# THE EFFECTS OF DEPRESSION ON NONCONSCIOUS PERCEPTION: AFFECTIVE JUDGMENT AND AFFECTIVE PRIMING

By

MATTHEW J. DOPPLER

Bachelor of Science
University of Minnesota-Morris
Morris, Minnesota
1987

Master of Science
Oklahoma State University
Stillwater, Oklahoma
1990

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
December, 1995

THE EFFECTS OF DEPRESSION ON

NONCONSCIOUS PERCEPTION:

AFFECTIVE JUDGMENT AND

AFFECTIVE PRIMING

Robert A. Stanners
Dissertation Adviser

Thomas C. Collins
Dean of the Graduate College

## PREFACE

Extant literatures in memory, cognition, and other information processing areas have demonstrated differences between depressed and nondepressed samples. Theoretical models have proliferated (e.g. Beck, 1967; Bower,1983). These studies are almost exclusively based in conscious processing of stimuli. The literature pertaining to nonconsciously mediated processing has failed to factor in individual differences. These auditory perception experiments attempted to extend the scope by investigating nonconscious processing while including individual differences. Experiment 1 included two such factors. College students were screened for "depression" using the BDI and contrasted with a group of nondepressed students. The second factor was "self-relevance" which individualized the affectively varying stimulus words (pleasant, depressive, and neutral) by dividing them into high and low relevance based on each participant's ratings. Using a dichotic masking paradigm, which addresses the methodological flaws of dichotic listening, three data sets were analyzed. The results were inconsistent with predicted mood congruent hypotheses. Despite this lack of evidence for between group (depression) differences, there was a

clear advantage for processing of depressively valenced words both nonconsciously and consciously. This was in contrast to a "pleasant" response bias. An alternative conceptualization of "valence" is discussed which posits that words' "arousability" effects how they are processed both consciously and nonconsciously. The "self-relevance" factor enhanced processing only for the consciously perceived material. Experiment 2 also contained the between subject factor "depression". An attempt was made to expand existing literature showing nonconscious semantic priming into the affective/ emotional domain. Prime-target word pairs were either matched or unmatched based on their "valence". Results were consistent with a demonstration of a nonconscious emotional priming effect. Mood failed to interact with valence. Depressed subjects identified more target words than the nondepressed group. The absence of interactions between valence and mood is discussed. A general discussion points to the import of considering the arousability of stimulus words when doing attention and perception studies as opposed to discrete categories (e.g. pleasant, depressive). Finally, dichotic masking is discussed as an approach to auditory perception with considerable promise.

ACKNOWLEDGEMENTS

I would like to start by thanking my committee chair, Dr. Robert Stanners, from whom I've learned a great deal. My gratitude goes out to Dr. Jim Price and Dr. Jim Seals. I want to offer special thanks to Dr. "Iron John" Chaney. Each of these professors made crucial contributions to my completion of this project.

I would also like to thank my wife, Jill, who persevered with me through some rather arduous times and always worked to instill resilience and hope. I am indebted to my parents, Denny and Wanda, whose contribution is perennial. It would be woefully inadequate to attempt to articulate what each of my siblings meant to me through this experience; thank you Marques, Mary Jane, Ruth Ann, John, and Tim.

I have had the support of so many others, who each in their own way helped buoy my spirit through friendship, kinship, and mentoring. These people are far too many to list but include my aunts and uncles, nephews and nieces, cousins, lifetime friends, mentors, graduate school friends, and internship friends. To all of you I humbly offer, "Thanks".

TABLE OF CONTENTS

# Experiment 1

## Statement of the Problem

A significant amount of attention has been devoted to the cognitive factors in the mediation of depression. Empirical findings related to cognition and information processing in depression span a broad spectrum of research from social psychological factors to the workings of the unconscious. Much less has been done in clinical psychology and its populations in nonconscious information processing. This is somewhat ironic considering the historical emphasis on the unconscious in clinical practice and the high prevalence of depression (American Psychiatric Association, 1994). This paper seeks to review and integrate existing literatures in related areas of information processing. Two experiments are presented. These studies investigate nonconscious processing, response bias, perceptual accuracy, and nonconscious priming in depressed and nondepressed samples. For the purposes of these studies, particular interest will be focused on individual differences as they are operationally defined psychometrically. The research asks the question whether psychometric assignment of depression involves differences in cognitive processing.

## The Cognitive Effects of Depression

There is extensive empirical and clinical evidence of differences in thinking between groups assessed as depressed and those measured as normal. Cognitive behavioral models

of depression have proliferated (Beck, 1967, 1976; Bandura, 1973; Ellis, 1977; Meichenbaum, 1977). Beck (1967, 1976) has asserted that distorted thought processes maintain the affective, emotional, and behavioral manifestations of depression. The characteristic use of cognitive distortions, such as catastrophizing, selective abstraction, arbitrary inference, dichotomous thinking, and overgeneralization sustain the depressed person in negative views of self, world, and future (Beck, 1976).

Many different methodologies have been used to compare depressed individuals with normals. One such approach has been the development of questionnaires that measure various types of cognitive distortion. Warren, Stake, and McKee (1982) developed the Interpretation Inventory with questions to address Beck's distortions. For example, "A friend walks by and does not appear to see you. Do you think your friend is just avoiding you?" (arbitrary inference). Subjects then rated their response tendencies on a five-point scale ranging from "never think that way" to "always think that way". The results indicated that depressed subjects' ratings were significantly more distorted than normals due to their making more negative inferences.

Norman, Miller, and Klee (1983) developed the Cognitive Bias Questionnaire. Four stories adapted for clinical patients (Krantz & Hammen, 1979) were followed by multiple choice questions, each coded according to two dichotomous

dimensions: depressed versus nondepressed in tone and mood, and distorted versus nondistorted in terms of logical inference from the story. They found that depressed subjects selected significantly more negatively valenced responses. In addition, their instrument correlated significantly with other self-report measures (e.g. The Beck Depression Inventory).

