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Running head: DEPRESSION AND HYPOMANIA

Selective Processing of Emotional Information in Subclinical Depression and Hypomania

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M. A. Thesis

Lakehead University

June 29, 1998

Submitted in partial fulfillment of the degree of Master of Arts, Clinical Psychology

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Abstract

Cognitive theories of emotion (e.g., Beck, 1976) posit that selective-processing biases for mood-congruent information serve to maintain the affective states associated with various emotional disorders. The present study investigated selective processing of depressed-, manic-, and neutral-content information in subclinical depression and hypomania using a modified Stroop colour-naming task and an explicit recall task. Sixty undergraduate students volunteered as participants and were allocated to dysphoric, hypomanic, and control groups (N = 20 per group) based on self-report data ascertained prior to the experiment. Contrary to predictions, none of the groups exhibited an attentional bias toward any of the three categories of stimuli as assessed by the Stroop task. However, group differences were evident on the recall task. Specifically, the dysphoric group recalled a smaller proportion of neutral information than the other groups and also recalled a greater proportion of depressed-content information than the hypomanic group only. Supplementary analyses revealed that anxiety displayed a stronger relationship with Stroop variables than did depression. Conversely, depression displayed a stronger relationship with recall variables than did anxiety. Results are discussed within both Beck's (1976) and Williams, Watts, MacLeod, and Mathews' (1988) cognitive frameworks. Methodological differences between the present study and previous Stroop investigations are highlighted and, finally, recommendations for future research on information processing in both hypomania and depression are made.

Acknowledgements

There are a number of individuals whom I must acknowledge for helping make this thesis possible. First, I owe so much to Dr. Mazmanian whose careful guidance, support, and generosity over the past two years have allowed me to grow as a scientist and an individual -- thank you. Thank you to Dr. Hayman for all of his assistance throughout the proposal and revision stages of the study. To Dr. Tan and Dr. Dobson, thank you for the supportive comments, thought-provoking questions, and suggestions for the final draft.

A special thanks is in order to all of those people who invested their own time in this project. Most notably, Greg Siegle for his numerous prompt revisions of the Stroop software; Troy Machan for his computer prowess and for locating the software; Barb Backs and Dr. Dobson for providing the word list and the corresponding thesis; the Mood Disorders class for rating all of those words; Francois Rousseau for helping out as a pilot subject; and Kirsten Barr for giving this thesis one final critical glance before it was sent off to the external reader.

Last, but not least, I would like to thank my family and friends for their endless support over the last two years. Without them, none of this would have been possible.

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Selective Processing of Emotional Information in Subclinical Depression and Hypomania

The development of cognitive theories of emotion (e.g., Beck, 1976; Williams, Watts, MacLeod, & Mathews, 1988) has drawn attention to the potential role of cognitive structures, or schemata, in vulnerability to unipolar depression, as well as the onset and maintenance of depressive symptomatology. A vast amount of research has accumulated over the past two decades investigating the proposal that individuals who are depressed have a tendency to selectively process information that is congruent with the nature of their disorder (for reviews see Haaga, Dyck, & Ernst, 1991; Mathews & MacLeod, 1994). In contrast to unipolar depression, bipolar disorder has received relatively little attention with respect to cognitive theory, leaving a large gap in our understanding of the cognitive mechanisms associated with this illness.

The purpose of the present study was to investigate selective processing of emotional information in subclinical depression and hypomania by extending an information-processing paradigm commonly used in studies of depression, the Stroop colour-naming task, to a sample of students with hypomania.

The Unipolar-Bipolar Distinction

Unipolar depression (major depressive disorder) has a lifetime risk of 5% to 25% in the general population with females being two to three times more likely than males to manifest the disorder (American Psychiatric Association [APA], 1994). Bipolar disorder, on the other hand, occurs with equal frequency in both sexes, but is less common, with a

lifetime prevalence of 0.4% to 1.6% (APA, 1994). Both disorders share a common core symptomatology characterized by a clinical course that includes one or more episodes of depressed mood or anhedonia, each of which must persist without remission for at least two weeks (APA, 1994). The essential feature that discriminates bipolar from unipolar disorder is the presence of at least one episode of mania (bipolar I disorder), hypomania (bipolar II disorder), or, less common, the presence of at least one mixed episode (APA, 1994). Manic and hypomanic episodes are defined as distinct periods of elevated, expansive, or irritable mood. In a manic episode, the period must last at least a week and cause marked impairment of functioning. Hypomania is less impairing and typically lasts a shorter period of time (i.e., at least four days; APA, 1994). Mixed episodes, on the other hand, are characterized by periods of at least a week during which the criteria for both a manic episode and a depressive episode are met simultaneously (APA, 1994). Although episodes of mania have been noted in individuals without a history of depression and are classified under the bipolar I rubric (APA, 1994), this presentation appears to be quite rare (Goodwin & Jamison, 1990). Researchers hypothesize that individuals identified as manifesting unipolar mania have either had past unreported depressions or inevitably develop depressive symptoms as their illness progresses (Goodwin & Jamison, 1990).

Present-day classification systems categorize unipolar and bipolar disorder as separate psychopathological entities based on the presence or absence of mania or hypomania. Historically, however, this has not always been the case. Based on their common core symptomatology, recurrent episodic course, and family history of the same

illness, Kraepelin (1921) posited that depression and mania were manifestations of "a single morbid process" (p. 1) which he termed manic-depressive insanity. More recent developments in this area have served to validate Kraepelin's original views. For example, the physiological processes which underly both unipolar and bipolar depressions have been shown to be analogous (APA, 1994; Perris, 1992), as are responses to lithium prophylaxis in recurrent forms of bipolar and unipolar disorder (Goodwin & Jamison, 1990). Central to Kraepelin's observations was the notion that both depression and mania represent separate mood spectrums which can vary from subtle fluctuations in normal mood to full blown depressive or manic episodes. However, although he speculated about the possible mechanisms underlying these states, Kraepelin (1921) admitted that ". . . about the nature of manic-depressive insanity we are still in complete uncertainty" (p.181).

It is now generally recognized that unipolar depression involves a complex interaction between biological, social, developmental, behavioural, affective, and cognitive factors (Beckham & Leber, 1995). Research on bipolar disorder has also been fruitful in determining associated biological and physiological mechanisms. However, psychological theories of bipolar disorder, particularly mania and hypomania, are limited. For example, psychodynamic accounts suggest that manic states occur as a defence against feelings of depression (e.g., Schwartz, 1961). However, these accounts have been criticized for lacking falsifiable hypotheses (Winters & Neale, 1985) as well as for their inability to account for mixed episodes (Kotin & Goodwin, 1972). An alternative

theoretical perspective with regards to mania and hypomania comes from Beck (1976), whose cognitive model of depression has been rigorously investigated while his claims about mania have received little empirical attention.

Beck's Cognitive Model of Emotion

Beck's (1976) cognitive theory of emotions postulates that basic emotions such as sadness and elation are determined by the manner in which an individual interprets or perceives an event rather than the specific characteristics of the event itself. Sadness is evoked when there is a perception of loss, defeat, or deprivation, which in turn results in withdrawal of interest in the source of disappointment. In contrast, elation follows from a perception of gain which in turn increases goal-directed activity. Both sadness and elation are believed to be highly adaptive processes when experienced in moderation. However, in their extreme forms, these emotions and their antecedent cognitive interpretations can become highly dysfunctional (Beck, 1976).

Beck (1976) posited that psychopathological states such as depression and mania represent exaggerated and persistent forms of sadness and elation, respectively. In depression, the perception of loss is unremitting and pervasive in all facets of the individual's life. The idiosyncratic ideational content of the depressed patient is reflected in what Beck (1967) has termed the negative cognitive triad. The triad is manifested in all depressive disorders regardless of subtype (Sacco & Beck, 1995) and is composed of a negative view of the self, a negative interpretation of experiences, and negative expectancies about the future. Depressed persons regard themselves as undesirable,

unworthy, and incapable; they misinterpret their interactions with the environment as representing defeat and deprivation; and they anticipate that current difficulties or suffering will continue indefinitely (Beck, Rush, Shaw, & Emery, 1979). Consequently, these negative evaluations lead to increases in depressive affect, decreases in motivation, and an escalation of the behavioural symptoms of depression such as avoidance and psychomotor retardation. In contrast, the thought content of the hypomanic or manic patient is the reverse of that of the depressed individual (Beck, 1976). In a hypomanic or manic state, individuals perceive a significant gain in each of their life experiences. They have exaggerated ideas of their abilities, they indiscriminantly attribute positive values to their experiences, and they unrealistically expect favourable results from their endeavours. These positive evaluations lead to feelings of euphoria, increases in motivation, and an exacerbation of the behavioural symptoms associated with hypomanic or manic states.

Within Beck's model, cognitive schemas are proposed as hypothetical structures which maintain the functional views associated with emotional well-being and the dysfunctional views associated with emotional disorders. Functioning like templates, schemas are responsible for the encoding, storage, and retrieval of information. Although they vary from person to person in terms of their content, valence, permeability, density, and flexibility, schemas represent stable cognitive patterns within an individual and are believed to be shaped by early life experiences (Beck et al., 1979; Beck, 1991). In psychopathology, schemas tend to be global, rigid, and toned by the nature of the

particular disorder. Prior to, and between episodes, these cognitive structures lie dormant but are activated by environmental stressors which are congruent with the ideational content of the schemas. Once activated, idiosyncratic schemas interfere with other cognitive structures involved in reality testing and reasoning which results in systematic errors in information processing, or cognitive distortions. Consequently, individuals who are experiencing a psychopathological state, such as depression or mania, inaccurately perceive their environment and thus, the symptoms associated with their state will be maintained or exacerbated (Beck, 1976).

Beck (1967) described several common systematic errors which reflect the activity of dysfunctional cognitive schemas. These include arbitrary inference, selective abstraction, overgeneralization, magnification and minimization, personalization, and dichotomous thinking. Each type of error reflects a common theme of reflexive thinking which seems plausible to the patient even though implausible to others. Furthermore, these "automatic thoughts" are presumed to be pervasive even in the presence of contradictory evidence (Beck, 1976). As psychopathology becomes intensified, patients show a progressively greater degree of distortion and an increasing fixation on the distortions until, in extreme cases, the patient loses all voluntary control over his or her thought processes.

Cognitive Assessment of Emotional Disorders

In assessing the validity of cognitive theories of emotion, researchers have focussed on three interrelated facets of cognitive theory, namely: *cognitive product*

variables, which include automatic thoughts, causal attributions, and perceptions about the self, world, and future; *cognitive process variables*, such as distortions in logical thought; and *cognitive schemas* (Segal & Swallow, 1994). Research paradigms involving the assessment of product and process variables in depressed populations have generally relied on questionnaires or structured interviews to make inferences about higher-order cognitive schemas (e.g., Hollon, Kendall, & Lumry, 1986). While these methods carry considerable face validity, they operate at the level of an individual's awareness and are therefore highly susceptible to self-representational biases (Dalgleish & Watts, 1990; Segal & Swallow, 1994). In light of this difficulty, depression investigators have sought to incorporate information-processing paradigms to examine how depressed subjects process material that is relevant to their disorder. It is generally believed that these procedures employ a more direct, and less transparent, approach to assessing depressogenic schemas (Dalgleish & Watts, 1990; Mathews & MacLeod, 1994; Segal & Swallow, 1994).

The Stroop Colour-Naming Task

The Stroop colour-naming task is an example of an information-processing paradigm that has been used to assess selective processing of negative stimuli in individuals who are depressed. The original Stroop procedure requires participants to name the colour of ink in which colour-words are printed, while attempting to ignore the word itself (Stroop, 1935). Participants typically demonstrate longer reaction times to words that are antagonistic colour names (e.g., the word *green* printed in red ink) in

comparison to meaningless stimuli (e.g., XXXX) or irrelevant words (e.g., table). This difference in response latency can be attributed to the content of the base item interfering with the colour of the ink in which it is printed. An extension of this original paradigm involves having individuals with emotional concerns (e.g., depression) colour-name words of varying emotional significance. In accordance with cognitive theory, words that are reflective of the individuals' emotional concerns should produce more interference than words that are perceived as emotionally neutral, this supposedly due to the greater effort required to suppress the meaning of stimulus words that are congruent with the content of emotionally-toned schemas (Segal & Swallow, 1994).

Depression and Stroop Interference

The earliest study to assess Stroop interference in depression was carried out by Gotlib and McCann (1984). Undergraduate students separated into "depressed" and "nondepressed" groups according to their scores on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) were asked to colour-name neutral, manic, and depressive words presented on a tachistoscope. Results showed that the valence of the word had little effect on the response latencies of the nondepressed group; however, the depressed students were significantly slower to respond to the depressed words in comparison to the neutral and manic words. Interestingly, a follow-up mood induction study (albeit with a different sample) demonstrated that students who were made to feel depressed prior to testing did not manifest a similar response bias for depressive words. Thus, Gotlib and McCann (1984) suggested that the Stroop effect

observed in the former study was mood-independent and was reflective of "stable cognitive differences associated with depression" (p. 434).

Williams and Nulty (1986) provided further evidence for Gotlib and McCann's (1984) claim. The authors presented neutral and negative words to a sample of depressed and nondepressed women who were categorized based on their scores on a short form of the BDI. Results indicated that levels of depression at the time of testing had a slight, yet non-significant, effect on colour-naming latencies in the depressed group. However, when participants were categorized into groups based on archival depression scores acquired 12 months prior to the study, the depressed group took significantly longer to colour-name the negative words than the neutral words, whereas this effect was not present in the nondepressed group. An additional finding, and perhaps the most crucial to the issue of cognitive stability, demonstrated that only a small proportion of participants who were nondepressed on both occasions showed Stroop interference, whereas a substantially larger proportion of women (51% more) who were depressed on both occasions showed interference.

