depressed/Negative Mood, n = 25; Remitted Depressed/Neutral Mood, n = 23; Never Depressed/Negative Mood, n = 19; Never Depressed/ Neutral Mood, n = 19

observed, $F(1.25, 101.09) = 1.28$, p = ns. A significant Stimulus Content x Depression History interaction, $F(1.25, 101.09) = 6.86$, $p < .01$ was obtained. No significant Stimulus Content x Depression History x Mood Induction interaction was observed, $F(1.25, 101.09) = .39$, p = ns.

A one-way ANOVA was used to analyze the significant Stimulus Content x Depression History interaction. A significant group difference for positive-content stimuli was observed, $F(1, 84) = 6.72$, $p < .05$. Specifically, never depressed participants generated significantly higher self-referent endorsement ratings for positive-content stimuli as compared to remitted depressed participants, $t(75.77) = 2.59$, $p < .01$, irrespective of mood. Separate error variance estimates were used due to significant heterogeneity of variance.

In addition, a 3 (Stimulus Content: Positive vs. Negative vs. Neutral) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was employed to examine self-referent endorsement. The Greenhouse-Geisser ε adjustment was used in response to a significant Mauchley's sphericity statistic ($W = .371$, $p < .001$) for the within-subjects factor Stimulus. A significant main effect of Stimulus was observed, $F(1.23, 45.83) = 52.40$, $p < .001$. This main effect was qualified by a significant Stimulus x Group interaction, $F(2.45, 11.25) = 12.86$, $p < .001$. One-way ANOVAs at fixed levels of the within-subjects variable were conducted to decompose this two-way interaction.

A significant effect of Group at the positive level of the within-subject variable was observed, $F(2, 63) = 5.86$, $p < .01$. Specifically, never depressed participants in negative mood generated significantly higher self-referent endorsement ratings for

positive-content stimuli relative to currently depressed participants, $t(39) = 4.07$, $p < .001$. A significant effect of Group at the negative level of the within-subject variable was also observed, $F(2, 63) = 14.30$, $p < .001$. Specifically, currently depressed participants generated significantly higher self-referent endorsement ratings for negative-content stimuli as compared to both never depressed participants in negative mood, $t(39) = 5.49$, $p < .001$, and remitted depressed participants in negative mood, $t(45) = 3.16$, $p < .01$. No significant effect of Group at the neutral level of the within-subject variable was observed, $F(2, 63) = 1.66$, p = ns. Thus, currently depressed participants generated significantly higher self-referent endorsement ratings for negative-content adjectives relative to both never depressed and remitted depressed participants in negative mood, and generated significantly lower self-referent endorsement ratings for positive adjective than never depressed participants in negative mood.

A series of t-tests were conducted to examine a priori hypotheses pertaining to Self-Referent Endorsement. Currently depressed participants failed to generate significantly higher self-referent endorsement ratings for negative versus positive, $t(21) = .18$, $p <$ ns, or neutral adjectives, $t(21) = 1.68$, p = ns. No endorsement disparity was observed between positive and neutral content adjectives, $t(21) = 1.75$, p = ns. Also contrary to expectation, remitted depressed participants in negative mood generated significantly higher endorsement ratings for positive versus negative, $t(25) = 4.51$, $p < .001$, and neutral content adjectives, $t(25) = 2.92$, $p < .01$. These participants also generated significantly higher endorsement ratings for neutral as compared to negative content adjectives, $t(25) = 4.90$, $p < .001$. As hypothesized, never depressed participants in both negative and neutral mood generated significantly higher self-endorsement ratings for

positive versus negative and neutral adjectives: never depressed/neutral mood, $t(18) = 9.07$, $p < .001$(positive vs. negative), and $t(18) = 10.57$, $p < .001$ (positive vs. neutral); never depressed/negative mood, $t(19) = 9.28$, $p < .001$ (positive vs. negative), and $t(19) = 5.58$, $p < .001$ (positive vs. neutral). Notably, the never depressed control groups also generated significantly higher endorsement ratings for neutral as compared to negative content adjectives: never depressed/neutral mood, $t(18) = 5.72$, $p < 001$; never depressed/negative mood, $t(18) = 9.56$, $p < .001$. Remitted depressed participants in neutral mood exhibited endorsement patterns similar to never depressed controls: positive versus negative, $t(21) = 4.61$, $p < .001$; positive versus neutral, $t(21) = 3.34$, $p < .01$; neutral versus negative, $t(21) = 4.43$, $p < .001$. In summary, currently depressed individuals exhibited an even-handed endorsement pattern across positive, negative, and neutral content adjectives. Remitted depressed and never depressed individuals, regardless of mood, demonstrated positively biased endorsement favoring positive over negative and neutral adjectives. Furthermore, these individuals favored neutral over negative adjectives as being self-descriptive.

Incidental Recall Task. It was hypothesized that currently depressed participants, and remitted depressed participants in negative mood, would recall a greater proportion of negative as opposed to positive and neutral sociotropic words. It was further hypothesized that never depressed participants in either a negative or neutral mood state, and remitted depressed participants in a neutral mood state, would recall a greater proportion of positive as opposed to negative and neutral sociotropic words. Mean incidental recall scores for positive, negative, and neutral-content stimuli were transformed into proportional scores (e.g., total number of positive words recalled

divided by total number of words recalled) and served as the dependent measure. Mean recall scores across experimental conditions are presented in Table 10.

A 3 (Stimulus Content: Positive Proportion vs. Negative Proportion vs. Neutral Proportion) by 2 (Depression History: Remitted Depressed vs. Never Depressed) by 2 (Mood Induction: Negative vs. Neutral) split-plot repeated measures ANOVA was used to investigate incidental recall. A significant effect of Stimulus Content was observed, $\underline{F}(2, 164) = 13.03$, $\underline{p} < .001$. Specifically, participants recalled a significantly greater proportion of positive, $\underline{t}(108) = 4.73$, $\underline{p} < .001$, and negative, $\underline{t}(108) = 6.96$, $\underline{p} < .001$, content-adjectives relative to neutral-content adjectives. No significant effect of Depression History, $\underline{F}(1, 82) = .05$, $\underline{p} = ns$, or Mood Induction, $\underline{F}(1, 82) = 0.03$, $\underline{p} = ns$, was observed. No significant Stimulus Content x Depression History two-way interaction, $\underline{F}(2, 164) = 0.20$, $\underline{p} = ns$, or Stimulus Content x Mood Induction two-way interaction, $\underline{F}(2, 164) = 1.30$, $\underline{p} = ns$, was observed. Finally, no significant Stimulus Content x Depression History x Mood Induction three-way interaction was observed, $\underline{F}(2, 164) = 0.59$, $\underline{p} = ns$.

In addition, a 3 (Stimulus Content: Positive Proportion vs. Negative Proportion vs. Neutral Proportion) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was also used to examine incidental recall. The Greenhouse-Geisser ε adjustment was used in response to a significant Mauchley's sphericity statistic ($\underline{W} = .825$, $\underline{p} < .01$) for the within-subjects factor Stimulus Content. Again, a significant effect of Stimulus Content was observed, $\underline{F}(1.70, 108.92) = 13.90$, $\underline{p} < .001$. No significant

Table 10.