Fennel and Campbell (1984), in their Cognitions Questionnaire, presented depressed and normal subjects with scenarios and had them rate them on five forced-choice interpretations. Depressed subjects were significantly more likely than normals to endorse negative interpretations deemed distorted by the authors. Additionally, depressed subjects' endorsements of items were consistent with Beck's delineations of characteristic differences (e.g., overgeneralization, catastrophizing, etc.). Watkins and Rush (1983) produced similar results by presenting subjects with open-ended vignettes from their Cognitive Response Test. They assessed cognitive distortion along similar dimensions as Beck (1967) and Fennel and Campbell (1984), only renaming the distortions: demandingness, absolutism, attribution to luck, and exaggeration.

Numerous other studies have corroborated the basic tenet that there is a qualitative difference between the way depressed and normals make judgements about themselves and sometimes others. Golin (1989) had students judge the

plausibility of positive and negative inferences ostensibly made by themselves or by others. The depressed students deemed negative self-inferences as more plausible and positive other-inferences as less plausible.

Another study demonstrated depressed subjects' tendency to endorse significantly more negative self-talk and significantly less positive self-talk than normals on an extended version of The Automatic Thoughts Questionnaire (Kendall, Howard, & Hays, 1989). Sackheim and Wegner (1986) looked at differences in how depressed versus normal subjects experience failure. They found that depressed subjects rated degree of control as less for positive outcomes than negative outcomes.

MacDonald and Kuiper (1984) investigated the consistency of self-schema processing by having subjects make a series of self-referent personality judgements concerning depressive-content and nondepressive-content personal adjectives. Consistency was found between dichotomous yes-no self-ratings and subsequent 9-point self-reference ratings. Not surprisingly, greater decision consistency was found for schema-congruent content with depressed subjects endorsing depressive adjectives relatively more frequently.

The effect of depression in making judgments has also been extended into the social context to varying degrees. It is presented here to corroborate and extend intrapersonal

data and to briefly highlight the social/interpersonal impact of depression. Dykmam and Volpicelli (1983) wanted to know whether depressed subjects' biases occurred across all situations or only in those with evaluative significance. Subjects performed a dot estimation task under varying feedback (i.e., good, average, poor, or ambiguous). Analyses revealed that depressed subjects were more apt than normals to judge their feedback as negative. Perception of negative feedback was most pronounced under ambiguous feedback conditions.

A series of studies was conducted using a videotape of a 9 year old girl portrayed as either depressed or nondepressed and as having experienced high or low recent life stress. Subjects (school teachers) rated their own level of anxiety and depression before and after the film. They then rated their attributions (negative or positive) about the child, feelings of affiliation, judgments of the child's attractiveness, and expectations about future behavior and the need for therapy. It was consistently demonstrated that the child's level of depression influenced almost every rating, including ratings of their own depression (Peterson, Wonderlich, Reaven, & Mullins, 1987; Mullins, Peterson, Wonderlich & Reaven, 1986).

In other studies involving interpersonal implications, results are consistent in demonstrating an interpretive bias in depressed subjects. Janowsky, Kraft, Clopton, and Huey

(1984) showed a negative correlation between negative moods and the subject's judgments of degree of regard, congruence, empathy, and unconditionality shown by a professional who had interviewed them. Lowenstein and Hokanson (1986) reported that subsequent to an acquaintanceship paradigm exposure (casual interaction with an experimenter), moderately dysphoric subjects displayed relatively negative appraisals of how they thought the speaker perceived them as compared to controls. Swallow and Kuiper (1987) had undergraduates rate their similarity to others on a Likert scale and generate a list of attributes thought to typify the "average other person". Subjects judged themselves to be less similar to others as depression level increased. And lastly, Radenhausen (1989) showed that depressed subjects rated themselves more negatively on a combined measure of personality traits and the experimenter more negatively for supportiveness traits relative to nondepressed subjects. This distorting effect of depression on social cognition has also been demonstrated using mood induction (Bollenbach & Madigan 1982).

It has been shown that cognitive distortions occur in different diagnostic categories, as well. For example, McNally and Foa (1987) demonstrated that agoraphobics were more likely than normals to interpret ambiguous bodily stimuli as threatening and were also more likely than normals to exaggerate the probability and cost of unpleasant

events. Ingram (1989) investigated the automatic thinking and accuracy in depressed and socially anxious subjects. He found that although negative automatic thinking was specific to the depressed group, the amount of positive thinking was impaired in both groups.

Depressive Accuracy

From the proliferation of research emerging out of the forementioned cognitive theories of depression has come some interesting results that have called into question the notion of "distortion". More specifically, there seems to be a group of people psychometrically defined as depressed who show a more accurate response tendency than their so called normal counterpart control groups with normal scores. That is, the labeled depressed subjects often are more objective in their analysis and judgments ("sadder but wiser") while the normal subjects demonstrate a positive distortion or bias ("Pollyanna hypothesis" [Osgood and Hoosain, 1983]).

Other studies have corroborated this finding. Doppler and Stanners (1990) did so using a dichotic masking paradigm. Dichotic masking presents a word to one ear and a white noise mask to the other to make stimulus items unidentifiable. They found a significant tendency for nondepressed subjects to respond pleasant more often to unidentified words than depressed subjects, regardless of the type of word presented. However, there was no

significant tendency for depressed subjects to produce a higher frequency of unpleasant responses than nondepressed subjects. Further, there was a significant tendency for nondepressed subjects to correctly identify more pleasant than depressive words while there was no evidence of this for depressed subjects (Doppler & Stanners, 1990). It is important to point out that this was not an overall accuracy effect. On the contrary, the overall means for correct identification were virtually the same for depressed and nondepressed subjects. The asymmetry was in the same direction in both the response bias and correct identification results. That is, the differences between depressed and nondepressed groups were only apparent for the pleasant (both word and response) material.