Gotlib and Cane (1987) attempted to extend the findings of the aforementioned studies by investigating Stroop interference in a clinical population. Hospitalized depressed patients and non-psychiatric controls were presented with the same manic, neutral, and depressive words as were employed in Gotlib and McCann's (1984) study. The results were consistent with previous findings. Depressed patients exhibited significantly more interference with the depressive words than the manic and neutral

stimuli. Furthermore, these interference effects were not present in the control group. In an effort to examine the stability of these differences in schematic accessibility, the authors retested the depressed group within a week following their discharge, when they were no longer clinically depressed. In comparison to their response latencies when depressed, the clinical group was quicker to colour-name the depressive words. Furthermore, there were no differences in response latencies when compared to time-matched controls and there was no evidence of an interference effect on the depressive words. Gotlib and Cane interpreted their results as supportive of an increased accessibility to negative schemas in depressed people which, furthermore, exhibits a direct relationship with changes in depressive symptomatology.

Further evidence supporting the value of the Stroop task in studying the cognitive mechanisms associated with depression comes from studies that have further demonstrated attention biases toward negative information (e.g., Klieger & Cordner, 1990) and studies that have built upon these original tenets to make inferences about the organization of negative self-referent schemas in depression (e.g., Segal, Hood, Shaw, & Higgins, 1988; Segal, Truchon, Horowitz, Gemar, & Guirguis, 1995). Other researchers in this area, however, have failed to find supportive results with the Stroop. For example, Hedlund and Rude (1995) found no evidence of selective processing of depressed-content words on the Stroop in their sample of clinically-depressed participants. Interestingly, this nil effect was found despite significant findings on two other information processing tasks (i.e., an incidental recall task and a scrambled-sentences task). Moreover, others

have found that colour-naming latencies for negative words do not differ between depressed samples and non-clinical controls (Carter, Maddock, & Magliozzi, 1992; Hill & Knowles, 1991; Mogg, Bradley, Williams, & Mathews, 1993).

Process Specificity Effects

Inconsistent findings in the aforementioned literature limit the extent to which explicit conclusions can be drawn regarding depression, the Stroop task, and selective processing of negative information. Recently, however, cognitive theorists such as Williams et al. (1988) have made assertions about the nature of selective processing and psychopathology that may serve to elucidate past discrepancies in the literature and provide a theoretical framework within which researchers can model future experimental paradigms. While Beck's (1976) theory assumes that depressogenic schemas bias all aspects of information processing including encoding, storage, and retrieval of information, Williams et al. (1988) have postulated that different emotions may influence different levels or stages of processing. Specifically, based on an extensive review of the relevant literature and corresponding adaptational theories of emotion, these processing-specificity theorists have asserted that depression is believed to primarily affect active/strategic cognitive processing, such as explicit recall of information, whereas anxiety is believed to operate primarily on passive/automatic processing such as information accessibility and attention (Williams et al., 1988). Given that Stroop interference is most commonly thought of as a measure of attentional bias (MacLeod, 1991; Williams, Mathews, & MacLeod, 1996), Williams et al.'s (1988) theory calls into

question the interpretations made by previous Stroop and depression researchers (e.g., Gotlib & Cane, 1987; Gotlib & McCann, 1984). Specifically, in accordance with Williams et al. (1988), researchers such as MacLeod and Mathews (1991) have argued that colour-naming interference in depressed participants may be attributable to co-occurring levels of anxiety as opposed to the influence of depressogenic schemas.

Evidence for MacLeod and Mathews' (1991) argument is relatively sparse as the majority of Stroop/depression researchers have neglected to assess the possible influence of comorbid anxiety. Furthermore, most studies that have attempted to account for comorbid anxiety differ in their focus (e.g., Bradley, Mogg, Millar, & White, 1995) or employ a constrained methodology (e.g., Hill & Knowles, 1991; Williams & Nulty, 1986) which limits the extent to which results can be interpreted within Williams et al.'s (1988) framework. That withstanding, only two studies appear to have directly addressed the question of whether anxiety accounts for Stroop interference in depressed participants. First, Williams and Broadbent (1986) found that Stroop interference in a sample of suicide attempters was more clearly predicted by self-rated depression as opposed to any other mood state including anxiety. This was true for both general emotionally-negative words and specific suicide-related words. However, Mathews and MacLeod (1985) showed that anxious patients, who were also mildly depressed, demonstrated greater Stroop interference to threatening words than nondepressed-nonanxious controls. Moreover, this effect was associated with self-reported anxiety and depression alike. However, partial correlations calculated for both depression and anxiety scores indicated

that state anxiety exhibited the strongest association with colour-naming interference. The results of the Williams and Broadbent (1986) and Mathews and MacLeod (1985) studies appear to provide conflicting evidence for MacLeod and Mathews' (1991) argument. However, it is difficult to draw generalizable conclusions from these studies as they employed samples with different presenting issues and used different sets of stimulus words.

Williams et al.'s (1988) position that depression is not reliably associated with attentional processing requires further validation particularly with respect to the Stroop task. However, their claim that there is a retrieval bias toward mood-congruent information in depression is well supported in the literature (see reviews by Blaney, 1986; Dalgleish & Watts, 1990; Johnson & Magaro, 1987; Mathews & MacLeod, 1994). Specifically, individuals who are depressed demonstrate better recall of negative self-referent information (Bradley & Mathews, 1983, 1988; Derry & Kuiper, 1981), or inferior recall of self-referent positive information (Kuiper & Derry, 1982), when compared to nondepressed controls.

Williams et al.'s (1988) processing specificity model suggests that there may be some benefit in utilizing multiple measures that can each assess separate stages of information processing (i.e., attention and retrieval) within the same study. If depression is more influential at the retrieval stage, it would be expected that assessing attention and retrieval biases for mood-congruent information in the same sample should yield supportive results for only the retrieval task. Unfortunately, only two Stroop/depression

studies have included supplemental information processing measures (i.e., incidental recall of words used in the Stroop; Gotlib & McCann, 1984; Hedlund & Rude, 1995) and these too have yielded conflicting results. Specifically, Gotlib and McCann (1984) reported an exclusive attentional bias whereas Hedlund and Rude (1995) found evidence supporting only recall selectivity for negative words. Again, Stroop methodology differed between studies (e.g., differences in the instructions given, response modalities employed, stimulus sets, and number of times each word was presented to the participant) which may account for discrepant results on the Stroop task and, consequently, the recall task. Nonetheless, this aspect of Williams et al.'s theory also appears to need further investigation.

Content-Specificity Effects

Researchers such as MacLeod and Mathews (1991) have drawn upon alternative theoretical models of emotion to explain inconsistencies in the Stroop/depression literature. However, little attention has been granted to the possible influence of methodological differences that are pervasive in this area of study. Most notably, there has been considerable variance in the stimulus words chosen across studies. Words are most often categorized on the basis of valence (negative, neutral, and/or positive) and then matched for both word length and frequency of occurrence in the English language (although the practice of matching is inconsistent). Fewer studies have controlled for part of speech (e.g., adjective, noun), and no depression study thus far has accounted for other characteristics of words such as emotional intensity which has been shown to affect the

ease with which words are processed (Dutta & Kanungo, 1967). Thus, it is likely that words used in previous experiments varied along more than the hypothesized valence dimension, which represents a possible substantial confound in these studies.

The process for partitioning words into valence categories has also been inconsistent across studies, with the majority of researchers relying on words which vary along an experimenter-perceived valence dimension (negative-positive) to make inferences about information-processing biases. Others, however, have employed words with substantially more criterion validity. For example, Gotlib and Cane (1987) and Gotlib and McCann (1984) derived their stimuli from a large set of adjectives that had been previously normed by Myers (1980) on psychiatric professionals' descriptiveness ratings of depressed and manic patients. Nonetheless, as reviewers have commented upon (e.g., Dalgleish and Watts, 1990; Williams et al., 1996), the categorization of emotional information based on valence is necessary, but not sufficient in itself, to make inferences about emotion-specific constructs. Specifically, the degree to which words vary in their self-relevance, whether positive or negative, has been shown to significantly influence colour-naming latencies (Riemann & McNally, 1995; Segal et al., 1995). Thus, the possibility exists that greater interference for negative words in the aforementioned studies may not have been a product of the emotional valence of these words but rather the degree to which the words were self-descriptive of the individuals tested.

The issue of self-relevance is important not only as a potential confound in previous studies but also as a critical theoretical variable for studying selective

processing. For example, studies that have manipulated the context under which negative information is processed (e.g., self-referent versus other-referent conditions) have demonstrated that only self-referent processing conditions appear to discriminate between depressed and nondepressed controls (Bargh & Tota, 1988; Segal et al., 1995). Others have shown that depressed participants exhibit a recall bias for negative words only if these words are self-descriptive (Bradley & Mathews, 1983; Derry & Kuiper, 1981). Findings such as these have been interpreted as support for the position that depressive cognition may be categorized by stronger associative links between the self-concept and negative constructs relative to nondepressive cognition (Bargh & Tota, 1988), or in light of Beck's (1976) theory which holds that, although depressive schemas are hypothesized to share a common bias toward negatively-valenced information, their specific content is thought to vary idiosyncratically from person to person according to their experiences. Nonetheless, results such as these suggest that the cognitive biases demonstrated by individuals who are depressed are characterized by selective processing of information that is both negative and self-relevant.

In summary, research to date using the modified Stroop task to study selective processing in depression has provided mixed results. Processing-specificity theorists have attributed supportive findings to the possible influence of co-occurring levels of anxiety in depressed participants, however, Stroop researchers have failed to reach a consensus with regards to this criticism. Furthermore, self-schema theories of depression have elucidated the importance of assessing the potential self-relevance of information used in

selective-processing research. The practice of comparing Stroop latencies for words that differ in their emotional valence is a necessary condition for inferring selectivity in depression, yet without assessing the extent to which these words are self-relevant, this practice may not be sufficient to yield such an effect.

Selective Processing in Bipolar Disorder

Unlike unipolar depression, selective processing in bipolar disorder has not been given extensive empirical consideration. The scarcity of studies in this area can perhaps be attributed to the phenomenology of the disorder itself, as the presence of manic episodes presents a significant obstacle for researchers. For example, as Johnson and Magaro (1987) have noted, there are considerable practical difficulties associated with testing patients during the manic phase of their illness. However, researchers who have tested remitted or depressed bipolar patients in order to make inferences about the existence of manic processing have found little evidence to suggest that bipolar patients differ from unipolar patients with respect to various cognitive variables (i.e., dysfunctional attitudes and automatic thoughts, Hollon et al., 1986; internal attributions, Winters and Neale, 1985). These results are, however, difficult to interpret within a schema-model of bipolar disorder, as it is unlikely that manic schemas would be active in a remitted or depressed state.

Given these difficulties, a viable alternative to studying the cognitive aspects of clinical mania is the use of an experimental analogue population. While recognizing that the employment of participant analogues can represent a limitation when extrapolating

results to the target population, analogue studies allow the experimenter greater control over variables that are otherwise difficult to control under natural conditions (Maher, 1970). Individuals who demonstrate subclinical manic traits, or hypomania, appear to represent a practical analogue sample for study. Within a continuum model of elation such as Beck's (1976), these individuals would be expected to display similar cognitive characteristics to manic patients while their attenuated levels of elation would allow for laboratory testing. Similar rationale is common in depression research where dysphoric students are often used as participant analogues in studying the cognitive facets of major depressive disorder.

Bentall and Thompson (1990) employed a participant analogue paradigm to investigate selective processing in mania with the Stroop task. University students were divided into three groups (low, medium, and high hypomania) based on their scores on Eckblad and Chapman's (1986) Hypomanic Personality Scale (HPS). The high hypomanic group was considered to be "hypomanic" whereas the remaining two groups acted as controls. Participants were required to colour-name emotionally neutral words, depressive words, and mania-related words as per usual Stroop procedure. The authors found that mean colour-naming latencies did not differ between groups or word type, nor was there a significant group-by-word interaction. However, subsequent analyses conducted on interference indices (calculated by subtracting the time taken to colour-name neutral words from the time taken to colour-name depressive and manic words) revealed a significant difference between groups, with the hypomanic group

demonstrating greater interference only for depressive words. Furthermore, there were differences between groups on self-rated depression scores (hypomanic group > control groups), yet using these scores as covariates in the analysis did not change the results nor were depression scores significantly correlated with Stroop measures. The authors interpreted their results within a psychodynamic framework concluding that hypomanic traits reflect a sustained defence against depressive feelings.

French, Richards, and Schofield (1996) took issue with the analysis of covariance that the abovementioned authors used to control for depression. Furthermore, they posited that Stroop interference for negative words may have been attributable to differences in anxiety between the hypomanic and control groups. In a direct replication of Bentall and Thompson's (1990) experiment, these researchers found that controlling for both depression and anxiety still resulted in an attentional bias towards negative stimuli.

The results of these investigations are interesting as they appear to conflict with the position that hypomanic schemas allow for selective processing of manic-related information. However, these studies can be criticized on a number of issues. First, the fact that the hypomanic groups in both studies evidenced a greater than average degree of depressive symptomatology is problematic. This finding implies that at least a portion of these participants were experiencing some degree of mixed states during the course of the respective studies, which therefore limits the extent to which results can be interpreted as the product of hypomania alone. Second, although the authors covaried depression scores from their analyses, it is debatable whether such an analysis is appropriate given our

limited knowledge about the effects of mixed states on cognitive processes. Only a more stringent sample selection such as the exclusion of depressed subjects from the study would have allowed for conclusions exclusive to hypomania to be drawn. Third, Bentall and Thompson's (1990) assertion that hypomanic traits reflect a sustained defence against depressive feelings would have to be qualified by a depressed control group that responded in a similar fashion to the hypomanic group. Thus, the lack of an appropriate control group is a major limitation of this study. Finally, these investigations share a number of the aforementioned limitations of the Stroop and depression studies in that words were inadequately matched and self-relevance of words was not included as a dependent measure.