Mean Incidental Recall Scores (Standard Deviations) for Positive, Negative, and Neutral Stimuli across Experimental Conditions

Variable	Currently Depressed M (SD)	Remitted Depressed/ Negative Mood M (SD)	Remitted Depressed/ Neutral Mood M (SD)	Never Depressed/ Negative Mood M (SD)	Never Depressed/ Neutral Mood M (SD)
Positive	4.52 (3.49)	5.52 (3.73)	3.61 (2.50)	4.15 (2.09)	5.36 (2.92)
Negative	5.52 (2.90)	4.92 (2.69)	4.17 (1.85)	4.47 (3.02)	5.36 (2.49)
Neutral	3.00 (2.71)	3.52 (2.40)	2.87 (1.98)	2.89 (2.18)	4.37 (2.81)

Currently Depressed, n = 23; Remitted Depressed/Negative Mood, n = 25; Remitted Depressed/Neutral Mood, n = 23; Never Depressed/Negative Mood, n = 19; Never Depressed/ Neutral Mood, n = 19

Stimulus Content x Group two-way interaction was observed, $F(3.40, 108.92) = 1.35$, p = ns.

Further analyses were conducted to examine recall biases for self-referential stimuli exclusively (i.e., SRET scores ≥ 5). It was hypothesized that examination of self-referent stimuli only would generate more extreme incidental recall biases. Mean Incidental Recall Scores (Standard Deviations) for Positive, Negative, and Neutral Self-Referent Stimuli across Experimental Conditions are presented in Table 11. A 3 (Stimulus Content: Positive Proportion vs. Negative Proportion vs. Neutral Proportion) by 2 (Depression History: Remitted Depressed vs. Never Depressed) by 2 (Mood Induction: Negative vs. Neutral) split-plot repeated measures ANOVA was used to investigate incidental recall of self-referent stimuli. The Greenhouse-Geisser ε adjustment was used in response to a significant Mauchley's sphericity statistic ($W = .853$, $p < .01$) for the within-subjects factor Stimulus Content. A significant effect of Stimulus Content was observed, $F(1.74, 115.09) = 25.75$, $p < .001$. Specifically, participants recalled a significantly greater proportion of positive, $t(90) = 6.54$, $p < .001$, and negative, $t(90) = 2.52$, $p < .05$, content-adjectives relative to neutral-content adjectives. Also, participants recalled a significantly greater proportion of positive than negative adjectives, $t(90) = 3.02$, $p < .01$. No significant Stimulus Content x Depression History two-way interaction, $F(1.74, 115.09) = 1.25$, p = ns, or Stimulus Content x Mood Induction two-way interaction, $F(1.74, 115.09) = 1.75$, p = ns, was observed. Finally, no significant Stimulus Content x Depression History x Mood Induction three-way interaction was observed, $F(1.74, 115.09) = .02$, p = ns.

Table 11.

Mean Incidental Recall Scores (Standard Deviations) for Positive, Negative, and Neutral Self-Referent Stimuli across Experimental Conditions

Variable	Currently Depressed M (SD)	Remitted Depressed/ Negative Mood M (SD)	Remitted Depressed/ Neutral Mood M (SD)	Never Depressed/ Negative Mood M (SD)	Never Depressed/ Neutral Mood M (SD)
Positive	2.05 (2.33)	4.05 (3.90)	2.05 (1.54)	3.55 (1.91)	4.56 (2.89)
Negative	2.90 (2.19)	1.60 (1.46)	1.61 (1.29)	0.93 (1.06)	1.88 (1.41)
Neutral	1.57 (1.69)	1.38 (1.28)	1.31 (1.38)	1.67 (1.68)	2.39 (2.06)

Currently Depressed, n = 21; Remitted Depressed/Negative Mood, n = 20; Remitted Depressed/Neutral Mood, n = 18; Never Depressed/Negative Mood, n = 16; Never Depressed/ Neutral Mood, n = 17

A 3 (Stimulus Content: Positive Proportion vs. Negative Proportion vs. Neutral Proportion) by 3 (Group: Never Depressed/Negative Mood vs. Remitted Depressed/Negative Mood vs. Currently Depressed) split-plot repeated measures ANOVA was also used to examine incidental recall of self-referent stimuli. The Greenhouse-Geisser ε adjustment was used in response to a significant Mauchley's sphericity statistic ($W = .661$, $p < .001$) for the within-subjects factor Stimulus Content. Again, a significant effect of Stimulus Content was observed, $F(1.49, 79.15) = 12.80$, $p < .05$. A significant Stimulus Content x Group two-way interaction was observed, $F(2.99, 79.15) = 6.69$, $p < .05$. One-way ANOVAs at fixed levels of the within-subjects variable were conducted to decompose this two-way interaction.

A significant effect of Group at the positive level of the within-subject variable was observed, $F(2, 53) = 6.93$, $p < .05$. Specifically, currently depressed participants recalled a significantly smaller proportion of positive-content adjectives relative to never depressed participants in negative mood, $t(34) = 3.84$, $p < .01$, as well as remitted depressed participants in negative mood, $t(39) = 2.75$, $p < .01$. A significant effect of Group at the negative level of the within-subject variable was also observed, $F(2, 53) = 8.71$, $p < .05$. Specifically, currently depressed participants recalled a significantly greater proportion of negative-content adjectives relative to never depressed participants in negative mood, $t(34) = 3.93$, $p < .001$, as well as remitted depressed participants in negative mood, $t(39) = 2.81$, $p < .01$. No significant effect of Group at the neutral level of the within-subject variable was observed, $F(2, 54) = .52$, p = ns. Thus, when self-referential endorsement is taken into account, hypothesized incidental recall biases become apparent, such that currently depressed participants recalled proportionally fewer

positive-content adjectives and more negative-content adjectives as compared to both never depressed and remitted depressed participants in negative mood.

A series of t-tests, using self-referential adjectives exclusively, were conducted to examine a priori hypotheses for within-subjects effects. Currently depressed participants failed to exhibit a negative versus positive recall bias, $t(20) = 1.72$, p = ns; rather, they demonstrated a negative versus neutral recall bias favoring negative content adjectives, $t(20) = 3.49$, $p < .01$. No positive versus neutral recall bias was observed, $t(20) = 1.28$, p = ns. Contrary to expectation, remitted depressives in negative mood produced a significant positive versus negative, $t(19) = 2.30$, $p < .05$, as well as positive versus neutral, $t(19) = 3.65$, $p < .01$, recall bias favoring positive adjectives. No negative versus neutral recall bias was observed, $t(19) = 1.20$, p = ns. As anticipated, never depressed participants in both mood conditions exhibited positive versus negative recall biases favoring positive adjectives: never depressed/negative mood, $t(14) = 5.00$, $p < .001$; never depressed/neutral mood, $t(16) = 3.80$, $p < .01$. Never depressed participants in both mood conditions also exhibited positive versus neutral recall biases favoring positive adjectives: never depressed/negative mood, $t(14) = 4.34$, $p < .01$; never depressed/neutral mood, $t(16) = 3.38$, $p < .01$. No significant negative versus neutral recall biases were observed: never depressed/negative mood, $t(14) = .96$, p = ns; never depressed/neutral mood, $t(16) = .20$, p = ns. Remitted depressed participants in neutral mood showed higher incidental recall for positive as compared to neutral adjectives, $t(17) = 2.47$, $p < .05$. No significant differences were observed for negative versus neutral, $t(17) = 1.25$, p = ns, nor negative versus positive, $t(17) = .99$, p = ns. Thus, when self-referential data are examined exclusively, currently depressed individuals demonstrated a negative recall bias (i.e.,

negative versus neutral); whereas, controls exhibited a positive recall bias (i.e., positive versus neutral). The remitted depressive results are more puzzling.