Vestre and Caulfield (1986) reported that nondepressed subjects showed some tendency toward distortion. In their study, cognitive distortion was evaluated by giving depressed and nondepressed subjects feedback about their personalities using neutral descriptions. The results indicated that depressed subjects, "were objectively more accurate in their interpretation of their evaluation," (p. 35). The authors went on to suggest that it is nondepressed subjects who distort feedback showing, "a 'normal' positive biasing effect," (p. 35).

Similarly, Martin, Abramson, and Alloy (1984) demonstrated that depressed subjects' judgments as accurate

with regard to control over a noncontingent but positive outcome. This was in contrast to nondepressed subjects' tendency to overestimate their control. Tang (1990) used a similar method of contingency management to demonstrate depressed subjects' tendency to make more accurate judgments than nondepressed subjects regarding control over a light that might or might not come on. Again, nondepressed subjects overestimated their personal control. Roth and Ingram (1985) demonstrated a negative correlation between the Self Deception Questionnaire and depression. And Richters and Pellegrini (1989) showed agreement between depressed mothers and teachers of their children in reporting behavior problems. This agreement, according to the authors, challenged the assumption that depression associations necessarily reflect distortion. As Kuiper, Olinger, and MacDonald (1985) suggest from the results of their study, mild depressives have a view of self that incorporates both valences, positive and negative, in content.

In addition to these studies there have been two review articles in the literature that have dealt with the issue of cognitive distortion and more specifically with where the distortion actually lies. Ruehlman, West, and Pasahow (1985) reviewed the evaluative tendencies of psychometrically defined severely depressed, mildly depressed, and nondepressed individuals in the areas of

judgements of contingency, attributions of causality, expectancy estimates, and self-reference. They concluded that cognitive distortion manifests itself with negativistic evaluative bias in severely depressed individuals and that nondepressed subjects tend to exhibit positive evaluative responses. Those categorized as mildly depressed display unbiased (neither negative or positive) evaluative response patterns. Baumeister (1989) proposed that optimal psychological functioning is associated with a slight to moderate degree of positive distortion in a person's perception of one's self and world. He cites research that has shown that highly accurate perceptions are associated with depression and goes on to discuss an optimal margin of illusion.

Perceptual Defense

Another body of literature exists that seems related to the nondepressed tendency to distort or be sensitized to the positive while under-perceiving negative materials. This is known as the perceptual defense and vigilance hypothesis, (Erdelyi, 1974; Bruner, 1943). It is otherwise known as the "New Look" in perception (Bruner & Postman, 1947, Erdelyi, 1992; Bruner, 1992). In its early history, the New Look was seen as an interactive phenomenon with perception being the result of organismic factors such as needs, expectancies, and defenses (Erdelyi, 1992, Bruner & Postman, 1947). The early data was primarily tachistoscopic (visual)

presentation of taboo words which were shown to have higher identification thresholds in comparison to neutral words (reviewed by Erdelyi, 1974). What followed was over 1000 articles investigating the New Look's principal assertions of the perceptual defense and vigilance hypothesis. It is stated by Erdelyi (1974), "that perception of stimuli may be inhibited (perceptual defense) or enhanced (perceptual vigilance) as a function of the input's emotionality," (p. 3).

Around 1960, major criticisms befell the theoretical notions of New Look that interacted with the era's Zeitgeist. Academic psychology had been dominated by behaviorism and mentalistic inferences were yet to be fully acknowledged as plausible (Greenwald, 1992). Additionally, any possible scientific results that implied a homunculus or that might corroborate psychodynamics and a complex functioning unconscious (Freudian notions) were out of the mainstream from an interpretive standpoint. However, the cognitive revolution was on its way. But in order to maintain or regain scientific respectability, a new vernacular would have to follow to divorce findings from psychodynamic interpretations. For example: filtering would replace censorship, executive processes would replace ego, decision nodes would replace conflict, and working memory would replace conscious, and so on (Loftus & Klinger, 1992).

Erikson (1960) wrote compelling articles challenging the New Look on many fronts. The first was the 'logical paradox' which asks how a perceiver can defend against something unless they first perceive the stimulus being defended against. Second, by having vigilance and defense built in to the theoretical machinery, it seemed circular and lended itself too readily to post hoc analyses that could explain basically any result. Third was the problem of word frequency where the commonness of a word in the language could act to confound defense or vigilance results (commonness leading to lower thresholds). The final, most important, and ubiquitous of the critiques was the issue of response bias (Holender, 1986; Dixon, 1981; Erdelyi, 1974). Simply, response bias is the tendency to respond in some patterned or biased way regardless of the meaning of the stimulus.

Erdelyi (1974) did an effective job of responding to each of the first three criticisms and appears to render them less than disconfirming to the literature. However, the debate remained with regard to response bias and separating "pure perception" from response (Dixon, 1981; Erdelyi, 1992, 1976,1974; Greenwald, 1992; Holender, 1986; Jacoby, Lindsay, & Toth 1992; Lewicki, 1992; Loftus & Klinger, 1992; Marcel, 1983). Perceptual defense and vigilance were interpreted as operations that either screened a subject from, or sensitized the subject to,

certain stimuli. This was in concert with the still strong clinical beliefs of unconsciously mediated processes, which badly needed stronger empirical support to add to the clinical observations of such phenomena. We now turn our attention to the next area of review; data in nonconscious (unconscious) processing.

Nonconscious Perception

That nonconscious processing exists is no longer an issue. Indeed some approaches to studying it have brought it back into scientific respectability by keeping explanations in information processing nomenclature away from psychodynamically based interpretations (Klinger & Loftus, 1992). There are notable exceptions to this (Silverman, 1985; Erdelyi, 1992). Erdelyi states that the unconscious must be reclaimed gingerly. Despite the differences in theoretical vantage points, there are recent studies that appear to fit into a perceptual defense interpretive scheme.