The limitations of these studies, accompanied by the lack of any further investigation into the specific aspects of selective processing in mania, supports the need for further research in this area.

Present Study

The purpose of the present study was to employ the Stroop colour-naming task to explore selective processing of self-relevant information in subclinical depression and hypomania in order to make inferences about the presence of information processing biases in bipolar disorder. Biases were investigated by comparing dysphoric, hypomanic, and asymptomatic university students' processing of depressed-content, manic-content, and emotionally neutral words.

Based on Beck's (1976) schema model of depression and mania, it was

hypothesized that dysphoric students would take longer than hypomanic and control students to colour-name depressed-content words. Hypomanic students, however, would evidence greater colour-naming latencies for manic-content words when compared to dysphoric and control students. As a secondary measure of information processing, an explicit recall task was employed. It was expected that the two symptomatic groups would show recall biases for words that were congruent with their respective emotional concerns.

A supplementary area of investigation concerns the self-relevance of the words employed in the present study. In accordance with earlier information processing investigations, it was expected that all groups would display longer colour-naming latencies for words that were self-relevant regardless of valence. However, given self-schema models of emotion, it was hypothesized that the symptomatic groups would experience greatest Stroop interference for words that were both congruent to their emotional concern and self-relevant. Furthermore, it was believed that explicit recall of words would again parallel Stroop findings.

Finally, given recent concerns about the influence of anxiety as a possible mediator in the depression-selective processing relationship, we examined whether self-reported anxiety and self-reported depression were differentially related to Stroop interference indices and recall.

Method

Participants

Participants were Lakehead University introductory psychology students recruited through brief oral descriptions of the project given by the author at the end of regular lectures. All participants received one bonus point per session for a maximum of two bonus points toward their final mark in the course.

The final sample of participants included 43 females and 17 males with a mean age of 20.34 (SD = 3.94) who were selected using a two-phase procedure. In the screening phase, 238 students completed a battery of questionnaires including the Beck Depression Inventory - Second Edition (BDI-II; Beck, Steer, & Brown, 1996), the Mania-Grandiosity (MAN-G) subscale of the Personality Assessment Inventory (PAI; Morey, 1991), and a general information questionnaire (see Questionnaires section for a description of these measures). In order to be selected for the experimental session, the participants had to meet the following criteria: Participants who scored 8 or below on both the BDI-II and the MAN-G were admitted as controls; those who scored 14 or above on the MAN-G and 8 or below on the BDI-II were allocated to a hypomanic group; and, conversely, participants who scored 14 or above on the BDI-II and 8 or below on the MAN-G were allocated to a dysphoric group. Exclusion criteria included the presence of a self-reported history of one or more Axis I disorders with the exception of a mood disorder (for the hypomanic and dysphoric groups only) and the presence of self-reported colour blindness.

Eighty-five participants met the aforementioned criteria and agreed to take part in the experimental session. For final inclusion in the sample, the participants again completed the BDI-II, MAN-G, and the general information questionnaire at the conclusion of the experimental session. The group inclusion criteria at retest were relaxed slightly to account for the standard error of measurement evidenced by the BDI-II and MAN-G (SEM = 2.78 and 2.41, respectively). Of the 85 participants who completed the experimental session, 20 failed to meet the psychometric criteria for group inclusion, two participants reported the presence of an anxiety disorder, and 3 participants demonstrated excessive errors on the Stroop task. These 25 participants were excluded from the final sample.

Descriptive statistics for the final sample of 60 participants are presented in Table 1. Sample sizes were equal for the three groups (N = 20) and the groups did not differ on the basis of age [$F(2, 56) = .17$, $p = .84$]. However, there was a significant difference between groups in terms of sex distribution [$\chi^2 (2) = 14.94$, $p < .001$] which can be attributed to the sex ratio being more evenly distributed in the hypomanic group in comparison to the predominantly female dysphoric and control groups. Despite this difference, males and females did not differ on any of the dependent measures used in the present study nor were there any significant interactions between sex and these variables.

The means and standard deviations of the psychometric grouping variables at retest are also presented in Table 1. The mean BDI-II score for the dysphoric group fell within the moderately depressed range according to the guidelines set forth by Beck and

Table 1

Demographic Characteristics and Mean Scores on the Psychometric Grouping Measures for the Dysphoric, Hypomanic, and Control Groups (SDs in parentheses)

Variable	Dysphoric	Hypomanic	Control
N	20	20	20
Male to Female Ratio	3:17	12:8	2:18
Age	20.70 (3.52)	20.35 (1.98)	19.95 (3.54)
BDI-II	20.45 (6.18)	2.70 (2.39)	3.85 (1.87)
MAN-G	5.30 (2.68)	16.55 (3.73)	7.05 (1.73)

colleagues (1996) and the mean MAN-G score of the hypomanic group translates to a T-score of 69 which is slightly less than two standard deviations above the mean for the standardization sample for the PAI (Morey, 1991). The hypomanic and control groups did not differ with respect to BDI-II scores [$t(38) = 1.70$, $p = .10$], however the control group did exhibit significantly higher MAN-G scores than the dysphoric group [$t(38) = 2.45$, $p < .05$].

Questionnaires

Beck Depression Inventory - Second Edition. The BDI-II is a 21-item self-report inventory designed by Beck et al. (1996) to assess the symptoms corresponding to criteria for diagnosing depressive disorders as defined in the *Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition* (DSM-IV; APA, 1994; see Appendix A). Each item consists of four short self-statements and respondents are asked to choose the statement that best describes how they have felt over the preceding two weeks. A total score, ranging from 0 to 63, is obtained by summing over the items with greater scores indicating greater severity of depression. Like its predecessor, the BDI-II has demonstrated admirable reliability with internal consistency and test-retest values ranging from .87 to .93 and .86 to .93, respectively (Beck et al., 1996; Merkley & Mazmanian, 1998).

Mania-Grandiosity Subscale. The MAN-G is an 8-item self-report subscale from the Personality Assessment Inventory (Morey, 1991; see Appendix B for items). Each item consists of a short self-statement which respondents are asked to rate as *not at all*

true, *slightly true*, *mainly true*, or *very true* by circling the appropriate response. Total scores range from 0 to 24 and are obtained by summing over the items. The item content of this subscale taps cognitive elements of the clinical presentation of mania and hypomania such as inflated self-esteem, expansiveness, and grandiosity (Morey, 1991) and its content converges closely with Beck's (1976) cognitive theory of mania. Internal consistency and test-retest reliabilities of the MAN-G are acceptable (.79 and .77, respectively) and the MAN-G demonstrates favourable convergent validity with a number of relevant indices of psychopathology and normal personality (Morey, 1991).

Beck Anxiety Inventory. The Beck Anxiety Inventory (BAI; Beck & Steer, 1993; Appendix C) is a 21-item self-report scale that measures the symptoms of anxiety. Respondents are asked to rate each symptom item on a 4-point scale in terms of how much they have been bothered by that symptom over the past week. The items are summed to yield a single anxiety score which can range from 0 to 63. Beck and Steer (1993) report internal consistencies in the .85 to .94 range over a number of samples. Discriminant correlations between the BAI and BDI in student samples have been shown to range from .45 to .61 (Alford & Gerrity, 1995; Beck & Steer, 1993; Lecci, Karoly, Briggs, & Kuhn, 1994; Lovibond & Lovibond, 1995). These values, although highly significant, are substantially less than those that are demonstrated between the BDI and the commonly employed State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). For example, Mogg et al. (1991) found correlations ranging from .78 to .83 between state/trait anxiety and BDI scores. In a recent review,

Clark and Watson (1991) indicated that the BDI/BAI combination offers among the best psychometric properties for differentiating the effects of anxiety and depression in comparison to other available self-report measures.

Shipley Institute of Living Scale - Vocabulary Scale. The vocabulary scale of the Shipley is a 40-item multiple-choice test that can be used to estimate an individual's verbal IQ (Zachary, 1986; Appendix D). This measure has demonstrated strong positive correlations with the WAIS-R vocabulary subtest (Wong, 1993) and was included to ensure that any differences between groups in the present study were not attributable to differences in verbal ability.

General Information Questionnaire. The general information questionnaire (see Appendix E) allowed for the collection of information such as age, sex, and marital status, as well as other factors which may have influenced participants' test performance (e.g., colour-blindness, current medications, psychiatric history).

Stimulus Words

The words that were used in the Stroop colour-naming task, self-descriptiveness rating task, and incidental recall task were identical. Each word was selected as representing one of three valence categories (depressive, manic, and neutral). To obtain the depressive and manic words, an initial normed list of 400 manic- and depressed-content adjectives, rated as such by psychiatric professionals in a study by Myers (1980), were reduced to 30 words (15 depressed-content and 15 manic-content). Words selected from this list have been used by a number of researchers to make inferences about

selective processing in depression (e.g., Dobson & Shaw, 1987; Gotlib & Cane, 1987; Gotlib & McCann, 1984; McCabe & Gotlib, 1993; Teasdale & Dent, 1987). In reducing the Myers' list to 30 adjectives, depressed-content words were those that were rated as most descriptive of depressed patients and least descriptive of manic patients. Similarly, manic-content words were those rated as most descriptive of manic patients and least descriptive of depressed patients. Further reduction of the word list was based on matching the depressed-content and manic-content words for ratings of emotional intensity, word length, number of syllables, and frequency of occurrence in the English language for each word. These values, with the exception of the number of syllables per word, were taken from Myers' data set.

Fifteen neutral adjectives served as control stimuli. These words were selected from previous selective-processing research, as well as a dictionary and thesaurus. In constructing the list of neutral words, ten graduate-level clinical psychology students who were enrolled in a mood disorders course were asked to rate a list of 68 words (38 potentially neutral adjectives and the 30 emotional words). A nine-point Likert scale was employed to discern how the students thought each word would be endorsed, in terms of its self descriptiveness, by someone who is feeling significantly depressed and someone who is feeling significantly manic. Only words that were rated as neutral (i.e., receiving ratings of 4, 5, or 6, for both depressed and manic persons) were considered candidates for the final list. These words were then reduced to 15 through a process of elimination that included ensuring that the final list of neutral words did not differ from the lists of

depressed- and manic-content words with respect to all of the aforementioned criteria with the exception of emotional intensity. Norms provided by Kucera and Francis (1967) were used to match the words for frequency of usage in the English language. The final list of 45 words is presented in Appendix F.

Apparatus

A computerized version of the modified Stroop colour-naming task was used. Words were displayed on a 13-inch DataTrain DC530P colour monitor by a Campus Touch/Pentium 90 computer. Each stimulus word was preceded by a one-second presentation of a small white square that served to draw the participant's attention to the centre of the screen. Words appeared in upper-case letters (2 cm. in height) at the centre of the screen and remained on the screen until the participant orally named the colour. The computer recorded response latencies (in milliseconds) using a head-mounted Optimus voice-activated microphone. The onset of each stimulus word activated an internal timer that was terminated by the participant's oral response.

Procedure

The present study included two sessions. The first session acted as a screening session and provided the basis for group allocation. The second session included the experimental testing.

Participant Screening. Participants took part in the screening session in groups of 20 to 40 students. Each participant was given a package that included a consent form, the general information questionnaire, the BDI-II, the PAI Mania subscales (MAN-A, MAN-

I, and MAN-G; see Appendix G), a personal information form, and two additional questionnaires. These additional questionnaires are presented in Appendix H but are not germane to the present study. After signing the consent form (Appendix I) to indicate their willingness to participate in the study, participants were asked to complete the package which included leaving their first name and telephone number on the personal information form (Appendix J). This allowed the experimenter to reach participants who met the group allocation criteria so that an appropriate time for the experimental session could be scheduled. Upon completion of the questionnaire package, all participants were thanked and given a debriefing form (Appendix K) that outlined the nature of the screening session. Furthermore, participants were reminded that some of them would be contacted with regards to the experimental session.

Experimental Session. The experimental session took place within nine days of the screening session (M = 3.48 days, SD = 1.98) and all participants were tested individually. To begin the experiment, participants were given a list of the 45 stimulus adjectives and were asked to rate each word on a 9-point likert scale as to how descriptive the word was of themselves (where 1 equals *not at all* and 9 equals *extremely*; see Appendix L). Following the rating task, participants completed five minutes of long-division problems. This exercise served as a distracter task to lessen the probability of the participants rehearsing the word list before they were asked to recall the words. Finally, the participants were given instructions that they had five minutes to write down as many of the words from the rating task as possible (see Appendix M for verbatim instructions).

Following the recall task, participants were seated in front of the computer monitor and asked to name aloud the colours of four Xs presented on the screen in green, blue, red, and yellow. This was done to familiarize the participants with each colour and ensure that they were able to discriminate among them. The participants were then instructed that their task was to name aloud the colours in which words are presented on the screen, as quickly and accurately as possible, without making any errors (see Appendix M for verbatim instructions).

When it was clear that the participants understood the task, they completed two practice trials that each involved colour-naming five neutral nouns (e.g., WAGON, HAT). Finally, if there were no further questions, the experimental trials commenced immediately. The order in which the stimulus adjectives were presented was generated at random by the Stroop software with the restriction that each word appeared once in each of the four different colours for a total of 180 trials. The trials were overseen by the experimenter on a separate computer monitor.