Partial Remission versus Full Remission

Frank et al. (1991) have proposed a conceptual framework for terms used to define the course of Unipolar Depression. The authors define *partial remission* as a "period during which an improvement of sufficient magnitude is observed that the individual is no longer fully symptomatic (i.e., no longer meets syndromal criteria for the disorder) but continues to evidence more than minimal symptoms". *Full remission* is defined as a "period during which an improvement of sufficient magnitude is observed that the individual is asymptomatic (i.e., no longer meets syndromal criteria for the disorder and has no more than minimal symptoms)". *Recovery* is defined as "remission that lasts for F days or longer". The "point of rarity" concept has been suggested as a method for determining the most valid choice for duration in defining recovery, such that few individuals experience a return of the syndrome beyond this point.

In the current study, both *partially remitted* and *fully remitted* participants were included. Depending on the 'duration' criteria used to establish recovery, a portion of the previously depressed sample used in the current study would be classified as *recovered.* Enhanced conceptual clarity was attempted by re-executing all experimental analyses using only *fully remitted* participants (e.g., participants who failed to meet SCID-I criteria for depression *and* generated BDI-II scores below 13). For the purpose re-analyses, 6 *partially remitted* participants in the negative mood condition and 6 *partially remitted* participants in the neutral mood condition were excluded, leaving 17 participants in each *fully remitted* group. With respect to statistical significance, the analyses yielded results

identical to those generated using the original sample, with the exception of BDI-II results. Specifically, *fully remitted* and never depressed participants were statistically indistinguishable in terms of mean BDI-II scores; whereas, in the original sample, the remitted sample generated significantly higher mean BDI-II scores relative to never depressed participants.

Discussion

The primary purpose of this study was to examine the mood-state dependence of cognitive vulnerability factors in remitted depressed women, those identified as at risk for relapse. A growing body of empirical literature supports the notion that cognitive products and operations are indeed mood-state dependent, and that cognitive information processing biases become undetectable as an episode of depression remits (Ingram et al., 1998). The mixed literature concerning cognitive styles in remitted depression likely reflects problems of accessibility as opposed to availability. The majority of studies in this area have failed to employ priming procedures to activate latent cognitive structures, and subsequent information processing. Consequently, null results from these studies are inconclusive at best. The present study provided a more stringent test of the cognitive vulnerability hypothesis by examining maladaptive cognitive processing, and cognitive products, in primed remitted depressives. A secondary purpose of the study was to examine cognitive processing, and cognitive products, in currently depressed women. This component represented not only an attempt to extend existing cognitive research in depression, but also an attempt to compare findings from distinct paradigms.

The following discussion is divided into four main sections: 1) the main experimental findings are reviewed within the context of current literature; 2) the implications of these results are discussed; 3) the general methodological strengths and limitations of the study are then addressed; and finally, 4) directions for future research are presented.

Cognitive Operations/Processes

Emotional Stroop Effect. The EST measured response latency in milliseconds. A number of studies have documented general reaction time retardation among psychiatric groups (e.g., Gotlib & Cane, 1987; Gotlib & McCann, 1984; Klieger & Cordner, 1990) - perhaps due to poor concentration or motivational impairment. Interference scores were calculated to minimize the impact of global reaction time disparity across groups. Specifically, between-group reaction time variability was reduced by using each participant's neutral content Stroop reaction time as a baseline (e.g., negative Stroop latency minus neutral Stroop latency). Although no significant group differences in neutral Stroop latency were observed, currently depressed individuals did generate higher neutral Stroop latency scores as compared to both remitted depressed and never depressed individuals. Within-group results are more directly interpretable given these potential confounds.

It was hypothesized that currently depressed, and remitted depressed participants in a sad mood state, would exhibit a negative attentional bias on the EST (e.g., greater Stroop interference for negative than positive content adjectives). By contrast, it was hypothesized that never-depressed participants in both sad and neutral mood, and remitted depressed participants in neutral mood, would exhibit positive or protective attention biases on the EST, favoring positive over negative content adjectives.

As predicted, currently depressed and remitted depressed participants in negative mood demonstrated a significantly greater Stroop effect for negative as compared to positive content adjectives. These findings are consistent with the extant EST literature (e.g., Dozois & Dobson, 2001a, 2001b; Gotlib & McCann, 1984; Klieger & Cordner,

1990; Segal & Vella, 1990; Williams & Nulty, 1986). Contrary to expectation, never depressed participants and remitted depressed participants in neutral mood failed to demonstrate a significantly greater Stroop effect for positive as compared to negative content adjectives. Instead, these three groups demonstrated even-handed, or non-biased, attention. This even-handed attentional distribution has been documented elsewhere (e.g., Dozois and Dobson, 2001a, 2001b). Although no significant between-group differences were observed, within-group results suggest that currently depressed and remitted depressed participants in negative mood demonstrated a greater negative attentional capture relative to controls, including remitted depressives in neutral mood.

Deployment of Attention. The DOAT assessed deployment of attention by measuring the proportion of times participants identified the color bar replacing the target word in each pair as having appeared first. It was hypothesized that currently depressed participants, and remitted depressed participants in negative mood, would perform the DOAT in an unbiased fashion attending equally to positive, negative, and neutral content stimuli. It was hypothesized that never depressed participants in both mood conditions, and remitted depressed participants in neutral mood, would exhibit a protective bias against the perception of negative stimuli by avoiding such material in favor of positive or neutral stimuli. Split-plot repeated measures ANOVAs examining between-group differences with respect to mean proportions of target words yielded non-significant findings. Planned t-tests provided a direct analysis of experimental hypotheses by indicating whether the observed proportions differed from chance. These analyses yielded predicted results.