When approaching research in the area of cognitive psychology, particularly in the domain of nonconscious or preconscious processes, it becomes apparent that some delineations need to be made prior to hypothesizing and theorizing. As Erdelyi (1992) elucidates, strictly speaking, much of the research being done in nonconscious processing today, although not completely independent of the unconscious and all its historical mystique, is different

from psychodynamics and its conceptualizations. Much of the controversy surrounds attempts at sorting findings on the distinction between responses to inputs and actual perception of those inputs (Erdelyi, 1992, Holender, 1986, Loftus & Klinger, 1992). The problem is that there is no possible way to elicit immediate responses to stimuli. As Erdelyi (1992) states, "Indeed perception itself is not immediate, but a microgenetic process unfolding over time, no response can bypass the objection," (p. 785); (see also Dixon, 1981, p. 140). That is to say, perception probably represents several points along a temporal continuum between physical sensation and psychological 'meaning'.

For the purposes of these experiments, then, nonconscious perception can be thought of as a process by which a verbal stimulus activates semantic (meaning) information without conscious identification; the latter being indicated by some form of verbal report (Dixon, 1971). Holender (1986) provides an extensive review of the literature in this area which shows the limited amount of data that is directly relevant to the present experiments which are unique in their endeavors into the rarely researched auditory mode of presentation. The existing research on nonconscious perception in the auditory modality will now be reviewed.

In a dichotic listening (different than dichotic masking) study done by MacKay (1973, Experiment 2), the

subjects repeated ambiguous sentences ("The hunters noticed the bark.") presented to one ear while a disambiguating word ("dog") was presented to the other (unattended) ear. A subsequent forced-choice recognition task indicated that the disambiguating word facilitated the appropriate interpretation of the sentence. In order to deal with the possibility that subjects had momentarily switched attention to the unattended channel, MacKay (1973, Experiment 3) stopped the subjects after the last sentence and asked for identification of the unattended word. Because only one out of 36 subjects correctly identified the word, MacKay concluded that nonconscious processing had taken place. This conclusion is problematic because the identification test was given only once. Additionally, the time duration between presentation of the word and the identification test might have allowed some subjects to consciously perceive and then rapidly forget the disambiguating word.

Additional controls were introduced by Newstead and Dennis (1979, Experiment 4) to prevent attention switching. In their experiment, the disambiguating words were preceded and followed by other words on the unattended channel. The reason was that in MacKay's experiment, words were coming out of silence and thus more likely to induce an attentional switch. Newstead and Dennis also eliminated the time duration between the sentences which may have allowed subjects to recover the word from a precategorical memory.

With these controls in place, MacKay's results could not be replicated. When the controls were relaxed (Experiment 4), the MacKay results were replicated.

Johnston and Dark (1982) compared a divided attention condition (subject attends to both channels) with a focused attention condition (subject attends to only one channel). They measured the extent to which a dichotically-presented word would bias the interpretation of a visually-presented test word which had two distinct meanings. In the focused attention condition the bias-inducing word occurred on the unattended channel. A significant biasing effect was found for the divided attention condition but not for the focused attention condition seeming to indicate that attention was required for semantic processing.

There appears to be a critical design flaw in the dichotic listening paradigm. That is, there is no way to insure that even a very brief attentional shift has not occurred (Holender, 1986). Alternatively, dichotic masking (a word presented to one ear and a white noise mask to the other) is a method that eliminates the problem of attention switching since the subject consistently attends to the ear in which the word is presented. By controlling the sound level of the word and mask, the word can be made unidentifiable. Dichotic masking can provide assessment of nonconscious perception under Dixon's (1971) criterion. Specifically, if a subject can be shown to have acquired

some information about a stimulus word without being able to report the word accurately, then nonconscious perception has been demonstrated.

Semantic priming is a phenomenon in which a word (prime) facilitates or inhibits the perception of a subsequently-presented word (target). Stanners, Cherry, and Carver (1989) used the dichotic masking paradigm to demonstrate semantic priming effects of unidentifiable prime words. Results showed both a facilitative priming effect for associatively related words and an inhibitory priming effect for unrelated words. The topic of Experiment 2 attempts to extend research in this area.

Memory and Emotion

In order to interrelate the cognitive distortion and nonconscious perception literature, we move now to the data suggesting depressive effects on memory. A predominant theory in mood and memory that has gained support from numerous studies is that of Bower's (1981). Bower proposes that human memory can be modeled in terms of semantic concepts and schemata that are used to describe events. Memory is represented as events in a cluster of descriptive propositions. Through experience new associative connections are established among instances of the concepts used in describing the event. The proposition represents the basic unit of thought. By activation of a proposition and its concepts, one engages the basic process of thought.

Consciousness is represented by the contents of sensations, concepts, and propositions whose current level of activation exceeds some threshold. During activation, a spreading effect presumably takes place from one concept to another, or from one proposition to another, by associative linkages among them.

Bower (1981) goes on to consider two basic phenomena that integrate affect (emotion) into the memory model. The first is the mood congruity effect which means that people attend to and learn more about events that match their emotional state. The basis of this effect is that the memory representations for the congruent mood are in a higher state of activation. The second phenomenon is the mood-state-dependent-retention effect which means that people tend to recall events better if they reinstate the original emotion that was present during learning. Therefore, one implication that seems to emerge is that emotional state should enhance the salience of mood-congruent material for selective attention and learning, as suggested by Powell and Hemsley (1984).