Errors on the Stroop task were recorded by the experimenter by depressing the space bar of the computer's keyboard each time an error occurred. The most common errors in order of frequency included: (1) not responding loudly enough to trip the relay; (2) unintentionally tripping the voice activated relay (e.g., coughing, clearing throat, laughing); (3) responding by saying the stimulus word rather than its colour; and (4) responding by saying the wrong colour. Participants who exhibited errors on greater than 15% of the total number of trials were excluded from the final sample. The mean number

of errors for the final sample was 8.33 (SD = 7.01) which accounts for less than 5% of all stimulus presentations.

Before leaving the experiment, all participants completed the BAI and the Shipley Vocabulary Scale. Furthermore, the BDI-II, the PAI Mania subscales, and the general information questionnaire were readministered. Participants were then given a debriefing form outlining the entire experiment (Appendix N) and asked if they had any further questions regarding the study. In addition, they were given an opportunity to obtain a copy of the final results of the experiment.

Data Reduction

For analyses of the Stroop task data, individual stimulus reaction times were calculated by averaging the response latencies of each word across the four presentations. Response latencies for presentations that were coded as errors were not included in these averages. Mean response times were then calculated by averaging across the 15 words in each category. Words that received two or more errors were not included in these mean response times.

Mean response times were also converted into response latency interference indices by subtracting the mean latency of the neutral words from the mean latency of the manic and depressive words, respectively. This procedure controlled for individual differences in colour-naming speed and allowed for a direct comparison to be made between the stimulus words of interest by yielding a manic-content index and a depressed-content index for each participant.

For the recall analyses, three proportion scores were calculated for each participant by dividing the number of words recalled for each of the three categories by the total number of words recalled.

Results

Psychometric Properties of Grouping Criteria

Data from the total sample at retest (N = 85) was employed for the purpose of computing test-retest reliability coefficients for the grouping criteria measures. MAN-G retest scores for two participants were unavailable for analyses. The MAN-G evidenced excellent test-retest reliability (r = .91, p < .001), however, there was a significant tendency for higher scores during the experimental session (M = 9.43, SD = 5.27) in comparison to scores during the screening session (M = 8.62, SD = 5.26), paired $t(82)$ = -3.42, p = .001. The BDI-II also demonstrated a strong test-retest correlation (r = .94, p < .001) with participants exhibiting lower experimental session scores (M = 9.44, SD = 8.40) than screening session scores (M = 11.05, SD = 8.93), paired $t(84)$ = 4.77, p < .001. Finally, the MAN-G and BDI-II displayed a significant inverse relationship (r = -.52, p < .001).

Potential differences between the three groups (N = 20 per group) on the Shipley and BAI were analysed using simple one-way Analyses of Variance (ANOVAs). Shipley T-scores for the three groups (dysphoric: M = 50.05, SD = 5.80; hypomanic: M = 53.65, SD = 5.99; control: M = 53.11, SD = 6.32) did not differ significantly [F (2, 56) = 2.06, p = .14]. The groups differed significantly on the basis of BAI scores [F (2, 57) = 36.50, p <

.0001] with Newman-Keuls post hoc analyses ($p < .05$) indicating that the dysphoric group ($M = 17.90$, $SD = 7.68$) scored significantly higher on the BAI than the hypomanic ($M = 4.60$, $SD = 4.49$) and control groups ($M = 3.52$, $SD = 3.52$). The latter two groups did not differ from each other.

Data Screening

Prior to conducting any analyses on the Stroop reaction times, Stroop interference indices, recall proportion scores, or self-descriptiveness ratings, the distributions of these dependent measures were screened for univariate outliers by transforming raw scores into z scores. Using the procedure recommended by Tabachnick and Fidell (1996), outliers were defined as cases with standardized scores in excess of +/- 3.29. No outliers were detected. Furthermore, normality plots were examined using SPSS EXPLORE. In the few cases where nonnormality was a potential issue, skewness values were divided by their respective standard errors. Significant skewness, as defined by a result exceeding +/- 3.29, was not detected for any of the dependent measures.

In the following sections, results are presented for the Stroop variables, recall scores, and self-ratings. Except where otherwise noted, analyses were carried out using a 3 (groups) x 3 (valence) mixed analysis of variance (ANOVA), with groups ($N = 20$ per group) as the between-subjects factor and valence as the within-subjects factor. Multiple comparisons were performed using Newman-Keuls post hocs with the probability set at .05.

Stroop Task Results

Mean Stroop response latencies for the three stimulus categories are sorted by group in Table 2. Analyses of these latencies revealed a significant effect for word valence only [$F(2, 114) = 3.34$, $p < .04$] which indicates that, collapsed across groups, participants took significantly longer to colour-name depressed-content words in comparison to the neutral words only ($p < .05$). The Group x Valence interaction, which provided the main test of the selective processing hypothesis, was not significant [$F(4, 114) = 1.10$, $p = .36$].

In order to further examine response latencies while simultaneously controlling for individual differences in general colour-naming speed, a 3 (groups) x 2 (valence) mixed ANOVA was performed using the manic- and depressed-content interference indices (see Table 2). This analysis yielded no significant main effects, nor was the hypothesized interaction significant [$F(2, 57) < 1$].

Because the main Stroop analyses failed to reveal any evidence of selective processing, a number of supplementary exploratory analyses were performed. First, two sets of ANOVAs were performed with maximally contrasting subgroups to explore the possibility that the original grouping criteria (i.e., MAN-G and BDI-II scores) did not separate the groups enough to yield the hypothesized processing effects. Stroop variables for 8 participants with MAN-G scores greater than 16 were compared with the 9 lowest scorers in the control group (MAN-G less than 7). Analyses of both response latencies and interference indices produced no significant main effects or interactions. Similarly,

Table 2

Mean Stroop Response Latencies and Interference Indices (in milliseconds) for the Stimulus Word Categories (Standard Deviations in Parenthases)

	Group		
Word Type	Dysphoric	Hypomanic	Control
Depressed	727.12 (123.74)	767.50 (152.08)	702.47 (111.46)
Manic	723.93 (116.28)	757.45 (137.63)	696.28 (115.90)
Neutral	712.80 (109.10)	755.14 (139.60)	701.59 (118.26)
Mean Reaction Time	721.29 (115.33)	760.03 (141.98)	700.11 (114.52)
Depressed Index[1]	14.32 (29.51)	12.36 (34.74)	0.88 (22.27)
Manic Index[2]	11.13 (28.36)	2.31 (31.95)	-5.31 (21.72)

1. Depressed Index = Subjects' neutral-content reaction time subtracted from their depressed-content reaction time.

2. Manic Index = Subjects' neutral-content reaction time subtracted from their manic-content reaction time.

the ten most dysphoric participants (BDI-II greater than 20) were compared with 12 participants in the control group with BDI-II scores less than 4. An analysis of the response latencies for these groups revealed no main effects for group or word valence. The interaction of the two, however, approached significance [$F(2, 40) = 2.61$, $p = .08$]. In order to clarify the nature of this potential interaction, a 2 (group) x 2 (word valence) mixed ANOVA was performed on the Stroop interference indices. This analysis revealed a significant main effect for group [$F(1, 20) = 5.50$, $p < .03$] which indicates that, collapsed across word valence, the dysphoric group exhibited greater Stroop interference when compared to the control group. This effect, however, was not qualified by a significant Group x Valence interaction [$F(1, 20) < 1$]. Thus, the marginal effect found in the response latency analysis was not attributable to differences in responding to the manic- and depressed-content words.

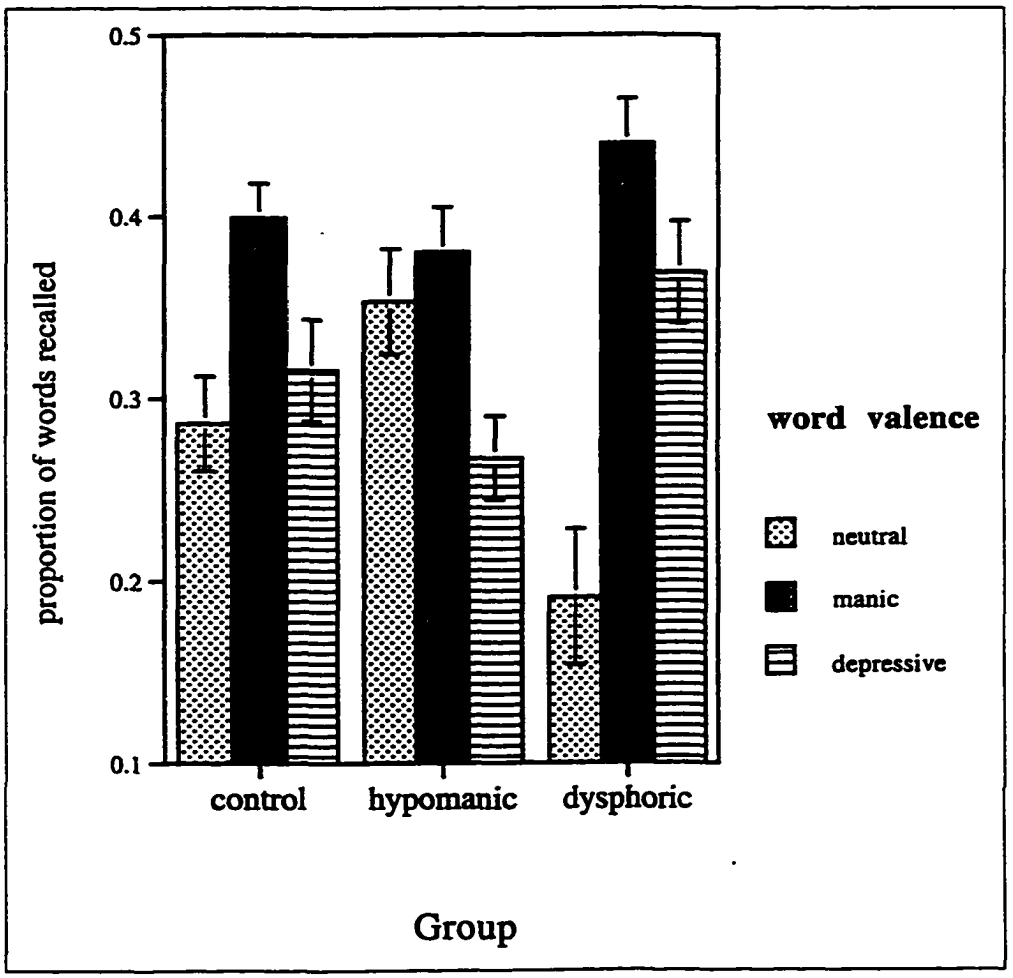
A second set of exploratory analyses was carried out to compare latencies and indices from the first half of the Stroop task with those in the latter half. The rationale for this stems from issues that have been raised by cognitive researchers about the structure and organization of maladaptive schemas. Most notably, Segal (1988) has argued that maladaptive schemas are organized with a high degree of interrelation and, therefore, activation of one of the elements in the structure should increase the accessibility of related information that is encapsulated within the schema. If this is the case, one would expect that selective processing would be more prominent in the latter half of the Stroop task due to the effects of schematic priming from prior presentations of the stimuli.

In order to conduct these analyses, the stimulus words occurring in the first 90 presentations (Block 1) and the latter 90 presentations (Block 2), respectively, were averaged according to valence. Stimulus words that were coded as errors were omitted. The original Stroop ANOVAs for response latencies and interference indices were then recalculated with 'Block' added as an extra within-subjects factor. The ANOVA for the response latencies yielded no significant block effects or block interactions. However, the ANOVA performed on the interference indices revealed a significant three-way Block x Valence x Group interaction [$F(2, 57) = 3.19$, $p = .049$]. Post hoc analyses indicated that, for the dysphoric group only, the manic words caused greater Stroop interference in the latter half of testing than in the first half.

Explicit Recall Task Results

The mean recall proportion scores for the stimulus categories are presented by group in Figure 1 (see Appendix O for means and standard deviations). An ANOVA performed on these scores resulted in a significant main effect for word valence [$F(2, 114) = 12.05$, $p < .001$] which was qualified by a significant Group x Valence interaction [$F(4, 114) = 4.69$, $p < .01$]. Post hoc analyses of the interaction conducted between groups indicated that the dysphoric group recalled a smaller proportion of neutral words than the other two groups and, furthermore, they recalled a greater proportion of depressed-content words when compared to the hypomanic group only. Moreover, post hocs of the interaction conducted within groups revealed that the control group demonstrated a recall preference for the manic words over the neutral words, the hypomanic group showed a

Figure 1. Means and standard errors of the proportion of depressed-, manic-, and neutral-content words recalled by each group.