As hypothesized, currently depressed participants and remitted depressed participants in negative mood performed the DOAT in an unbiased fashion attending equally to positive, negative, and neutral content stimuli. As anticipated, never depressed participants in both mood conditions, as well as remitted depressed participants in neutral mood, demonstrated a positive attentional bias favoring positive as compared to negative content adjectives. However, these non-vulnerable individuals did not uniformly demonstrate the "protective pattern" observed elsewhere (e.g., McCabe, Gotlib, & Martin, 2000). Specifically, only the remitted depressed individuals in neutral mood showed the characteristic "protective pattern" (i.e., attentional bias favoring neutral and positive versus negative adjectives in absence of positive versus neutral adjectives). In general, the mean Positive-Neutral word pair proportion was significantly larger than the mean Negative-Neutral word pair proportion, which was significantly larger than the mean Negative-Positive word pair proportions. Also, it was found that never depressed participants in negative mood attended significantly less to negative content targets as compared to currently depressed participants. These findings are consistent with the DOAT literature (e.g., Gotlib et al., 1988; McCabe & Gotlib, 1995; McCabe, Gotlib, & Martin, 2000; McCabe & Toman, 2000), suggesting that depressives and vulnerable individuals in sad mood fail to exhibit the "protective" bias typically observed among non-vulnerable individuals. The bias exhibited by remitted depressed individual in neutral mood may be considered "protective" in that it diverts attention away from negative content stimuli, without favoring positive stimuli more generally (i.e., positive content as compared to neutral content). This protective bias may shield non-vulnerable individuals from processing negative information, and assist in maintaining positive mood states.

Results derived from the EST and the DOAT were expected to be conceptually consistent. Specifically, it was anticipated that currently depressed participants, and remitted depressed participants in a sad mood state, would exhibit maladaptive information processing styles such that a greater overall negative information "capture" would be observed. This negative information processing style was not expected of never depressed participants, nor remitted depressed participants in a neutral mood state.

Indeed, both the EST and the DOAT yielded results consistent with this hypothesis. Currently depressed participants, and remitted depressed participants in negative mood, exhibited greater Stroop interference as well as even-handed deployment of attention to negative content stimuli. By contrast, never depressed participants and remitted depressed participants in neutral mood produced no Stroop interference effect, and exhibited positively-biased deployment of attention.

Self-Referent Endorsement. Self-referent endorsement ratings assess cognitive products, as opposed to cognitive operations. However, because the results are methodologically linked to incidental recall, and hence information processing, they are described here. It was hypothesized that currently depressed participants, and remitted depressed participants in a sad mood state, would generate significantly higher self-endorsement ratings for negative as opposed to positive and neutral sociotropic words. By contrast, it was hypothesized that never depressed participants in either a sad or neutral mood state, and remitted depressed participants in a neutral mood state, would generate significantly higher self-referent endorsement ratings for positive as opposed to negative and neutral sociotropic words.

Contrary to expectation, currently depressed participants failed to demonstrate significantly higher endorsement ratings for negative as compared to positive content adjectives. Rather, currently depressed participants demonstrated an even-handed endorsement across positive, negative, and neutral content adjectives. Also contrary to expectation, remitted depressed participants in negative mood generated significantly lower self-referent endorsement ratings for negative as compared to positive and neutral content adjectives. As anticipated, never depressed participants in both mood conditions and remitted depressed participants in neutral mood produced significantly higher endorsement ratings for positive as compared to negative and neutral content stimuli.

The observed even-handed self-referent endorsement (i.e., positive versus negative content adjectives) found among depressives coupled with the positively biased self-referent endorsement found among nonpsychiatric controls has been documented in the literature (e.g., Derry & Kuiper, 1981; Dozois & Dobson, 2001a, 2001b; Greenberg & Alloy, 1989; MacDonald & Kuiper, 1985). In general, the self-referent endorsement results parallel those obtained in similar studies (Derry & Kuiper, 1981; Dobson & Shaw, 1987; Dozois & Dobson, 2001a, 2001b). Specifically, currently depressed participants judged as self-descriptive more negative and less positive content adjectives than nonpsychiatric controls (i.e., never depressed participants in negative mood). Taken together, the data suggest that the self-schemata of depressives contains positive content, but that compared to nonpsychiatric controls, this information may be less accessible.

The performance of remitted depressed participants in negative mood on the self-referent endorsement task is noteworthy. These individuals not only failed to produce negatively biased endorsements, but also did not produce the even-handed pattern

demonstrated by currently depressed participants. In fact, this group generated significantly higher positive than negative self-referent endorsement ratings. Furthermore, this group endorsed significantly fewer negative content adjectives as compared to currently depressed participants. These findings run counter to priming literature pertaining to cognitive products (e.g. Miranda & Persons, 1988; Miranda, Persons, Byers 1990; Teasdale & Dent, 1987).

Incidental Recall. It was hypothesized that currently depressed participants, and remitted depressed participants in a sad mood state, would recall a greater proportion of negative as opposed to positive and neutral sociotropic words. By contrast, it was hypothesized that never depressed participants in either a negative or positive mood state, and remitted depressed participants in a neutral mood state, would recall a greater proportion of positive as opposed to negative and neutral sociotropic words.

These hypotheses were not supported in preliminary analyses (i.e., proportional incidental recall scores using combined self-referential and non-self-referential adjectives). Only a significant main effect of Stimulus Content was observed such that all participants, regardless of mood induction or depression history, recalled a significantly greater proportion of positive and negative content adjectives relative to neutral adjectives. No significant group differences in overall recall were observed. Thus, there appeared to be no general memory impairments for the free recall of adjectives.

Examination of self-referential adjectives exclusively yielded significant incidental recall biases consistent with the current literature (Alloy et al., 1997; Derry & Kuiper, 1981; Dozois & Dobson, 2001a, 2001b; Ingram & Holle, 1992; Khatri, 2002; Kuiper et al., 1983; Matt, Vazquez, & Campbell, 1992). In addition to the above noted main effect

of Stimulus Content, it was found that currently depressed participants recalled a significantly greater proportion of negative content adjectives and a significantly smaller proportion of positive content adjectives as compared to never depressed participants in negative mood. This incidental recall bias among depressives was found despite even-handed self-referent endorsement. The results suggest that currently depressed individuals possess more deeply and elaborately encoded negative self-referent information. By contrast, never depressed individuals appear to have more deeply and elaborated encoded positive self-referent information. Contrary to current mood-state dependence literature (Gilboa & Gotlib, 1997; Hedlund & Rude, 1995; Khatri, 2002; Teasdale & Dent, 1987), remitted depressed participants in negative mood did not demonstrate superior recall for negative content adjectives as compared to never depressed participants.

Analysis of within-subject effects yielded intriguing results. Contrary to expectation, currently depressed individuals recalled an equal proportion of negative versus positive content adjectives. However, as anticipated, these individuals did demonstrate superior recall for negative as compared to neutral content adjectives. Unexpectedly, remitted depressed individuals in negative mood showed superior recall for positive versus negative and neutral adjectives. Remitted depressed individuals in neutral mood showed superior recall for positive versus neutral, but not negative adjectives. As anticipated, never depressed individuals in both mood conditions demonstrated superior recall for positive versus negative and neutral adjectives. Thus, positive material may be more easily accessible to non-vulnerable individuals, while negative information may be more easily accessible to depressives.