Indeed several studies of mood and memory have shown that memories consistent in valence with an individual's mood state facilitate both recall and speed of retrieval. The procedures of these studies varied in many ways, demonstrating the robustness of the basic relationship between mood and memory. For example, Isen, Shalker, Clark,

and Karp, (1978) gave subjects a recall test of negatively and positively valenced words subsequent to failure or success experiences. Words consistent with the subject's experience were recalled more frequently than inconsistent words. Riskind, Rholes, and Eggers (1982), Snyder and White (1982), Teasdale and Fogarty (1979), and Teasdale and Taylor (1981) manipulated mood by means of the Velten Mood Induction Procedure (VMIP; Velten, 1968) and then asked subjects to recall life experiences. Subjects consistently recalled events congruent with the mood induced.

In all of the studies mentioned directly above, memories consistent with induced mood were more accessible. Laird, Wagner, Halal, and Szegda (1982) and Riskind (1983) manipulated subjects' facial expressions and found that memory was better when the material to be recalled was affectively consistent with the mood state implied by the facial expression. Bower (1981) used hypnosis to induce mood and found effects on recall of life experiences and experimentally induced learning that further corroborated the effect of mood on memory.

Individual Differences in Memory

It is implicit in Bower's theory (1981) that personal experience is the natural process in the development of propositional networks. This indicates the import of the development of individual differences in memory. It is plausible that a person who experiences depressive or

pleasant moods more often would have more of their memory devoted to congruent propositions. It is possible that simple induction of mood in a subject might not provide an adequate measure of the existence of the truly qualitative memory differences between depressed and normal subjects (Cherry, 1993). Therefore, there might be an enhanced effect if the experimenter used naturally occurring depression as opposed to mood induction. Presumably a person who experiences more time in a depressed mood state would encode into memory relatively more mood congruent material. As Mayo (1983) asserted, there may be long-term influences on memory reflected in personality traits which are associated with the accessibility of positive and negative experiences encoded.

Indeed, there have been studies that have used clinical populations and naturally occurring moods to extend the analogue laboratory studies of mood induction. Clark and Teasdale (1982) and Lloyd and Lishman (1975) found that naturally occurring depression increases the accessibility of memories of affectively negative life experiences. Williams and Broadbent (1986) examined autobiographical memory in subjects who had recently attempted suicide by overdose. Subjects were required to retrieve specific personal memories to positive or negative cue words. Compared to control groups the suicide attempters showed biased retrieval. The bias was evidenced in delayed

retrieval of positive memories rather than speeded retrieval of negative memories.

In another study, Bargh and Tota (1988) used a concurrent memory load paradigm. Depressed and nondepressed subjects judged each of a series of depressive and nondepressive adjectives as to their descriptiveness of the self or the average other person. Some subjects, while making each judgment, held six digits in working memory. They found that the memory load manipulation resulted in depressed subjects reliably demonstrating a smaller increase in latencies for depressive content than for nondepressive content in making the judgment of self-description. The reverse was true for nondepressed subjects. This suggested to the authors that depressive content had less of an inhibiting effect on processing the information for depressed subjects.

Self Reference

Another attempt to more accurately look at individual differences in depression and memory has explored self-referenced (self-relevant) stimulus material. This approach brings the exploration of cognition and memory even closer to individual experience and perhaps provides an opportunity to address idiosyncracies that might otherwise obscure effects.

Bradley and Mathews (1983) used recall measures for self- versus other- person referent positive and negative

adjectives. They compared depressed and matched normals. Depressed subjects recalled more negative than positive adjectives and this bias was only apparent in the self-referent condition. Bradley and Mathews (1988) later replicated their findings and added a group of recovered depressives. Again depressives showed self-referent bias in recall of negative adjectives, whereas, the recovered group and the controls recalled more positive than negative self-referent material. Additionally, in an other- person referent condition, recovered depressives recalled fewer positive than negative adjectives. The authors concluded that retrieval operations in recovery are not completely normal, yet not as biased toward negativity as they were in the depressed condition.

Kuiper and MacDonald (1982) had subjects who varied on a depressive dimension rate the applicability of positive and negative personality adjectives to themselves. In an incidental recall period, normals remembered significantly more positive information about themselves than negative, whereas mild depressives recalled equal amounts of positive and negative self-referent material.

Pyszczynski, Hamilton, Herring, and Greenberg (1989) hypothesized that the negative memory bias in depressed people is mediated by excessive levels of self-focused attention. They instructed nondepressed and subclinically depressed subjects to either focus on themselves or

externally, and then to recall 10 events that had happened to them during the previous two weeks. Events recalled by depressed subjects were more negative than events recalled by nondepressed subjects under the self-focused but not the external-focus condition. Forgas, Bower, and Krantz (1984) demonstrated a relationship between hypnotically induced mood (pleasant and depressed) and measures on recall memory and behavior assessments after subjects had participated in an interactive setting while videotaping them. One day later, subjects were hypnotized and a happy or depressed mood induced. Strong mood influences were demonstrated on behavior assessments and recall memory as well as an effect due to self- versus other- target. The influences were consistent with other findings showing a mood congruent memory effect.

What the self-referent/relevant data suggests is that memory studies and their effects are enhanced when stimulus materials are related to the subject's experiential base; here deemed self-relevant. Individual differences might be enhanced by tailoring stimuli to the actual memories for people; as in depression where encoding is likely relatively more negative emotionally.

Thus, in the literature on cognitive "distortion" in depressed and other disorders, individual differences can be shown to affect information processing. This supports the original intention to demonstrate that such effects can

occur on various levels of information processing (e.g. cognition, memory, perception). Additionally, it is apparent that there exists a lack of research in nonconscious levels of processing using individual differences as a factor in either experimental or clinically oriented investigations.

Perceptual Sensitivity

There has also been a limited amount of research done directly on differences between groups in perceptual sensitivity. This can be thought of as differential receptivity to qualitatively differing stimuli. There are some data, however, that seem to corroborate the idea. McNally, Kaspi, Rieman, and Zeitlin (1990) had Vietnam combat veterans with and without posttraumatic stress disorder (PTSD) perform a modified Stroop task in which they named the colors of neutral words, positive words, obsessive-compulsive words, and PTSD words. PTSD subjects took significantly longer than controls to color-name PTSD than neutral, OCD, and positive words. The increased latency was interpreted to be Stroop interference which was defined to reflect involuntary semantic activation.