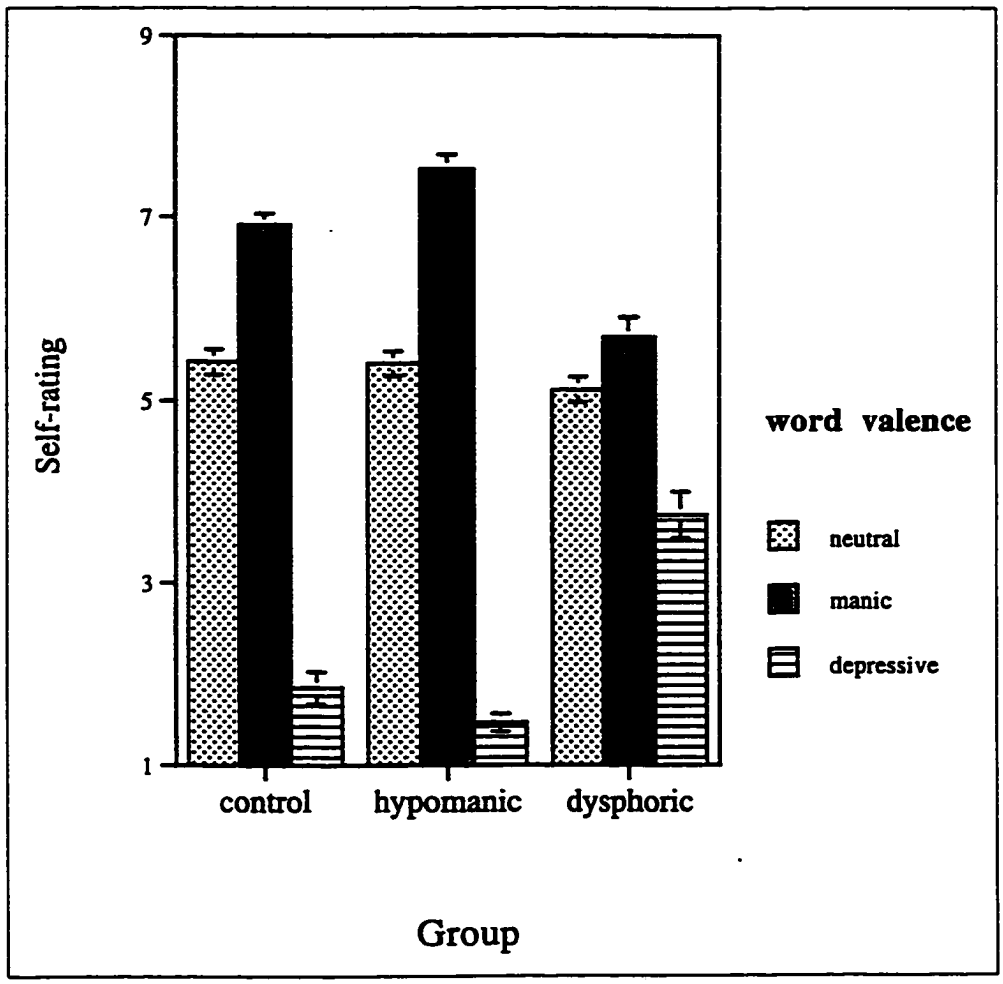
preference for the manic words over the depressed-content words, and the dysphoric group recalled a greater proportion of both manic and depressed-content words in comparison to the neutral stimuli.

In order to compare the results of the present study with past depression and memory research findings which have employed nondysphoric and dysphoric groups only, we collapsed the hypomanic and control groups into one nondysphoric group and performed a 2 (group) x 3 (valence) mixed ANOVA on the recall proportion scores. This analysis again yielded a significant main effect for word valence [$F(2, 116) = 15.34$, $p < .001$] and a significant Group x Valence interaction [$F(2, 116) = 7.63$, $p = .001$]. The dysphoric group recalled a smaller proportion of neutral words and a greater proportion of depressed-content words in comparison to the nondysphoric group. Furthermore, the nondysphoric group recalled a greater proportion of manic- than depressed-content words.

Self-descriptiveness Results

A mixed ANOVA was performed on the self-descriptiveness ratings of the stimulus words (see Figure 2). Means and standard deviations of these ratings are sorted by group in Appendix P. The analysis resulted in a highly significant main effect for word valence [$F(2, 114) = 546.64$, $p < .001$] and a significant Group x Valence interaction [$F(4, 114) = 44.13$, $p < .001$]. Post hoc analyses indicated that the three groups did not differ on the basis of neutral word ratings. However, there were significant differences between all three groups on the manic word ratings. These words were rated highest by the hypomanic group, followed by the control group, and then the dysphoric group. Finally,

Figure 2. Means and standard errors of the self-descriptiveness ratings of depressed-, manic-, and neutral-content words for each group.



the depressed-content words were rated as more self-descriptive by the dysphoric group than the other two groups. It should be noted, however, that the dysphoric group's mean rating of the depressed words fell within the "not self-descriptive" range (i.e., less than 5) on the self-descriptiveness rating scale.

It was the original intent of the present study to include self-descriptiveness ratings of the stimulus words as a second within-subjects factor in the Stroop ANOVAs. Words that were rated between 1 and 4 were to be considered "not self-descriptive" and words that were rated between 6 and 9 were to be considered "self-descriptive". Employing this dichotomization in the analyses, however, was not possible because of an unequal distribution of participants within cells. For example, none of the participants in the hypomanic or control group rated any of the depressed-content words as self-descriptive and only a minority of participants in these groups rated any of the manic words as not self-descriptive. Furthermore, only 55% of the dysphoric group rated any of the depressed-content words as self-descriptive. Thus, self-descriptiveness was not included as a dependent measure in the Stroop analyses.

For the abovementioned reasons, analysing self-descriptiveness on a participant-by-participant basis was not tenable. However, an alternative method for judging the effects of self-descriptiveness was used. This entailed determining whether there was a subset of words in the manic or depressed-content categories that, based on self-descriptiveness ratings, discriminated between the groups and then subjecting the Stroop reaction times associated with these words to the appropriate analysis. One-way

ANOVAs were calculated on the self-descriptiveness ratings garnered by each of the 15 manic words with group membership as the between-subjects factor. Neuman-Keuls post hoc analyses ($p < .05$) determined that self-ratings for 6 words (IMPORTANT, ENTERTAINING, ZESTFUL, TALENTED, VIBRANT, and CONFIDENT) discriminated the hypomanic group from the other groups. Stroop reaction times for these words were then compared with the nondiscriminating manic words using a 3 (group) x 2 (word discrimination) mixed ANOVA. Neither of the main effects or the interaction was significant, which indicates that self-descriptiveness was not related to Stroop reaction times for the manic words. We also attempted to carry out the same analysis with the depressed-content words. However, one-way ANOVAs performed on the self ratings for this category of words revealed that all 15 words reliably discriminated the dysphoric group from the other groups and, thus, the subsequent analysis would not have offered any empirical value that had not been already tested in the prior analyses.

Correlations

In order to assess the relationship between anxiety, depression, and the processing variables, Pearson product-moment correlation coefficients were calculated among these measures. In addition, a composite measure of general distress was also included in each correlation matrix. This measure was derived by converting the BAI, BDI-II, and PAI irritability subscale (MAN-I) scores into z scores and then summing the results. A preliminary inspection of the relationship between the mean reaction times for the three categories of words and the self-report measures indicated that none of these correlations

was significant (range: r = -.10 to -.02). Furthermore, these coefficients did not appear to follow any meaningful pattern. Correlations between the Stroop interference indices (manic and depressed-content) and the self-report measures did, however, display a positive relationship (see Table 3). The strongest and only significant correlation occurred between the manic word index and the measure of general distress. Furthermore, the self-report measures consistently accounted for slightly more variance in the manic index than the depressed index.

Correlations between the recall proportion scores and the self-report measures are also presented in Table 3. There was a significant negative relationship between the proportion of neutral words recalled and increases in self-report scores, with the BDI-II and the measure of general distress accounting for the most variance. Conversely, the proportion of both manic- and depressed-content words recalled was positively related to increases in scores on the self-report measures. Again, these correlations were slightly higher for both the BDI-II and the measure of general distress. Finally, the raw number of words recalled was negatively related to scores on the self-report measures. The BDI-II, however, exhibited the strongest and only significant correlation with this processing measure.

In the present study, the BAI and BDI-II evidenced a highly significant interrelationship (r = .84, $p < .001$). Thus, to examine the relative effects of anxiety and depression on the processing measures, two sets of partial correlations were calculated: (a) correlations between the BAI and the processing measures with BDI-II scores

Table 3

Correlations and Partial Correlations Between the Information Processing Variables and Measures of Anxiety and Depression

	Measures				
Variable	BAI	BDI-II	General Distress	BAI Partial[1]	BDI-II Partial[2]
Stroop Indices					
manic	.25	.18	.31*	.17	-.04
depressed	.19	.11	.15	.18	-.09
Recall Proportion					
neutral	-.30*	-.42**	-.37**	.10	-.31*
manic	.20	.29*	.29*	-.10	.25
depressed	.20	.26*	.21	-.03	.17
No. of Words Recalled	-.18	-.26*	-.20	.07	-.20

* = $p < .05$; ** = $p < .01$

1. BAI Partial = Beck Anxiety Inventory scores with Beck Depression Inventory-II scores partialled out.

2. BDI-II Partial = Beck Depression Inventory-II scores with Beck Anxiety Inventory scores partialled out.

partialled out, and (b) correlations between the BDI-II and the processing measures with BAI scores partialled out. As can be observed in Table 5, BAI partial scores remained positively, yet nonsignificantly, related to both Stroop indices whereas the BDI-II partial scores exhibited a nonsignificant negative relationship with these measures. Conversely, the BDI-II partial scores displayed a correlational pattern with the recall variables that mirrored that of the original Pearson correlations whereas the BAI partial scores were weakly related to recall proportion scores.

Before turning to the discussion, it is important to note that the possibility of the recall task confounding the results of the Stroop task was ruled out by comparing Stroop reaction times for words that had been recalled with those that had not in a 3 (groups) by 2 (recall status) mixed ANOVA. This analysis revealed no significant main effect for recall status and the interaction was also not significant (both $\underline{F}$s < 1).

Discussion

The purpose of the present study was to investigate selective processing of schema-relevant information in both subclinical depression and hypomania in order to make inferences about information processing in bipolar disorder. Based on Beck's (1976) cognitive theory of emotions, it was hypothesized that hypomanic participants would selectively attend to manic stimuli, as assessed by the modified Stroop task, and selectively recall manic stimuli on the explicit recall task. Furthermore, it was expected that dysphoric participants would exhibit a similar pattern of processing in response to the depressed-content stimuli. The findings of the present study, however, did not support an

omnibus selective processing by either group. No differences in Stroop colour-naming latencies were evident between the symptomatic groups and neither of these groups' latencies differed significantly from the controls'. On the other hand, significant group differences were apparent on the explicit recall task. As will be discussed following the Stroop results, the extent to which the recall findings conform to the predictions of the present study is questionable.

Selective Processing and the Stroop Task

The absence of predicted differences on the Stroop Task is not in accordance with Beck's (1976) views on hypomania nor does this finding adhere to previous studies that have reported colour-naming interference for negative-content information in students with hypomanic traits (Bentall & Thompson, 1990; French et al., 1996). An important distinction must be made between the present study and these previous investigations. Previous Stroop experiments have used the HPS as a hypomanic grouping criterion. This scale was developed to assess a broad range of hypomanic symptomatology for the purpose of identifying persons at risk for developing bipolar disorder (Eckblad & Chapman, 1986). In the present study, the MAN-G, a measure of grandiosity, was employed as the grouping criterion because its content closely adheres to the three cardinal cognitive symptoms of hypomania/mania posited by Beck (i.e., an overly positive view of the self, world, and future). Thus, the analogue hypomanic sample employed in the present study may have been characteristically quite different from the samples used in the studies by Bentall and Thompson (1990) and French and colleagues

(1996). Nevertheless, the findings of the present study lend further credence to these previous investigations which have found no evidence for a selective attentional bias towards manic-content information in subclinical hypomania.

Interestingly, the dysphoric group also failed to reveal the hypothesized colour-naming bias toward depressed-content words. This finding conflicts with previous investigations that have reported evidence of selective processing in dysphoric students (Gotlib & McCann, 1984), dysphoric community samples (Williams & Nulty, 1986), and clinically depressed individuals (Gotlib & Cane, 1987), but is in accordance with subsequent studies that have been unable to replicate these findings (e.g., Carter et al., 1992; Hedlund & Rude, 1995; S. B. McCabe, personal communication, December 2, 1997; Mogg et al., 1993). This lack of evidence for selective processing of depressed-content information was further supported by exploratory analyses investigating comparisons of subjects with maximally contrasting BDI-II scores and schematic priming, both of which failed to yield an outcome that could be construed as supportive of a schema-driven model of depression. Such results are not surprising given the relatively weak positive bivariate correlations between the BDI-II and both the manic- and depressed-content Stroop interference indices.

Various criticisms have been levied against previous Stroop/depression studies including their failure to manipulate self-descriptiveness (cf., Segal et al., 1995) and their failure to control for, or measure, concurrent anxiety. In the present study, for reasons described previously, operationalizing self-descriptiveness within the analyses of the

Stroop variables was not possible. However, a straight comparison of Stroop reaction times with self-descriptiveness ratings may be of some value in understanding the relevance of these ratings. Specifically, of the three categories of words, the depressed-content adjectives were rated as least self-descriptive by all three groups. Conversely, these words garnered the longest reaction times when latencies were compared for all 60 participants. Taken together, a cautious interpretation of this comparison is that, in the present study, self-descriptiveness ratings had little bearing on Stroop latencies.

MacLeod and Mathews (1991) have argued that attentional biases toward negative information in previous Stroop/depression studies may be mediated by concurrent anxiety. Unlike past investigations, we took the precaution of excluding participants who reported past or present difficulties with anxiety. Whether or not this safeguard accounted for the null Stroop findings in the present study is indeterminable. However, the issue of statistical significance withstanding, the positive relationship between anxiety and Stroop interference and the weaker, and negative, relationship between depression and interference (as determined by the BAI and BDI-II partial correlations, respectively) lends some limited support to MacLeod and Mathews' argument. In spite of this, the relationship between anxiety and the depressed-content indices was virtually identical to the relationship between anxiety and the manic-content indices. Although caution should be taken when interpreting these nonsignificant partial correlations, the possibility exists that anxiety is related to an attentional bias toward emotional material in general rather than a selective bias toward negative or threatening stimuli. If such a general emotional

bias exists, then matching emotional words for their emotional intensity, as was done in the present study, is of considerable importance when studying selective processing hypotheses. For example, results from previous investigations that have not matched for emotionality may be compromised by an anxiety-driven bias toward the most affectively laden category of words (i.e., depressed-content words) rather than the specific valence of these words.