Summary and Implications

A growing body of empirical literature supports the association between clinical depression and biased information processing. The majority of studies focus on attention and memory biases. Compared to non-psychiatric controls, depressed/dysphoric individuals have been found to "capture" a greater proportion of negative than positive information (e.g., Dozois & Dobson, 2001a, 2001b; Gotlib & McCann, 1984; Gotlib & Cane, 1987; Gotlib, McLachlan, & Katz, 1988; McCabe & Gotlib, 1995; McCabe & Gotlib, 1993). Similarly, depressed individuals have been found to recall a significantly greater proportion of negative than positive information (e.g., Bradley et al., 1995; Dozois & Dobson, 2001a, 2001b; Khatri, 2002; Matt, Vazquez, & Campbell, 1992). This body of empirical literature supports Beck et al.'s (1967) cognitive formulation, which postulates depression-associated information processing biases.

In general, the findings from the present study are also consistent with Beck et al.'s (1979) model. Currently depressed individuals endorsed, recalled, and attended to a greater proportion of negative than positive content stimuli compared to controls. Interestingly, currently depressed and never depressed individuals were distinguished differently across cognitive tasks. In the EST, currently depressed individuals exhibited a negative attentional bias (e.g., greater Stroop interference for negative as compared to positive content adjectives), whereas, never depressed individuals demonstrated an even-handed attention pattern. By contrast, in the DOAT, currently depressed participants demonstrated an even-handed deployment of attention (e.g., attended equally to positive, negative, and neutral content adjectives), whereas, never depressed participants demonstrated a partial "protective" bias (e.g., diverted attention away from negative

content adjectives, without favoring positive content adjectives). In the SRET, currently depressed participants exhibited an even-handed self-referent endorsement pattern across positive, negative and neutral adjectives, whereas, never depressed participants demonstrated a positive endorsement bias. Finally, in the IRT, currently depressed participants exhibited a partial negative recall bias (e.g., negative versus neutral), whereas the never depressed participants demonstrated a partial positive recall bias (e.g., positive versus negative and neutral).

The results are mixed in terms of potential depressogenic pathways. It may be the case that depressives and controls differ in terms of negative information processing, such that depressives attend to and elaborate a greater amount of negative information as compared to non-vulnerable individuals. In the current study, EST and IRT results support a negative information processing bias in depression. Alternatively, it may be the case that depressives and controls differ in terms of positive information processing, such that depressives fail to exhibit the positive, or protective, information processing biases typically observed among non-vulnerable individuals. In the current study, support for the absence of a positive, or protective bias, was observed in the DOAT, SRET, and IRT results. Taken together, the results suggest that depressives "capture" a greater amount of negative material relative to non-vulnerable individuals in terms of attention and cognitive elaboration.

Importantly, Beck et al.'s (1967) model implicates these processing biases as vulnerability factors for depression. However, much of the existing literature suggests that memory and attention biases normalize following recovery from depression (e.g., Gotlib & Cane, 1987; McCabe & Gotlib, 1993; Gilboa & Gotlib, 1997; Hedlund & Rude,

1995). Priming studies, which putatively activate latent maladaptive cognitive schemata, have provided evidence for the existence of stable cognitive vulnerability factors for depression. Attentional and memory biases have been observed among primed remitted depressives (e.g., Ingram, Bernet, & McLaughlin, 1994; McCabe, Gotlib, & Martin, 2000; Gilboa & Gotlib, 1997; Teasdale & Dent, 1987). These findings support the diathesis-stress model of depression. Specifically, maladaptive information processing styles (i.e., diathesis) may mediate the relationship between negative mood (i.e., stress) and depression.

In the current study, remitted depressed individuals in negative mood demonstrated negative attentional biases on the EST and DOAT, such that a greater amount of negative than positive content information was captured relative to controls, including remitted depressed participants in neutral mood. However, contrary to anticipation, remitted depressed individuals in negative mood failed to recall, or endorse as self-descriptive, a significantly greater proportion of negative than positive content adjectives. Instead, these individuals exhibited recall and endorsement patterns similar to those of never depressed participants. Thus, the attention allocation results support the diathesis-stress model of depression; whereas, the endorsement and recall results generated inconsistent results.

Methodological Considerations

A number of methodological factors may account for the various discrepancies in the existing literature on cognitive biases in depression. The following section highlights methodological strengths and limitations of the current study.

Inclusion and exclusion criteria in the present study ensured the establishment of well-controlled samples. Although the groups differed on age and marital status, these

factors were not significantly correlated with the dependent variables. In addition, exclusionary criteria ensured that the potentially confounding influences of substance abuse, psychosis, or Bipolar disorder were eliminated from the study.

As necessitated by inclusion criteria, the currently depressed group generated significantly higher mean BDI-II scores relative to both the remitted depressed and never depressed groups. Although mean BDI-II scores for the remitted depressed and never depressed groups fell within the "non-depressed" range, remitted depressed participants did generate significantly higher mean BDI-II scores relative to non-depressives. A potentially limiting factor in the present study was the inclusion of *partially remitted* participants (i.e., scored above 12 on the BDI-II). Theoretically, these participants met criteria for remission (i.e., SCID-I), but not for recovery (Frank et al., 1991). As a precaution, the data were re-analyzed using only *fully remitted* participants, and as previously noted, the results were consistent with those for the full sample. Examination of additional clinical factors supports the well-controlled nature of the samples. Specifically, currently depressed and remitted depressed participants in negative mood generated higher dysfunctional attitude scores and endorsed more sociotropic beliefs relative to never depressed participants and remitted depressed participants in neutral mood.

Also related to sample characteristics is the suggestion that attentional biases in depression are likely influenced by comorbid anxiety (Gotlib & Cane, 1989; Gotlib & MacLeod, 1997; Gotlib & Neubauer, 1999). Anxiety has been characterized by future-focused *attention* toward threat or impending danger (e.g., enhanced schematic integration), whereas depression has been characterized by past-oriented *memory* for loss

and failure experiences (e.g., enhanced schematic elaboration) (Gotlib & MacLeod, 1997). Essentially, it has been hypothesized that individuals vulnerable to anxiety should react to negative mood with enhanced integrative processing, while those vulnerable to depression should react with enhanced elaborative processing. In general, selective *attentional bias* for negative content is more apparent among anxious individuals, whereas, selective *memory bias* for negative content is more apparent among depressed individuals (Gotlib & MacLeod, 1997). Thus, *attentional* biases toward negative content in depression could potentially be confounded, or inflated, by comorbid anxiety. In the current study, 22% of currently depressed and 10% of remitted depressed participants met criteria for at least one Anxiety Disorder. This group disparity, however, was non-significant. By inclusion criteria, the never depressed sample had no Anxiety Disorders. The present study is limited in the sense that although comorbidity information was collected, no "pure depressive" sample was generated.

Experimental stimulus diversity across studies may also account for discrepancies in the literature. Content-specificity has been recognized as a critical prerequisite for detecting maladaptive cognitive biases (Gotlib & Neubauer, 1999; Ingram et al., 1998). Specifically, stimuli must be both self-descriptive and depressogenic in nature. Many of the studies in the literature do not use depression-relevant stimuli (e.g., general negative affect-stimuli) or assess for self-descriptiveness. The current study offered advantages in these regards. Specifically, an empirically derived set of interpersonally oriented positive and negative adjectives matched for degree of valence, emotional intensity, imagability, and word frequency was selected. Sociotropy, or interpersonal orientation, has been associated with vulnerability to depression (Beck, 1983; Dozois & Backs-Dermott, 2000).