Schotte, McNally, and Turner (1990) examined whether bulimics would exhibit enhanced perceptual and physiological sensitivity for material related to their concerns about body shape and weight. They varied concern related target words with neutral words using a dichotic listening task in

which skin conductance responses were recorded. Bulimic subjects detected the concern related target more often than the neutral word when both were presented to the unattended channel and exhibited larger skin conductance responses to concern related words. These differences were not observed in controls. Additional research has demonstrated that anxious people show selective attention to verbal stimuli having connotations of threat in both clinically anxious individuals (MacLeod, Mathews, & Tata, 1986) and in psychiatrically normal people displaying high levels of anxiety (Eysenck, MacLeod, & Mathews, 1987).

What the review of literature indicates at this point is that psychometrically defined groups, principally depressed people, show a variety of differences in information processing. These differences are documented in cognitively mediated dimensions including judgment and interpersonal responses. Research was also reviewed that extends the differences to learning and memory as well as more automatic levels of attention and perception, both consciously and nonconsciously.

Beck's model (1967) suggests that idiosyncratic maladaptive cognitive schemata are activated in the depressed person. Schemata are defined as organized representations of 'prior experiences' which screen, code, categorize, and evaluate information. Bower (1981) likewise suggests that links have been laid down by prior association

of concepts with particular mood states. Thus each subject is likely to have highly idiosyncratic associative networks depending on personal experience.

The major implication is that because memories are individualized, treating them as a group compromises accuracy. If stimulus material could be individualized, it should increase effects. Stimulus irrelevance, stemming from a standard group of stimuli which might not activate memory for some subjects, would be somewhat distinguished by using those words deemed most relevant to the self by each subject. As it has been demonstrated, there are factors that contribute to the development of an individual's memory. By isolating depression as one factor we can ask the empirical question of whether such a factor enhances effects in basic levels (nonconscious) of information processing.

Experiment 1 stands as an attempt to improve upon the precision of the Doppler and Stanners (1990) study that failed to indicate nonconscious perception effects. By tailoring stimulus material (words) to concepts associated with an individual's memory and presenting stimulus items with the dichotic masking paradigm, it is hypothesized that nonconscious perception will be enhanced with higher level of accuracy in classification and identification obtained. Subjects will evaluate items from a pool of affective words prior to the dichotic-masking task on the basis of their

self-descriptiveness or self-relevance. Then the dichotic-masking procedure will carried out. The items endorsed by subjects as self-relevant prior to the experimental procedure will then be used as the unique/idiosyncratic stimulus words in the analyses. This serves to individualize stimulus materials. Based on the aforementioned models and literature review, it is predicted that subjects' mood would have a stronger effect on words endorsed as self-relevant by the subject.

## Method

### Subjects

College students (24 male and 24 female) were screened from psychology courses at Oklahoma State University. The screening included having them complete the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Criterion levels recommended by Beck and used efficaciously in other research (Krantz & Liu, 1987; Vestre & Caulfield, 1986; Warren, Stake, & Klee, 1982; Fennel & Campbell, 1984), were set within the range of mild to more severe levels for depressed subjects (mean = 17.2, range 12-28), while nondepressed subjects' scores were also controlled and did not exceed the criterion score set at 4 (mean = 1.6, range 0-4). All participants were native speakers of English and right handed by self-designation. It should be noted, scores in the range of 10-15 are classified as "mild depression" (Young, 1982) and

"dysphoric" (Kendall, et al, 1987).

The screening procedure also included a list of 150 words varying on an affective ("valence") dimension (pleasant, neutral, and depressive). The individuals were asked to rate each word on a five-point Likert scale as to its self-relevance or applicability to their experience.

Materials

Pleasant words were selected from an evaluation study conducted by Stanners and Gordon (1989). The experimenters played words on an audio tape to groups (n = 200) of students who then rated them on a scale from one (low) to seven (high) for level of pleasantness. Words with greater than 5 pleasantness ratings were selected for use as pleasant words and so designated in this study. In two other studies, Stanners and Gordon (1989) compiled semantic judgements of words by having subjects categorize them as either pleasant or unpleasant. [Neutral words were operationalized as those words subjects categorized as pleasant or unpleasant at approximately a chance level (50%)]. Neutral words were selected for this study as those nearest to chance level categorization. Unpleasant (depressive) words were selected from the Depressive Adjective Checklists (DACL) forms A-G (Lubin, 1965). The DACL forms are lists of adjectives used to assess depression by having the subject endorse those words that describe their current mood state. They have been used extensively

in research and assessment of depression (Christenfeld, et al., 1978, Cherry, 1993). Additional depressive words were chosen from a study in which subjects made associations to depressively valenced words. The study yielded several words reliably identified as congruent with the stimulus words (Wohl and Izawa, 1979).

The frequency of each word's occurrence in the English language was checked using the Kucera-Francis (1967) norms. Data suggest even very large differences between frequencies (e.g. 10-3000 occurrences per-million) have no effect on visual thresholds (Eriksen, 1963) or auditory thresholds (Doppler & Stanners, 1990; Stanners, Cherry, & Carver, 1989). The pleasant, depressive (unpleasant), and neutral words used in this study were within this undifferentiated range.

Response sheets used during the listening portion of the experiment had three lines for each trial (Appendix E). The first two lines were used for the subjects to check one of the two affective categories (Pleasant or Unpleasant). The third line was used for the participants to write down the word if they could.

Procedure

Upon arrival at the site of the experiment, individuals signed a consent form (Appendix A). Subsequent to this, all participants completed the BDI, as it has been demonstrated that scores are to most reliable when administered on the

day of test which ensures valid use of the instrument (Sacco, 1981). Those who scored within the aforementioned ranges for both depressed and nondepressed were included in the study.