Selective Processing and the Explicit Recall Task

Despite the lack of support for an attentional bias towards schema-relevant information in either of the symptomatic groups, a number of group differences were evident on the explicit recall task. The comparisons between each of the symptomatic groups and the control group are most relevant to the selective processing hypothesis and will therefore provide the basis for the majority of the discussion. First, the hypomanic group differed from the controls in that they recalled a smaller proportion of depressed words in comparison to manic words whereas the controls recalled a smaller proportion of neutral words in comparison to manic words. However, no significant between-subjects differences were evident between the hypomanics and controls for any of the valence categories. This latter finding calls into question the substantiality of the differences in recall patterns. In essence, the hypothesized selective processing effect would entail the hypomanic group recalling a greater proportion of manic words than *both* the depressed and neutral words. Furthermore, we would expect the hypomanic group to remember a greater proportion of manic words than the control group. In the

present experiment, neither of these effects were present.

The dysphoric group, on the other hand, did reliably differ from the controls in that they recalled a significantly smaller proportion of neutral words than both the manic- and depressed-content adjectives. Moreover, they recalled a smaller proportion of the neutral words than the control group. Interpreting these findings within the context of previous depression/recall studies is difficult due to the fact that these investigations have typically employed negative and positive words only (e.g., Bradley & Mathews, 1983), or depressed words and nondepressed words (i.e., a mix of neutral and positive words) only (e.g., Derry & Kuiper, 1981). Nevertheless, when asymptomatic students act as controls, the results of this study suggest that dysphoric students do not exhibit a recall preference for negatively valent stimuli as would be predicted by Beck (1976). Instead, they display a tendency to turn effortful processing resources away from neutral material.

Finally, only when the two symptomatic groups' recall proportion scores were compared was there any evidence of superior recall of depressed-content stimuli in the depressed group (or conversely, an inferior recall of these words in the hypomanic group). At first glance, this finding appears to lend some support to Beck's (1976) claim that hypomania and depression, as they were operationalized in the present study, may in fact represent diametrically opposite emotional states. However, the lack of a difference between these groups in their recall of manic-content words is inconsistent with this argument. The influence of the hypomanic group's pattern of processing was also evident when we compared dysphoric participants' recall scores with those of our non-dysphoric

participants (controls and hypomanics collapsed). This analysis yielded results that replicate a strong finding in the subclinical depression literature (see the review by Matt, Vazquez, & Campbell, 1992). Our dysphoric students displayed an equivalent recall of depressed- and manic-content information and recalled a greater proportion of depressed-content stimuli than the non-dysphorics. The non-dysphorics, however, exhibited a recall bias toward the manic-content words. Selective processing researchers (e.g., Gotlib, McLachlan, & Katz, 1988; Sanz, 1996) have often interpreted positive biases in nondepressed participants and a lack of bias in dysphoric participants as supportive of the depressive realism hypothesis (i.e., the claim that depressed individuals have a more accurate perception of reality than their nondepressed counterparts, Alloy & Abramson, 1988; cf., Dobson & Franche, 1989). Interestingly, we only found this positive (manic) bias when we included the hypomanic participants within our "nondepressed" group. Because this is the first study to include a distinct hypomanic sample when testing Beck's selective recall hypothesis, further investigation of this issue is necessary before firm conclusions can be drawn. Nonetheless, previous studies that have found such a positive bias in nondepressed samples may be reporting misleading results by failing to account for subclinical hypomanic traits such as grandiosity.

Some support for Williams and colleagues' (1988) proposal that depression, and not anxiety, is responsible for biased recall was attained in the present study. The recall variables all correlated significantly with the BDI-II and, furthermore, BDI-II partial correlations retained the same pattern as the original bivariate coefficients. BAI partial

correlations, on the other hand, were weaker and displayed an opposite pattern to that of the BDI-II partials. Depression did not, however, display a stronger relationship with recall of depressed-content stimuli when compared to the manic-content stimuli. Like the results of the Stroop correlations, these findings do not support our prediction of a *selective* recall bias toward depressed-content information.

Summary, Limitations, and Considerations for Future Investigation

In summary, the findings of the present investigation suggest that subclinically depressed and hypomanic students do not display a selective attentional bias toward schema-relevant information as assessed by the modified Stroop task. Evidence of content-specific recall, on the other hand, appears to be limited to a fastidious "filtering out" of neutral information in subclinical depression. In fact, with the exception of hypomania-dysphoria differences in the proportion of negative information recalled, the proposal that symptomatic groups would display a recall preference for content-specific stimuli received little support in this study.

Beck (1976; 1991) has suggested that emotion-congruent biases operate throughout all aspects of processing. Conversely, Williams et al. (1988) assume that different emotions (i.e., depression and anxiety) have disparate effects on various stages and levels of cognitive processing. In the present study, we found more support for the latter hypothesis. Depression possessed a stronger relationship with effortful processing as assessed by the explicit recall task whereas anxiety exhibited a stronger relationship with automatic processing as measured by the modified Stroop task. Nonetheless, the

extent to which either of these theories was supported by our results is compromised by the finding that both anxiety and depression were equally related to negative and positive stimuli on the respective processing tasks.

Before discounting the selective processing hypotheses, it is important to consider both the strengths and limitations of the present study. First, this investigation offers a number of methodological advantages over the majority of previous studies that have used the Stroop to study selective processing in depression or hypomania. Like Gotlib and Cane (1987) and Gotlib and McCann (1984), we employed target words from a normative list and matched them for frequency in the English language. However, care was also taken to ensure that the words were matched on the basis of a number of other potentially confounding factors including word length, number of syllables, part-of-speech, and emotional intensity. Second, unlike the aforementioned studies that presented each of 150 words once to their participants, we presented participants with a smaller number of words and repeated each word four times, once per colour, as per usual emotional Stroop protocol (Williams et al., 1996). Averaging over the four presentations then allowed for greater precision of measurement and enabled us to eliminate the possibility of any Colour x Valence interactions that could substantially undermine results. Third, the random computer-generated presentation of words used in this study reduced the likelihood of 'blocking effects' that are inherent in studies that employ carded Stroop presentations. Presenting categories of words with the same theme in succession (e.g., Bentall & Thompson, 1990; French et al., 1996; Williams & Nulty, 1986) may foster

results that mimic selective processing by way of interitem priming. Such priming effects serve to increase mean response latencies of target words (Richards, French, Johnson, Naparstek, & Williams, 1992; Williams et al., 1996) and presumably increase the amount of variability associated with each category of words. It is important to note, however, that blocked presentations are not necessary to produce results supportive of selective processing hypotheses (see Williams et al., 1996). Finally, this investigation utilized a more stringent participant selection criteria than past studies in this area. Participants were screened twice for the presence of other clinical concerns that may have interfered with interpretation of our findings. Moreover, in order to accurately test Beck's (1976) model of depression and hypomania, we ensured that: (a) the dysphoric group did not display significant hypomanic symptomatology; (b) the hypomanic group did not display significant depressive symptomatology (cf., Bentall & Thompson, 1990; French et al. (1996); and the control group did not exhibit a significant degree of either depressive or hypomanic symptomatology.

Despite the methodological strengths of the present study, the use of a nonclinical sample to test our hypotheses has its limitations. As mentioned previously, a student sample was deemed necessary to carry out this study because of the impracticality of testing a clinically manic population. Coyne (1994), however, has argued that students who score above a certain cut-off point on a depression inventory may not reflect a suitable analogue for clinical depression. Instead, high scores may indicate a greater level of transient or general distress that has little in common with syndrome depression. A

similar criticism can presumably be levied against selecting hypomanic participants based on self-reported grandiosity. Reducing the complexities of hypomania/mania to this one symptom may limit the extent to which these results can be generalized to the intended clinical population. Other researchers (e.g., Mathews & MacLeod, 1994; Williams et al., 1996) have also suggested that nonclinical populations may possess the ability to override the tendency to be distracted by emotional material. This position, however, appears to warrant further experimentation given mixed support for selective processing effects in both clinically (e.g., Gotlib & Cane, 1987; Hedlund & Rude, 1995) and subclinically (e.g., Gotlib & McCann, 1984; Hill & Knowles, 1991) depressed samples. Nevertheless, Beck's (1976) model is based primarily upon observations of clinical populations and, thus, the use of analogue participants to test such a model is a limitation of this investigation.

A second, and possibly related, limitation of the present study involves our attempt to manipulate the effect of self-descriptiveness on the information-processing variables. It was reasoned that perhaps only words that were most salient to the participants would manifest a selective processing effect (e.g., Segal et al., 1995). The negative stimuli used in the present study, however, represented a selection of words that had been rated as very descriptive of depressed *patients* by psychiatric professionals and, thus, it is perhaps not surprising that only a few of these adjectives were rated as self-descriptive by our dysphoric group given that they were drawn from a nonclinical setting. In retrospect, an *a priori* ideographic stimulus selection method such as that used in

studies by Riemann and McNally (1995) and Segal and colleagues may have provided for a more informative test of this hypothesis.

Although the results of the present investigation suggest that selective processing in hypomania is limited, if present at all, future studies appear warranted to substantiate this claim. The Stroop as a measure of attentional bias has been criticized on a number of grounds including its inability to disentangle the effects of attentional allocation and subsequent post-attentional processing (Dalgleish & Watts, 1990; Gotlib et al., 1988) or attentional bias and cognitive avoidance (De Ruiter & Brosschot, 1994; MacLeod & Mathews, 1991). Thus, other cognitive paradigms such as attentional deployment tasks or focused-attention dichotic listening tasks may be of some value for studying selective attention in hypomania. Relatedly, future hypomania studies will likely employ nonclinical populations. If these participants actually display the ability to 'override' selective processing effects, then the inclusion of a concurrent task (e.g., a memory load paradigm, Bargh & Tota, 1988) for the purpose of dividing participants' attention may serve to reduce the likelihood of this occurring.

Finally, in the present study, the hypomanic group significantly influenced between-groups comparisons when their recall data was merged with that of the control group and compared with the dysphoric group. The results of this investigation indicate that future depression and selective processing research should take the precaution of screening participants for hypomanic traits that may obscure comparisons between depressed and nondepressed individuals.

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Appendix A: Beck Depression Inventory - Second Edition

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

0 I do not feel sad.
1 I feel sad much of the time.
2 I am sad all the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism

0 I am not discouraged about my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure

0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure

0 I get as much pleasure as I ever did from the things I enjoy.
1 I don't enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

0 I don't feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6. Punishment Feelings

0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike

0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness

0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying

0 I don't cry anymore than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

11. Agitation

0 I am no more restless or wound up than usual.
1 I feel more restless or wound up than usual.
2 I am so restless or agitated that it's hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0	I have not lost interest in other people or activities.
1	I am less interested in other people or things than before.
2	I have lost most of my interest in other people or things.
3	It's hard to get interested in anything.

13. Indecisiveness

0	I make decisions about as well as ever.
1	I find it more difficult to make decisions than usual.
2	I have much greater difficulty in making decisions than I used to.
3	I have trouble making any decisions.

14. Worthlessness

0	I do not feel I am worthless.
1	I don't consider myself as worthwhile and useful as I used to.
2	I feel more worthless as compared to other people.
3	I feel utterly worthless.

15. Loss of Energy

0	I have as much energy as ever.
1	I have less energy than I used to have.
2	I don't have enough energy to do very much.
3	I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0	I have not experienced any change in my sleeping pattern.
1a	I sleep somewhat more than usual.
1b	I sleep somewhat less than usual.
2a	I sleep a lot more than usual.
2b	I sleep a lot less than usual.
3a	I sleep most of the day.
3b	I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

0	I am no more irritable than usual.
1	I am more irritable than usual.
2	I am much more irritable than usual.
3	I am irritable all the time.

18. Changes in Appetite

0	I have not experienced any change in my appetite.
1a	My appetite is somewhat less than usual.
1b	My appetite is somewhat greater than usual.
2a	My appetite is much less than before.
2b	My appetite is much greater than usual.
3a	I have no appetite at all.
3b	I crave food all the time.

19. Concentration Difficulty

0	I can concentrate as well as ever.
1	I can't concentrate as well as usual.
2	It's hard to keep my mind on anything for very long.
3	I find I can't concentrate on anything.

20. Tiredness or Fatigue

0	I am no more tired or fatigued than usual.
1	I get more tired or fatigued more easily than usual.
2	I am too tired or fatigued to do a lot of the things I used to do.
3	I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0	I have not noticed any recent change in my interest in sex.
1	I am less interested in sex than I used to be.
2	I am much less interested in sex now.
3	I have lost interest in sex completely.

Appendix B: Mania-Grandiosity Scale Items

I have many brilliant ideas.

I have some very special talents that few others have.

My plans will make me famous someday.

I have accomplished some remarkable things.

I think I have the answers to some very important questions.

I think I would be a good comedian.

Lately I feel so confident that I think I can accomplish anything.

I could never imagine myself being famous.

Appendix C: Beck Anxiety Inventory

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by each symptom during the PAST WEEK, INCLUDING TODAY, by placing an X in the corresponding space in the column next to each symptom.