Future research is needed to determine whether consistent results would emerge using only "autonomous" (i.e., achievement-oriented) stimuli. An empirically derived set of neutral, but not necessarily interpersonally-oriented, adjectives was added to the stimuli set to provide baseline data. Use of neutral adjectives, as opposed to non-lexical stimuli, permitted comparison with positive and negative interpersonally-oriented adjectives. Specifically, it was possible to compare groups in terms of neutral versus positive and negative incidental recall, as opposed to simply positive versus negative recall. Notably, the current study is limited in the sense that the neutral adjectives were not rated for emotional intensity, imaginability, or frequency of word use and length, as were the positive and negative adjectives. Finally, the current study assessed the significance of using an exclusively self-descriptive adjective set. No significant differences were found on the EST, although power may have been a factor. However, on the IRT, meaningful results consistent with the literature emerged when self-referent adjectives exclusively were included.

Methodological factors associated with the assessment of temporal stability of cognitive biases in depression warrant consideration. Beck's (1967) cognitive model of depression postulates the existence of a *stable* negative self-referent schemata in depression, which according to a growing body of literature, becomes less *accessible* as an episode of depression remits (see Ingram et al., 1998). Priming designs, which putatively activate dormant schemata, have been used to investigate the existence of cognitive vulnerability factors in remitted depression. Researchers have documented cognitive information processing biases, as well as cognitive product biases, among remitted depressives that are not attributable to transient mood (e.g., Gotlib & McCann,

1984; Ingram, 1984). Similarly, the priming design used in the current study offered the methodological advantage of teasing apart stable cognitive vulnerability factors versus transient mood effects. Specifically, never depressed and remitted depressed groups were divided and assigned randomly to either a negative or neutral mood condition. On the EST and DOAT (i.e., cognitive integration), remitted depressives in negative mood were differentiated from never depressed controls (regardless of mood) and remitted depressives in neutral mood, but indistinguishable from depressives. This pattern of findings indicate that depression-prone individuals respond differently to *negative* mood than do non-vulnerable individuals, and furthermore, supports the notion that remitted depressives possess latent negative attention allocation biases. On the IRT (i.e., cognitive elaboration), remitted depressives were differentiated from never depressed controls (regardless of mood) and remitted depressives in neutral mood, but also were distinguishable from depressives in terms of not demonstrating the anticipated negative content recall bias. On the SRET (i.e., cognitive product), remitted depressives were not differentiated from never depressed controls or remitted depressives in neutral mood, but were distinguished from depressives. Thus, despite the theoretical suggestion that *attentional* biases are less "robust" as compared to *memory* biases in depression (see Gotlib & Neubauer, 1999), the current study suggests that attentional biases are more consistent as compared to memory biases.

However, a number of methodological factors may account for the intuitively inconsistent findings. Depression history (i.e., number of previous episodes) likely influences degree of information processing bias (Davis, 1979a, 1979b; Davis & Unruh, 1981; Williams & Nulty, 1986). The significance of depression history makes intuitive

sense from a developmental perspective – the more chronic or persistent the depression, the more integrated and well elaborated is the depressogenic schemata likely to be. Many studies have not considered, or at least have not reported, information pertaining to depression history in their samples. In the current study, depression history (e.g., number of previous episodes) was assessed. Remitted depressed participants estimated having experienced fewer MDEs as compared to currently depressed participants, although this discrepancy was not significant after controlling for Type I error rates. It is certainly possible that remitted depressives in this study did not possess as well elaborated cognitive schemata as depressives, who demonstrated robust incidental recall biases. However, the observed attentional biases among remitted depressives in negative mood conflict with this hypothesis.

A more plausible explanation for the disparate findings relates to the mood priming design. Specifically, the efficacy of the mood manipulation must be considered. Visual analogue data suggests that the negative mood manipulation was effective in generating significant mood shifts. Although the negative mood prime produced significant negative mood shifts on pre-induction versus post-induction and pre-induction versus post-experiment VAS ratings, further analyses indicate that the negative mood shift decayed over the course of the experiment. Specifically, a series of t-tests revealed that post-experiment negative mood ratings were significantly lower than post-induction mood ratings. This apparent decay occurred despite mood boosts, which were initiated each time VAS ratings fell below the original post-mood induction VAS ratings and the minimum 20-point shift was lost. Approximately 42 percent of the negatively mood induced sample received mood boosts. No post-mood boost VAS ratings were obtained in

order to minimize demand characteristics. Rather, the mood manipulation exclusionary criteria depended solely on the initial post-mood induction shift of 20-points. Importantly, the SRET and IRT were administered following the EST and DOAT tasks. Thus, failure to find the hypothesized SRET and IRT effects among remitted depressed participants in negative mood may be partly attributable to decay of transient negative mood.

An intriguing alternative hypothesis for the disparate *attention* versus *memory* biases found among remitted depressives relates to the focus of the sad mood manipulation. The negative prime was self-referential (e.g., autobiographical) and depression-relevant (e.g., loss focused). However, it was also future-focused: "imagine the sudden death of a loved individual who is currently part of your life". As previous noted, anxiety has been conceptualized in terms of future-focused threat, whereas, depression has been conceptualized in terms of past loss or failure (Gotlib & MacLeod, 1997). This conceptualization fits with empirical literature documenting more robust cognitive elaboration as compared to integration in depression, with the reverse true for anxiety. It is certainly conceivable that the future-focused negative mood manipulation sensitized depression-prone individuals towards potential threat and subsequently facilitated detection of cognitive integration biases on attentional tasks. A strictly past-focus negative mood manipulation may have generated more pronounced memory processing biases.

A considerable advantage of the present study was the inclusion of multiple measures of cognitive functioning. The same well-controlled stimulus set was used across experimental tasks, with the exception of the DOAT in which the complete set was reduced for logistical purposes. Three measures of *cognitive product* (i.e., DAS, SAS,

SRET), two measures of *attentional processing* (i.e., EST, DOAT), and one measure of *memory processing* (i.e., IRT) were administered to provide an integrated assessment of stable cognitive vulnerability factors associated with depression. The two attentional processing tasks (i.e., EST and DOAT) were included in the current study to enhance interpretative clarity. Unlike the DOAT, the EST presents only one perceptual stimulus at a time. The difficulty involves differentiating input (e.g., attention) from output (e.g., response) biases. Specifically, the "to-be-selected" and "to-be-ignored" aspects of the Stroop display are integrated into one perceptual object. Response differences may emerge in the initial attention stage, or alternatively, in a subsequent processing stage. The DOAT uses a forced choice format to circumvent this limitation. Specifically, the to-be-selected and to-be-ignored aspects of the DOAT display are not integrated as in the Stroop format. Furthermore, the disparity in deployment of attention observed between dysphoric/depressed individual and controls cannot be accounted for by group differences due to psychomotor retardation effects (see McCabe & Toman, 2000).