Participants were then escorted to the laboratory space containing the apparatus. A brief explanation of the domain of the experiment (auditory perception) was given prior to each of the phases of the experiment (Appendices B - D). Stimulus words were presented to the right ear as previous research has shown stronger contralateral pathways than ipsilateral producing a right ear advantage for verbal presentation of material to right handed subjects (Kimura, 1961). Concurrent with the presentation of the word to the right ear is the presentation of a white noise mask to the left ear. A calibration procedure was carried out to determine a level of the white noise mask which would produce misidentification on a high proportion of trials (Appendix B).

During calibration, subjects listened to up to ten series of five words recorded at 10-second intervals on a cassette tape, and instructed to write the words down when possible. The calibration words were neutral with regard to affective valence and equated approximately for frequency and syllabic content. If the subject correctly identified any of the five words in a series, the white noise mask gain was increased incrementally until a five consecutive misses

occurred. Previous research (Stanners & Gordon, 1988; Stanners & Doppler, 1990) has shown that this criterion produces 60-80% identification errors.

Following calibration, subjects received 10 practice trials and were asked to first categorize the words as pleasant or unpleasant and then write down the word when possible on the response sheet (Appendices C and E). Five of the words were pleasant and five unpleasant/depressive. After the practice trials, another tape containing pleasant, neutral and depressive (to be categorized unpleasant) words was played and the same categorization and reporting task required of the subjects. Again, words were matched approximately for frequency and syllabic content. There were 50 of each word valence (pleasant, depressive, neutral) for a total of 150 trials. The words were randomly ordered, with the restriction that no more than three consecutive words from the same category were allowed to occur. The number of words was arrived at by doubling the number used in the Doppler and Stanners (1990) study which provided an adequate number of data points for both the correct identification data and the misidentified data; both of interest. Including the self-relevant condition made it necessary to add a number of trials [double that in the Doppler and Stanners (1990) study] which would provide adequate data to address all the questions of interest.

Because of the large number of stimulus items, a break

was given to address the potential motivational problems with prolonged exposure. No subjects reported that they were having any difficulty sustaining attention, and virtually all of them opted to continue immediately. The stimulus tapes used during each half of the task were counterbalanced to control for possible order effects of words within the two major exposure periods.

Apparatus

Tapes were recorded on a stereo tape recorder/player. A noise level meter was used in recording to control the voice level of each word so there was consistency in volume. Each trial number was recorded on the left channel followed by the stimulus word recorded on the right channel with 10-second intervals between trials. When played into a stereo headset, a sound-operated relay detected the onset of the word on the right channel and a switching circuit presented the output of a white noise generator to the left channel. The noise levels were measured by a General Radio, Model 1551-C sound level meter.

## Results: Experiment 1

Experiment 1 produced three data sets. The first was the 'categorization' data which would be used to assess nonconscious perception. Recall that the stimulus words were all responded to by having the subjects categorize as "pleasant" or "unpleasant" what they believe they heard. This data set was restricted to categorization of

misidentified words. That is, the subject marked the word as pleasant or unpleasant, but wrote it down incorrectly. The second data set, addressing response bias, included subjects' categorization of neutral words. The third data set was the 'identification' data, which consisted of trials on which subjects correctly identified the stimulus word (wrote it correctly on the response sheet). It was used as the measure of perceptual accuracy.

Nonconscious Perception

To start, the focus will be on the categorization data (misidentifications). In dealing with the issue of nonconscious processing, the response bias issue needed to be addressed. In this study, response bias was defined as the tendency of subjects to respond "pleasant" more often than "unpleasant" (or visa versa) in the absence of any semantic information. Response bias was assessed by using performance on neutral words as a baseline. Nonconscious perception would be indicated by departure of categorization performance on the affective words (pleasant and depressive) from the performance level on neutral items.

A correction for response bias, if present, was made by adjusting subjects' categorization scores. The following procedure was used for the adjustment. For a given subject, the proportion of pleasant categorization given neutral stimuli [P(P/N)] was subtracted from the proportion of pleasant categorization given pleasant stimuli [P(P/P)].

The same was done for depressive word presentation categorized as unpleasant ([P(U/U)] minus [P(U/N)]). Significant differences, say, between pleasant and depressive words for adjusted scores could not then be attributed to response bias. In other words, subsequent to the adjustment, subjects' ability to process some information about the word (correct categorization), although they could not identify it correctly, would be taken as an indication that stimulus words had been given some degree of (nonconscious) semantic interpretation.

It should be noted that the trials on which subjects failed to respond at all were not appropriate data trials. This was because there was no way to ensure that subjects did not withhold information after having the word in awareness at least for some time, however brief.

Subsequent to the categorization score adjustment, the mixed factorial design had three factors. The first two were within-subjects factors, 'valence' (pleasant or depressive), and 'relevance' (high or low). The between-subjects factor was 'depression' (depressed or nondepressed subjects). The major question of Experiment 1 was whether the individual differences factor 'relevance' added any precision or accuracy to the design and thereby contributing to demonstrating nonconscious processing effects.

The Likert rating scores collected during screening

were used to ascertain an individual subject's top 25 words in each valence dimension (pleasant, neutral, depressive). A given subject's top 25 ratings in each affective dimension represented high self-relevant words while the rest constituted the low self-relevant words. This individualized the stimulus materials by utilizing the subjects' ratings for words most self-relevant. The anticipated effects were nonsignificant and individually tailoring the stimulus materials did not enhance nonconscious perception.

The nonconscious perception data did show a main effect for valence, $F$ (1, 46) = 4.40, $p$ = 04. The mean proportions for 'valence' were: .1176 (depressive) and .0446 (pleasant). Subjects, collapsing across 'depression' and 'relevance', correctly categorized more depressive than pleasant material after the data were adjusted for response bias. No other significant effects were found in the analysis of the categorization data involving pleasant and depressive words.