	NOT AT ALL	MILDLY It did not bother me much.	MODERATELY It was very unpleasant, but I could stand it	SEVERELY I could barely stand it
1. Numbness or tingling.	☐	☐	☐	☐
2. Feeling hot.	☐	☐	☐	☐
3. Wobbliness in legs.	☐	☐	☐	☐
4. Unable to relax.	☐	☐	☐	☐
5. Fear of the worst happening.	☐	☐	☐	☐
6. Dizzy or lightheaded.	☐	☐	☐	☐
7. Heart pounding or racing.	☐	☐	☐	☐
8. Unsteady.	☐	☐	☐	☐
9. Terrified.	☐	☐	☐	☐
10. Nervous.	☐	☐	☐	☐
11. Feelings of choking.	☐	☐	☐	☐
12. Hands trembling.	☐	☐	☐	☐
13. Shaky.	☐	☐	☐	☐
14. Fear of losing control.	☐	☐	☐	☐
15. Difficulty breathing.	☐	☐	☐	☐
16. Fear of dying.	☐	☐	☐	☐
17. Scared.	☐	☐	☐	☐
18. Indigestion or discomfort in abdomen.	☐	☐	☐	☐
19. Faint.	☐	☐	☐	☐
20. Face flushed.	☐	☐	☐	☐
21. Sweating (not due to heat).	☐	☐	☐	☐

Appendix D: Shipley Institute of Living Scale - Vocabulary Scale

Instructions: In the test below, the first word in each line is printed in capital letters. Opposite it are four other words. Circle the *one word* which means the *same thing*, or most nearly the same thing, as the first word. If you don't know, guess. Be sure to circle the *one word* in each line that means the same thing as the first word.

EXAMPLE:

LARGE	red	big	silent	wet
(1) TALK	draw	eat	speak	sleep
(2) PERMIT	allow	sew	cut	drive
(3) PARDON	forgive	pound	divide	tell
(4) COUCH	pin	eraser	sofa	glass
(5) REMEMBER	swim	recall	number	defy
(6) TUMBLE	drink	dress	fall	think
(7) HIDEOUS	silvery	tilted	young	dreadful
(8) CORDIAL	swift	muddy	leafy	hearty
(9) EVIDENT	green	obvious	sceptical	afraid
(10) IMPOSTOR	conductor	officer	book	pretender
(11) MERIT	deserve	distrust	fight	separate
(12) FASCINATE	welcome	fix	stir	enchant
(13) INDICATE	defy	excite	signify	bicker
(14) IGNORANT	red	sharp	uninformed	precise
(15) FORTIFY	submerge	strengthen	vent	deaden
(16) RENOWN	length	head	fame	loyalty
(17) NARRATE	yield	buy	associate	tell
(18) MASSIVE	bright	large	speedy	low
(19) HILARITY	laughter	speed	grace	malice
(20) SMIRCHED	stolen	pointed	remade	soiled
(21) SQUANDER	tease	belittle	cut	waste
(22) CAPTION	drum	ballast	heading	ape
(23) FACILITATE	help	turn	strip	bewilder
(24) JOCOSE	humorous	paltry	fervid	plain
(25) APPRISE	reduce	strew	inform	delight
(26) RUE	eat	lament	dominate	cure
(27) DENIZEN	senator	inhabitant	fish	atom
(28) DIVEST	dispossess	intrude	rally	pledge
(29) AMULET	charm	orphan	dingo	pond
(30) INEXORABLE	untidy	involatile	rigid	sparse
(31) SERRATED	dried	notched	armed	blunt
(32) LISSOM	mouldy	loose	supple	convex
(33) MOLLIFY	mitigate	direct	pertain	abuse
(34) PLAGIARIZE	appropriate	intend	revoke	maintain
(35) ORIFICE	brush	hole	building	lute
(36) QUERULOUS	maniacal	curious	devout	complaining
(37) PARIAH	outcast	priest	lentil	locker
(38) ABET	waken	ensue	incite	placate
(39) TEMERITY	rashness	timidity	desire	kindness
(40) PRISTINE	vain	sound	first	level

Appendix E: General Information Questionnaire

Please answer the following questions as honestly as you can. All answers will be kept strictly confidential.

1) Age:_____ Sex:_____ Marital Status: _____

Years of Education (years from grade 1 to 13 + college + university): _____

2) List the types and names (as best you can remember) of all medications that you are currently taking and the number of months that you have been taking them.

Medication	Number of months of use
_____	_____
_____	_____
_____	_____
_____	_____

3) Are you colour blind? ☐ yes ☐ no

4) Check the box of any disorder that you have been treated for, hospitalized for, or diagnosed with:

☐ depression ☐ panic attacks ☐ other:_____
☐ eating disorder ☐ bipolar disorder (manic depression)
☐ anxiety disorder ☐ schizophrenia

Do you feel or think that you may have some type of problem with mood, anxiety, or something else that you have never been diagnosed with or received treatment for? Please describe briefly what you believe to be the problem and why you believe this: _____

_____
_____
_____
_____

5) Check the box of any disorder that any family member has been treated for, hospitalized for, or diagnosed with and include the relationship of that family member to you on the line following the disorder (e.g., mother, uncle, sister, grandfather):

☐ depression _____ ☐ panic attacks _____ ☐ other: _____ _____
☐ eating disorder _____ ☐ bipolar disorder (manic depression) _____
☐ anxiety disorder _____ ☐ schizophrenia _____

Do you feel or think that any of your family members may have some type of problem with mood, anxiety, or something else, that they have never been diagnosed with or received treatment for? Please describe briefly what you believe to be the problem, why you believe this, and the relationship of this person to you (e.g., mother, uncle, sister, grandfather):_____

_____
_____

Appendix F: List of Stimulus Words

neutral	manic	depressed
BULKY	IMPORTANT	WORTHLESS
COMPACT	ENTERTAINING	DEPRESSED
DOMESTIC	ENERGETIC	USELESS
FAIR	RESPECTED	DISCOURAGED
LANKY	LIVELY	DOWNHEARTED
LOYAL	SUPERIOR	EMPTY
MATURE	ZESTFUL	FAILURE
METHODICAL	ENTHUSIASTIC	INSIGNIFICANT
MODEST	SPIRITED	UNWANTED
NATURAL	EXCITED	HOPELESS
POLITICAL	HAPPY	LIFELESS
PROTECTIVE	TALENTED	SAD
RELIGIOUS	VIBRANT	SORROWFUL
RUGGED	CONFIDENT	DOOMED
STRICT	SOCIABLE	INCOMPETENT

Appendix G: Personality Assessment Inventory - Mania Subscales

Instructions: Read each statement and decide whether it is an accurate statement about you.

- If the statement is **FALSE, NOT AT ALL TRUE**, circle **F**.
- If the statement is **SLIGHTLY TRUE**, circle **ST**.
- If the statement is **MAINLY TRUE**, circle **MT**.
- If the statement is **VERY TRUE**, circle **VT**.

Give **your own opinion** of yourself. Be sure to answer every statement. Erase completely any answer you wish to change. Begin with the first statement and respond to every statement.

1. Often I think and talk so quickly that other people cannot follow my train of thought.	F	ST	MT	VT
2. I have many brilliant ideas.	F	ST	MT	VT
3. I can be very demanding when I want things done quickly.	F	ST	MT	VT
4. I take on so many commitments that I can't keep up.	F	ST	MT	VT
5. I have some very special talents that few others have.	F	ST	MT	VT
6. I get quite irritated if people try to keep me from accomplishing my goals.	F	ST	MT	VT
7. Recently I've had much more energy than usual.	F	ST	MT	VT
8. My plans will make me famous someday.	F	ST	MT	VT
9. Sometimes I get upset because others don't understand my plans.	F	ST	MT	VT
10. At times my thoughts move very quickly.	F	ST	MT	VT
11. I have accomplished some remarkable things.	F	ST	MT	VT
12. I have great plans and it irritates me that people try to interfere.	F	ST	MT	VT
13. My friends can't keep up with my social activities.	F	ST	MT	VT
14. I think I have the answers to some very important questions.	F	ST	MT	VT
15. It bothers me when other people are too slow to understand my ideas.	F	ST	MT	VT
16. I feel like I need to keep active and not rest.	F	ST	MT	VT
17. I think I would be a good comedian.	F	ST	MT	VT
18. I have no patience with people who try to hold me back.	F	ST	MT	VT
19. Recently I have needed less sleep than usual.	F	ST	MT	VT
20. Lately I feel so confident that I think I can accomplish anything.	F	ST.	MT	VT
21. At times I am very touchy and easily annoyed.	F	ST	MT	VT
22. I hardly ever buy things on impulse.	F	ST	MT	VT
23. I could never imagine myself being famous.	F	ST	MT	VT
24. I have little patience with those who disagree with my plans.	F	ST	MT	VT

Appendix H: Social Desirability Questionnaires

This questionnaire consists of 39 statements. After reading each statement carefully, circle the response which best describes you. If the statement is true all of the time, or most of the time, circle **True**. If it is not true all of the time, or most of the time, circle **False**. Be sure to read each statement carefully and circle only one response per statement.

1.	My hands and feet are usually warm enough.	True	False
2.	I am very seldom troubled by constipation.	True	False
3.	I find it hard to keep my mind on a task or job.	True	False
4.	Most any time I would rather sit and daydream than to do anything else.	True	False
5.	My family does not like the work I have chosen (or the work I intend to choose for my life work).	True	False
6.	My sleep is fitful and disturbed.	True	False
7.	I am liked by most people who know me.	True	False
8.	I am happy most of the time.	True	False
9.	Criticism or scolding hurts me terribly.	True	False
10.	It makes me impatient to have people ask my advice or otherwise interrupt me when I am working on something important.	True	False
11.	I have had periods in which I carried on activities without knowing later what I had been doing.	True	False
12.	I cry easily.	True	False
13.	I do not tire quickly.	True	False
14.	I am not afraid to handle money.	True	False
15.	It makes me uncomfortable to put on a stunt at a party even when others are doing the same sort of things.	True	False
16.	I frequently notice my hand shakes when I try to do something.	True	False
17.	It does not bother me particularly to see animals suffer.	True	False
18.	I dream frequently about things that are best kept to myself.	True	False
19.	My parents and family find more fault with me than they should.	True	False
20.	I have reason for feeling jealous of one or more members of my family.	True	False
21.	No one cares much what happens to you.	True	False
22.	I usually expect to succeed in things I do.	True	False
23.	I sweat very easily even on cool days.	True	False

24.	When in a group of people I have trouble thinking of the right things to talk about.	True	False
25.	I can easily make other people afraid of me, and sometimes do for the fun of it.	True	False
26.	I am never happier than when alone.	True	False
27.	Life is a strain for me much of the time.	True	False
28.	I am easily embarrassed.	True	False
29.	I cannot keep my mind on one thing.	True	False
30.	I feel anxiety about something or someone almost all the time.	True	False
31.	I have been afraid of things or people that I knew could not hurt me.	True	False
32.	I am not usually self-conscious.	True	False
33.	People often disappoint me.	True	False
34.	I feel hungry almost all the time.	True	False
35.	I worry quite a bit over possible misfortunes.	True	False
36.	It makes me nervous to have to wait.	True	False
37.	I blush no more often than others.	True	False
38.	I shrink from facing a crisis or difficulty.	True	False
39.	I sometimes feel that I am about to go to pieces.	True	False

Using the scale below as a guide, write a number beside each statement to indicate how true it is.

1	2	3	4	5	6	7
NOT TRUE			SOMEWHAT			VERY TRUE

____ 1. My first impressions of people usually turn out to be right.

____ 2. It would be hard for me to break any of my bad habits.

____ 3. I don't care to know what other people really think of me.

____ 4. I have not always been honest with myself.

____ 5. I always know why I like things.

____ 6. When my emotions are aroused, it biases my thinking.

____ 7. Once I have made up my mind, other people can seldom change my opinion.

____ 8. I am not a safe driver when I exceed the speed limit.

____ 9. I am fully in control of my own fate.

____ 10. It's hard for me to shut off a disturbing thought.

____ 11. I never regret my decisions.

____ 12. I sometimes lose out on things because I can't make up my mind soon enough.

____ 13. The reason I vote is because my vote can make a difference.

____ 14. My parents were not always fair when they punished me.

____ 15. I am a completely rational person.

____ 16. I rarely appreciate criticism.

____ 17. I am very confident of my judgements.

____ 18. I have sometimes doubted my ability as a lover.

____ 19. It's all right with me if some people happen to dislike me.

____ 20. I don't always know the reasons why I do the things I do.

Using the scale below as a guide, write a number beside each statement to indicate how true it is.

1	2	3	4	5	6	7
NOT TRUE			SOMEWHAT			VERY TRUE

____ 21. I sometimes tell lies if I have to.

____ 22. I never cover up my mistakes.

____ 23. There have been occasions when I have taken advantage of someone.

____ 24. I never swear.

____ 25. I sometimes try to get even rather than forgive and forget.

____ 26. I always obey laws, even if I'm unlikely to get caught.

____ 27. I have said something bad about a friend behind his/her back.

____ 28. When I hear people talking privately, I avoid listening.

____ 29. I have received too much change from a salesperson without telling him or her.

____ 30. I always declare everything at customs.

____ 31. When I was young, I sometimes stole things.

____ 32. I have never dropped litter on the street.

____ 33. I sometimes drive faster than the speed limit.

____ 34. I never read sexy books or magazines.

____ 35. I have done things that I don't tell other people about.

____ 36. I never take things that don't belong to me.

____ 37. I have taken sick-leave from work or school even though I wasn't really sick.

____ 38. I have never damaged a library book or store merchandise without reporting it.

____ 39. I have some pretty awful habits.

____ 40. I don't gossip about other people's business.

Appendix I

EMOTION AND INFORMATION PROCESSING
CONSENT FORM

This is a study to identify information processing biases associated with different types of emotions. The study will consist of two sessions. In today's session you will be asked to complete questionnaires that relate to different kinds of emotional concerns. You will then be asked to leave your first name and phone number so that you can be contacted for the second session. The second session will take place within the next week. In this session you will participate in a computerized task requiring you to name colours on a computer screen. You will also be asked to complete a variety of questionnaires during the session. It is important to note that NOT EVERYONE WHO TAKES PART IN THIS FIRST SESSION WILL BE CONTACTED AND ASKED TO RETURN FOR THE SECOND SESSION. You will receive one credit toward your introductory psychology grade for participating today and one further credit for participating in the second session.