Ingram et al. (1998) emphasize the important of variable sensitivity, specificity, and stability in detecting cognitive vulnerability factors. The variable measurement must be adequately *sensitive* to detect between and/or within group differences. The criterion of sensitivity was attained such that negative information processing biases were detected among depressives. *Specificity* requires that that variable be observed more frequently among depressives than controls. Specificity was observed such that depressives generated information processing biases distinct from those generated by controls. Finally, *stability* implies that the variable is available (but not necessarily accessible) among vulnerable individuals. Stability was observed among primed remitted depressives

on the attention tasks (i.e., EST and DOAT), but not on the endorsement (i.e., SRET) or recall tasks (i.e., IRT).

The current study has some limits in terms of external validity. Evidence suggests that interpersonally-oriented word stimuli (i.e., sociotropic) are more salient to depression, particularly among woman, than autonomous word stimuli (Beck, 1987). However, the exclusively female sample, and consequent decision to use sociotropic word stimuli limits the generalizability of the results to men as well as to non-sociotropically oriented word stimuli. Future research is required to assess gender differences in cognitive vulnerability to depression. In addition, individuals who met criteria for Substance Abuse, Psychosis, and/or Bipolar Disorder were excluded from the study to enhance internal validity. Again, generalizability was compromised.

The external validity of the current study is also limited with respect to ethnic diversity. Ninety-five percent of the sample was Caucasian. Diversity issues in cognitive vulnerability to depression research have not been emphasized. Thus, it is not known whether the observed findings would generalize to ethnic minority populations. This limitation represents an important area for future research.

Future Research

The current study employed a priming design to assess the complexities of Beck's *diathesis-stress* model of depression. Specifically, the negative mood manipulation was used to activate (i.e., *stress*) hypothesized maladaptive self-referent cognitive structures in depression (i.e., *diathesis*). Importantly, cognitive models of depression not only propose the existence of latent schemata, but also suggest that these maladaptive schemas play a causal role in depression. Although priming designs closely parallel the theoretical

parameters of cognitive vulnerability models of depression, they do not address whether the detected cognitive factors are causally related to depression. Rather, the observed cognitive factor may represent an effect of previous MDEs (i.e., scars). Prospective studies demonstrating that cognitive activation is predictive of either the onset or maintenance of clinical depression are needed to address causality.

Future empirical research aimed at elucidating putative depressogenic pathways is warranted. Cognitive theories of depression have typically focused on the activation of cognitive processes in depression, and in particular, the notion that depressed individuals process negative material more efficiently than positive material. However, it has become apparent that maladaptive information processing in depression may involve a failure to demonstrate the positive, or protective, biases observed among non-vulnerable individuals. Future research in this area is warranted.

In a recent study, Dozois and Dobson (2001b) examined the stability of cognitive *organization* in depression. Results of the study suggest that negative cognitive organization (i.e., structures, propositions), unlike negative information processing, appears to be stable over time and less susceptible to deactivation upon remission. Thus, negative cognitive organization may represent a stable cognitive vulnerability marker for depression. Again, prospective research is needed to infer causality.

Future research aimed at uncovering the therapeutic mechanisms underlying various treatment approaches (e.g., cognitive-behavioral therapy versus pharmacotherapy) would represent a significant contribution to the literature. The disproportionately high relapse rate for pharmacotherapy versus CBT at follow-up may be attributable to cognitive change. Specifically, it may be that CBT facilitates the

deactivation of maladaptive information processing in depression. This hypothesis is supported by a growing body of priming literature. Alternatively, CBT may actually alter stable self-referent organization, either by way of dismantling negative schemas or by generating positive schemas. Prospective examination of cognitive vulnerability factors in depression, at all levels of cognitive taxonomy, will undoubtedly enhance understanding of the factors associated with the onset, maintenance, and recurrent of clinical depression. Insight into cognitive risk factors associated the depression will hopefully result in the enhanced treatment and prevention of the disorder.

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Appendix A

Research Project:	Development of a Positive, Negative, and Neutral Adjective Word Set
Investigators:	Kate Hamilton, M.Sc. & Keith Dobson, Ph.D.

This consent form, a copy of which has been given to you, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The purpose of this study is to develop equivalent lists of positive, negative, and neutral affect adjectives for an upcoming research project. Participation in this pilot study will involve rating 150 adjectives on the degree to which you think they reflect a positive, neutral, or negative trait. Participation will require approximately 20 minutes. You are free to withdraw from the study at any point without penalty. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

In signing this form I fully understand that I am participating in this study as part of my educational experience in the psychology Department. In exchange for my time I expect to gain some understanding of research and some of the ideas currently being explored in psychology. If, after the study, I feel I have not gained sufficient educational benefit, or have other concerns regarding this experience, I may register my concerns with Dr. S. D. Boon, Chair: Psychology Department Ethics Committee (Human Participants). She will insure that my comments are acted upon with no fear that I will be identified personally. Dr. Boon can be reached at: A231B, 220-5564, sdboon@ucalgary.ca.

If you have further questions concerning matters related to this research, please contact:

Kate Hamilton: 220-3697
Keith S. Dobson: 220-5096

If you have any questions concerning your participation in this project, you may also contact Mrs. Patricia Evans, Research Services Office, Room 602 Earth Sciences, telephone: 220-3782.

Participant Signature Date

Investigator Date

Appendix B

VALENCE RATINGS

On the following pages you will find a list of adjectives that can be used to describe people. Each adjective differs in terms of how positive, neutral, or negative it is. Under each adjective is a rating scale numbered 1 through 7. On this scale, number 1 indicates "extremely negative" and number 7 indicates "extremely positive". Number 4 indicates that you perceive the adjective to be neutral. For example:

THRIFTY

Extremely Negative			Neutral			Extremely Positive
1	2	3	4	5	6	7

Your task is to rate each adjective on the degree to which you think it reflects a positive, neutral, or negative trait. When you have decided upon a rating, indicate your choice by circling one of the numbers on the scale by the adjective. For example, if you believe that the adjective "thrifty" is extremely negative, then you should circle number 1. Conversely, you might perceive the adjective "beautiful" to be extremely positive and you should therefore circle number 7 on the rating scale. Adjectives that you feel are intermediate in degree of positivity or negativity should be rated appropriately between the two extremes.

Please work through the adjectives in order, without skipping any. Work fairly quickly, and feel free to use the entire range of numbers 1 through 7 in 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 right or wrong answers, so just put down what you honestly feel to be true. Please raise your hand if you have any questions.

Appendix C

Research Project Title: Mood and Cognition
Investigators: Kate E. Hamilton, Ph.D. Candidate & Keith S. Dobson, Ph.D.

This consent form, a copy of which has been given to you, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The purpose of this study is to examine the effect of mood on thinking styles in individuals with current depression and past (remitted) depression. A control group of individuals who have never been depressed will be used for comparison. Participation will involve: a) a brief interview, b) a randomly selected negative or neutral mood induction, c) several self-report inventories, and d) several brief computer tasks. Participation in this study will require approximately 1 to 2 hours. Participants randomly selected to undergo a negative mood induction procedure will undergo a positive mood induction procedure prior to leaving the laboratory. **Currently depressed individuals will not undergo any mood induction procedures.** All participants will be provided with mental health care contact information.