My signature on this sheet indicates that I agree to participate in this study by Dave Davies, M.A. Clinical Psychology candidate, and it also indicates that I understand the following:

1. I am a volunteer and can withdraw at any time from the study without explanation and without penalty.
2. There are no known risks of physical or psychological harm.
3. Benefits of this study include an increased understanding of the information processing associated with different types of emotions.
4. The data I provide will be confidential.
5. Data obtained in this research will be stored at Lakehead University by Dr. Dwight Mazmanian for seven years, as per standard university procedures.
6. I will receive a summary of the project upon request and following completion of the project. This information can be obtained from Dave Davies or Dr. Dwight Mazmanian through the Lakehead University Psychology Department.

I have received explanations about the nature of the study, its purpose, and procedures.

_____ _____

Signature of Participant Date

Appendix J: Personal Information Form

Please leave your FIRST name and telephone number in the space provided below. By leaving this information you are giving Dave Davies, M.A. Clinical Psychology Candidate, permission to contact you within the next week in order to schedule a convenient time for the second session to take place.

First Name (Please Print) _____

Telephone _____

Appendix K

EMOTION AND INFORMATION PROCESSING
DEBRIEFING FORM: SESSION 1

The purpose of the present study is to determine whether students who experience different emotional states will demonstrate biases for information that is congruent with their emotions. Cognitive psychologists have suggested that these "selective processing biases" serve to maintain various emotional states.

The session in which you have just participated was designed for two purposes:

1. To obtain normative data for a number of relatively new psychological tests which have been designed to assess emotional states in university students and other individuals. Such information allows us to evaluate the reliability and validity of these scales and provides normative scores for which we can compare other individuals in the future.

2. To be able to identify students who are experiencing emotional states of interest to the present research.

Thank you for participating in Session 1. You will be contacted should you be selected for Session 2 of this study. If you have any questions about the study, please contact Dave Davies (343-8476), Clinical Psychology M.A. candidate, or Dr. Dwight Mazmanian (343-8257), Department of Psychology, Lakehead University, Thunder Bay, Ont., P7B 5E1.

If you would like to learn more about the use of psychological tests for assessing emotional states in university students, the following journal articles can be found in the Chancellor Paterson Library:

Hammen, C. L. (1980). Depression in college students: Beyond the Beck Depression Inventory. Journal of Consulting and Clinical Psychology, 48. 126-128.

Tanaka-Matsumi, J., & Kameoka, V. A. (1986). Assessing the stability of depression in college students. Multivariate Behavioral Research, 22, 5-19.

If participating in this study or completing the questionnaires has distressed you or has raised personal issues that you would like to discuss, or if you just need someone to talk to, the following organizations are available: LU Health Centre (343-8361), Peer Support Line (343-8255), Chaplain (343-8018), and Career Counselling Services (343-8018).

Appendix L

Below are a list of adjectives that people sometimes use to describe themselves. Your task will be to rate the adjectives in terms of how you think they describe YOU. Please indicate your ratings for each word by circling the appropriate number on each rating scale.

	Extremely NOT Self-descriptive				Neutral				Extremely Self-descriptive
ENERGETIC	1	2	3	4	5	6	7	8	9
EMPTY	1	2	3	4	5	6	7	8	9
CONFIDENT	1	2	3	4	5	6	7	8	9
LANKY	1	2	3	4	5	6	7	8	9
SOCIABLE	1	2	3	4	5	6	7	8	9
HOPELESS	1	2	3	4	5	6	7	8	9
MATURE	1	2	3	4	5	6	7	8	9
SAD	1	2	3	4	5	6	7	8	9
PROTECTIVE	1	2	3	4	5	6	7	8	9
ENTHUSIASTIC	1	2	3	4	5	6	7	8	9
POLITICAL	1	2	3	4	5	6	7	8	9
INCOMPETENT	1	2	3	4	5	6	7	8	9
SUPERIOR	1	2	3	4	5	6	7	8	9
HAPPY	1	2	3	4	5	6	7	8	9
DOWNHEARTED	1	2	3	4	5	6	7	8	9
BULKY	1	2	3	4	5	6	7	8	9

	Extremely NOT Self-descriptive				Neutral				Extremely Self-descriptive
MODEST	1	2	3	4	5	6	7	8	9
SPIRITED	1	2	3	4	5	6	7	8	9
METHODICAL	1	2	3	4	5	6	7	8	9
DOOMED	1	2	3	4	5	6	7	8	9
FAIR	1	2	3	4	5	6	7	8	9
IMPORTANT	1	2	3	4	5	6	7	8	9
LIFELESS	1	2	3	4	5	6	7	8	9
LOYAL	1	2	3	4	5	6	7	8	9
DOMESTIC	1	2	3	4	5	6	7	8	9
INSIGNIFICANT	1	2	3	4	5	6	7	8	9
STRICT	1	2	3	4	5	6	7	8	9
EXCITED	1	2	3	4	5	6	7	8	9
SORROWFUL	1	2	3	4	5	6	7	8	9
COMPACT	1	2	3	4	5	6	7	8	9
VIBRANT	1	2	3	4	5	6	7	8	9
DEPRESSED	1	2	3	4	5	6	7	8	9
ZESTFUL	1	2	3	4	5	6	7	8	9
ENTERTAINING	1	2	3	4	5	6	7	8	9

	Extremely NOT Self-descriptive				Neutral				Extremely Self-descriptive
RUGGED	1	2	3	4	5	6	7	8	9
FAILURE	1	2	3	4	5	6	7	8	9
TALENTED	1	2	3	4	5	6	7	8	9
NATURAL	1	2	3	4	5	6	7	8	9
UNWANTED	1	2	3	4	5	6	7	8	9
RESPECTED	1	2	3	4	5	6	7	8	9
USELESS	1	2	3	4	5	6	7	8	9
LIVELY	1	2	3	4	5	6	7	8	9
DISCOURAGED	1	2	3	4	5	6	7	8	9
RELIGIOUS	1	2	3	4	5	6	7	8	9
WORTHLESS	1	2	3	4	5	6	7	8	9

Appendix M

Recall Instructions

Remember the list of adjectives that I just had you rate? Take the next five minutes to try and recall as many of those words as you can. As you remember each word please write it in one of the spaces provided on the sheet of paper.

Stroop Instructions

In this task you are going to see a number of words presented one at a time. Each word will be printed in one of the following colours: red, green, blue, or yellow. Your task will be to name aloud the colour that the word is printed in as fast as you can without making any errors. The task will take approximately 20 minutes.

Appendix N

EMOTION AND INFORMATION PROCESSING
DEBRIEFING FORM: SESSION 2

The purpose of the present study is to determine whether students who experience different levels of elation and sadness will demonstrate biases for information that is congruent with their emotions. Cognitive psychologists have suggested that these "selective processing biases" serve to maintain positive and negative emotional states.

The computer task that you completed is a modified version of the Stroop colour-naming task. This information processing task has been used extensively to investigate attentional biases toward emotionally-relevant information. A number of studies employing the Stroop have shown that participants typically take longer to colour-name words that are of some emotional significance to them. Other research has demonstrated that when participants are given an unexpected recall test (such as the one that you just completed) they show a similar bias, recalling more emotionally significant words than emotionally neutral words.

In the present study it is hypothesized that students who experience elevated levels of sadness will take longer to colour-name, and will recall more, negative words. Similarly, it is hypothesized that those who experience elevated levels of elation will show the same bias toward positive words.

Thank you for your participation in this study. If you have any questions about the study, please contact Dave Davies (343-8476), M.A. Clinical Psychology candidate, or Dr. Dwight Mazmanian (343- 8257), Department of Psychology, Lakehead University, Thunder Bay, Ont., P7B 5E1.

If you would like to learn more about the relationship between information processing and emotional states, the following journal articles can be found in the Chancellor Paterson Library:

Gotlib, I, H., & McCann, C. D. (1984). Construct accessibility and depression: An examination of cognitive and affective factors. Journal of Personality and Social Psychology, 47, 427-439.

Mathews, A., & MacLeod, C. (1994). Cognitive approaches to emotion and emotional disorders. Annual Review of Psychology, 45, 25-50.

Segal, Z. V., & Swallow, S. R. (1994). Cognitive assessment of unipolar depression: Measuring products, processes, and structures. Behaviour Research and Therapy, 32, 147-158.

If participating in this study or completing the questionnaires has distressed you or has raised personal issues that you would like to discuss, or if you just need someone to talk to, the following organizations are available: LU Health Centre (343-8361), Peer Support Line (343-8255), Chaplain (343-8018), and Career Counselling Services (343-8018).

Appendix O

Means and Standard Deviations for the Proportion of Depressed-, Manic-, and Neutral-content Words Recalled by Each Group

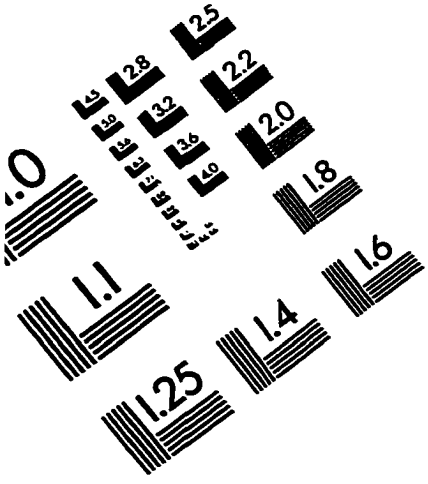
	Word Type		
Group	Depressed	Manic	Neutral
Dysphoric	.37 (.12)	.44 (.11)	.19 (.17)
Hypomanic	.27 (.10)	.38 (.11)	.35 (.13)
Control	.32 (.13)	.40 (.09)	.29 (.12)

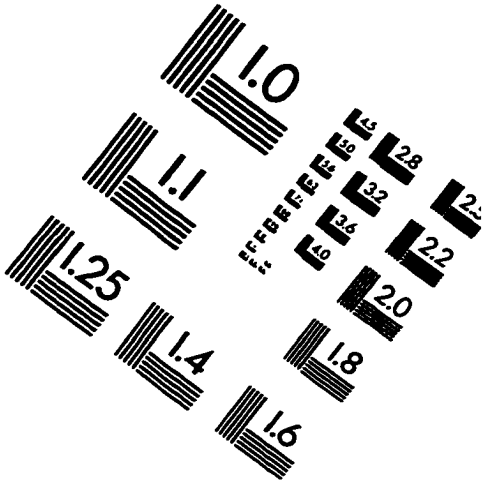
Appendix P

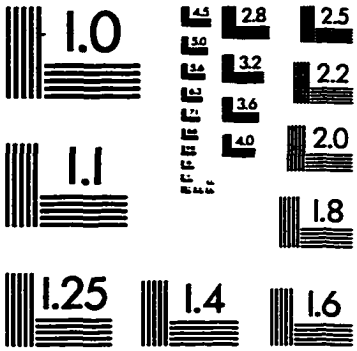
Means and Standard Deviations for the Self-descriptiveness Ratings of the Depressed-, Manic-, and Neutral-content Words

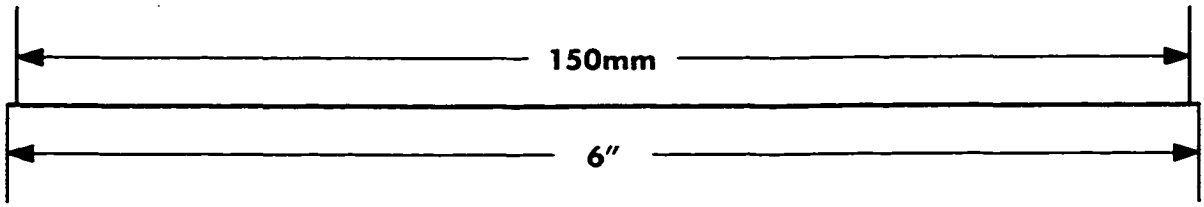
	Word Type		
Group	Depressed	Manic	Neutral
Dysphoric	3.75 (1.13)	5.69 (.97)	5.12 (.62)
Hypomanic	1.47 (.44)	7.53 (.71)	5.40 (.61)
Control	1.85 (.79)	6.91 (.57)	5.42 (.62)

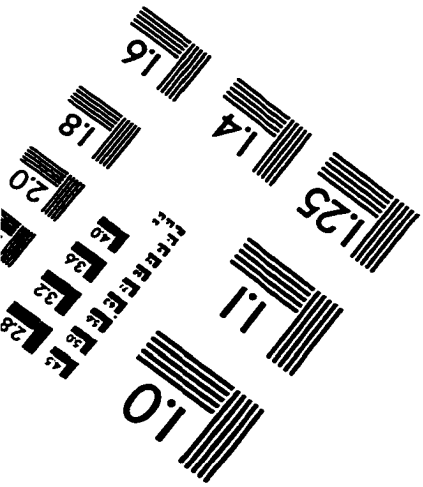
IMAGE EVALUATION
TEST TARGET (QA-3)

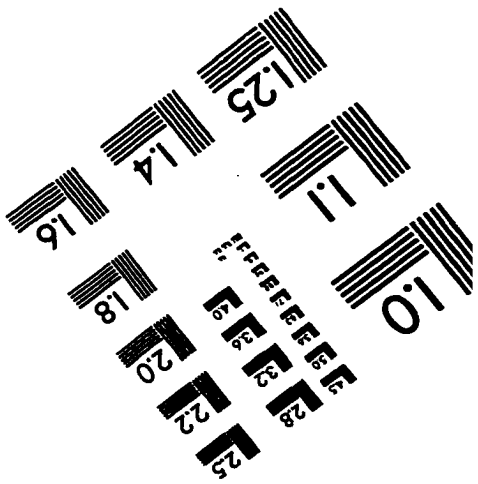












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