Participant information will be kept in strict confidence within the limits of the law. Limits to confidentiality include: a) harm to self or others, and b) child abuse. All documents will be locked in a secure storage area and, with the exception of the principal investigators and/or research assistants, no one will have access to participant information. Research publications that may follow from this study will only present group results – no identifying information will be released. Participant information will be destroyed five years after publication of the research. Participants may request a copy of the final results upon completion of the research project.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. If you have further questions concerning matters related to this research, please contact:

Kate Hamilton: 220-3697
Dr. Keith Dobson: 220-5096

If you have any questions or issues concerning this project that are not related to the specifics of the research, you may also contact the Research Services Office at 220-3782 and ask for Mrs. Patricia Evans.

Participant's Signature Date

Investigator Date

Appendix D

POSITIVE STIMULI	NEGATIVE STIMULI	NEUTRAL STIMULI
Admired	Aggressive	Absorbed
Approving	Alone	Abstract
Comical	Annoying	Ambiguous
Communicative	Attention-seeker	Bewildered
Confiding	Bossy	Brisk
Connected	Combative	Buoyant
Delightful	Controlling	Cautious
Desirable	Criticized	Complying
Encouraged	Demanding	Concrete
Energetic	Dependent	Convincing
Entertaining	Forceful	Direct
Extroverted	Gossiper	Discrete
Gentle	Hot-tempered	Distinct
Gifted	Immature	Dominant
Gracious	Impatient	Engrossed
Hilarious	Insecure	Frank
Humble	Irritable	Frisky
Joyful	Judgmental	Insistent
Lively	Lazy	Judicious
Marvelous	Lonely	Limber
Neighbourly	Lonesome	Mellow
Nonjudgmental	Needy	Nimble
Outgoing	Overbearing	Pensive
Playful	Pessimistic	Protective
Pleasurable	Possessive	Puzzled
Selfless	Pushy	Quiet
Soft-hearted	Quarrelsome	Resolute
Spontaneous	Resentful	Robust
Valuable	Showy	Systematic
Wonderful	Unassertive	Transparent

Appendix E

DAS

This inventory lists different attitudes or beliefs that people sometimes hold. Read EACH statement carefully and decide how much you agree or disagree with the statement by circling the number that BEST DESCRIBES HOW YOU THINK. There are no right or wrong answers to these statements.

1	TOTALLY DISAGREE
2	DISAGREE VERY MUCH
3	DISAGREE SLIGHTLY
4	NEUTRAL
5	AGREE SLIGHTLY
6	AGREE VERY MUCH
7	TOTALLY AGREE

It is difficult to be happy unless one is good looking, intelligent, rich and creative	1 2 3 4 5 6 7
Happiness is more a matter of my attitude towards myself than the way other people feel about me	1 2 3 4 5 6 7
People will probably think less of me if I make a mistake	1 2 3 4 5 6 7
If I do not do well all the time, people will not respect me	1 2 3 4 5 6 7
Taking even a small risk is foolish because the loss is likely to be a disaster	1 2 3 4 5 6 7
It is possible to gain another person's respect without being especially talented at anything	1 2 3 4 5 6 7
I cannot be happy unless most people I know admire me	1 2 3 4 5 6 7
If a person asks for help, it is a sign of weakness	1 2 3 4 5 6 7
If I do not do as well as other people, it means I am an inferior human being	1 2 3 4 5 6 7
If I fail at my work, then I am a failure as a person	1 2 3 4 5 6 7
If you cannot do something well, there is little point in doing it at All	1 2 3 4 5 6 7
Making mistakes is fine because I can learn from them	1 2 3 4 5 6 7
If someone disagrees with me, it probably indicates he does not like me	1 2 3 4 5 6 7
If I fail partly, it is as bad as being a complete failure	1 2 3 4 5 6 7
If other people know what you are really like, they will think less of you	1 2 3 4 5 6 7

I am nothing if a person I love doesn't love me	1 2 3 4 5 6 7
One can get pleasure from an activity regardless of the end result	1 2 3 4 5 6 7
People should have a reasonable likelihood of success before undertaking anything	1 2 3 4 5 6 7
My value as a person depends greatly on what others think of me	1 2 3 4 5 6 7
If I don't set the highest standards for myself, I am likely to end up a second-rate person	1 2 3 4 5 6 7
If I am to be a worthwhile person, I must be truly outstanding in at least one major respect	1 2 3 4 5 6 7
People who have good ideas are more worthy than those who do not	1 2 3 4 5 6 7
I should be upset if I make a mistake	1 2 3 4 5 6 7
My own opinions of myself are more important than other's opinions of me	1 2 3 4 5 6 7
To be a good, moral, worthwhile person, I must help everyone who needs it	1 2 3 4 5 6 7
If I ask a question, it makes me look inferior	1 2 3 4 5 6 7
It is awful to be disapproved of by people important to you	1 2 3 4 5 6 7
If you don't have other people to lean on, you are bound to be sad	1 2 3 4 5 6 7
I can reach important goals without slave driving myself	1 2 3 4 5 6 7
It is possible for a person to be scolded and not to get upset	1 2 3 4 5 6 7
I cannot trust other people because they might be cruel to me	1 2 3 4 5 6 7
If others dislike you, you cannot be happy	1 2 3 4 5 6 7
It is best to give up your own interests in order to please other people	1 2 3 4 5 6 7
My happiness depends more on other people than it does on me	1 2 3 4 5 6 7
I do not need the approval of other people in order to be happy	1 2 3 4 5 6 7
If a person avoids problems, the problems tend to go away	1 2 3 4 5 6 7
I can be happy even if I miss out on many of the good things in life	1 2 3 4 5 6 7
What other people think about me is very important	1 2 3 4 5 6 7
Being isolated from others is bound to lead to unhappiness	1 2 3 4 5 6 7
I can find happiness without being loved by another person	1 2 3 4 5 6 7

Appendix F

Please indicate your CURRENT mood by placing a slash across the line below. Zero indicates positive mood and 100 indicates negative mood (e.g., sadness).

0 — 100

Positive — Negative

You have been assigned randomly to participate in a negative mood condition, which involves trying to get yourself into a sad mood. To facilitate and maintain this sad mood, a piece of music will play in the background. For the next few minutes, we would like you to imagine the sudden death of a loved individual who is currently part of your life. Please put forth your best effort toward achieving a negative mood state.

Appendix G

Please indicate your CURRENT mood by placing a slash across the line below. Zero indicates positive mood and 100 indicates negative mood (e.g., sadness).

0 — 100

Positive — Negative

In the space provided, please draw a map of a driving route from any local hospital to the University of Calgary Administration Building. Please label the street names of the roads you choose.

Appendix H

Please indicate your CURRENT mood by placing a slash across the line below. Zero indicates positive mood and 100 indicates negative mood (e.g., sadness).

0 — 100
Positive — Negative

Having participated in a negative mood condition, we believe it is important for you to participate in a positive mood condition. We do not want you to leave the study in a mood more negative than the one with which you entered. While listening to the music, please think about the most positive event, real or imagined, in your life. Write a short paragraph about this event.