Response Bias

Another area of inquiry with regard to how subjects categorized data was whether there was evidence of response bias and further, whether there would be differences in response bias between the depressed and nondepressed subjects. This was done by comparing depressed and nondepressed subjects on their performance on neutral items.

That is, the mean proportion of unpleasant responses given a neutral word P(U/N) versus the mean proportion of pleasant responses given a neutral word P(P/N) for depressed and nondepressed subjects. In this three way mixed factor ANOVA the two levels of the within subjects 'response' factor refer to pleasant or unpleasant categorization. The other within subjects factor was 'relevance', while 'depression' (depressed and nondepressed subjects) was the between subjects factor.

The main effect for 'response' was highly significant, $F$ (1,46) = 28.06 $p$ <.0001. The mean proportions for the two levels of the 'response' factor were .616 (pleasant) and .384 (unpleasant). Subjects, regardless of depressive status or level of relevance, categorized neutral words as pleasant significantly more often than they categorized them as unpleasant. None of the other main effects or interactions were significant.

Conscious Identification

As forementioned, the third data set was the identification data. This analysis considered the issue of identification accuracy. An individual score was the number of words correctly identified. A three-way mixed factor ANOVA was used to analyze the data. The between subjects factor was 'depression' (depressed versus nondepressed subjects). The within subjects factors were 'valence' (pleasant, depressive, or neutral) and 'relevance' (high or

low).

The analysis did indicate a significant main effect for 'relevance', $F$ (2,46) = 15.25 $p$ < .0007. The means were 5.66 for high relevance, and 4.84 for low relevance. Subjects identified significantly more high than low relevance words.

The correct identification data also revealed a significant main effect for 'valence', $F$ (2,92) = 64.49, $p$ < .0001. Because the 'valence' factor contained three levels, simple effects tests were required to tease out the sources of difference. The means for the three levels of 'valence' were as follows: depressive = 6.68, pleasant = 5.12, neutral = 3.97. All combinations of the three levels were analyzed by using two-tailed t-tests. Contrasting both depressive and pleasant with neutral yielded significant differences, $t$ (92) = 11.32, $p$ < .01 (depressive versus neutral) and $t$ (92) = 4.80, $p$ < .01 (pleasant versus neutral). Subjects correctly identified significantly more of both depressive and pleasant (affective) words than they did neutral words. The comparison between depressive and pleasant identification was also significant, $t$ (92) = 6.52, $p$ < .01; subjects correctly identified significantly more depressive than pleasant words.

Due to empirical evidence that affectivity produces greater salience in contrast to neutrally toned stimuli in various perception and attention tasks (Cherry, 1993;

Kitayama, 1990), a final comparison was made. The affective (pleasant and depressive) levels of the 'valence' factor were combined and compared to performance on the neutral words. The mean for the affective words was 5.90 and the neutral word mean was 3.97. The t-test showed a significant difference $t$ (48) = 3.43, $p < .01$.

## Discussion: Experiment 1

### Nonconscious Perception (Categorization Data)

Neither the addition of the relevance factor nor the depression factor showed up in the main effects or interactions in the nonconscious perception data. This failure to demonstrate between-group differences might suggest that subjects needed to have higher levels of depression, possibly into the clinical range. The negative finding for relevance also indicates that under conditions of nonconscious processing, self-reference ratings of affective words failed to influence the type of auditory perception involved in the present experiment. That is, for some reason the effects of self-relevance that occur on the conscious level (e.g. Conscious Identification Data) failed to appear at a nonconscious level. This nondistorted processing is in contrast to the empirically demonstrated relationship between self-relevance and depressive distortion in conscious (cognitive and memory literature) information processing (e.g. Bradley and Mathews, 1983, 1988; Bower, 1983). It would interesting to be able to

replicate results showing information processing that is distorted consciously and unbiased unconsciously.

The categorization data did, however, show a significant main effect for 'valence' indicating that nonconscious perception was facilitated by depressive words. After the adjustment for response bias, subjects (regardless of status as depressed or nondepressed) correctly categorized more depressive words than they did pleasant words. This demonstration of nonconscious perception adds to previously existing data using dichotic masking and showing nonconscious perceptual effects (Stanners, Cherry and Carver, 1989; Cherry, 1993).

What remains to be explained with regard to the main effect for 'valence', is why subjects, especially the nondepressed group, performed better on depressive material than they did on pleasant material; opposite of what might be expected based on theories of memory and emotion, depressive cognition, depressive accuracy/perceptual sensitivity, and perceptual defense (Bower, 1983; Beck, 1967; Ruehlman et al. 1985, Erdelyi, 1992). One possibility is that it represents some sort of fluke, yet this is probabilistically unlikely, especially in light of the fact that the same pattern of results had been demonstrated by Cherry (1993). She used the dichotic masking paradigm in a mixed factorial design. After showing mood induction for elation, neutral, and depressed mood, subjects in her study

nonconsciously perceived information only with the unpleasant stimulus words.

One potential explanation of the nonconscious perception of depressive material result is to reconsider the emotional classification of stimulus words. The words actually form a sort of affective hierarchy, as opposed a set of categories (pleasant, depressive, and neutral) used in this and other studies. Construction of the valence conditions placed the words into actual classes, when such words probably form a scale. Perhaps as words vary from neutrality or are more affectively extreme, that has an effect on memory and accessibility in semantic and/or emotional information processing. To explain subjects' superior performance on depressive material, then, it would be posited that, under the conditions of this experiment, depressive valence was more affectively extreme or arousing, and therefore more perceptible. Looking at the result from the standpoint of perceptual defense, it would have to be assumed that the negative valence of the words was not sufficiently high to invoke the perceptual defense. Perhaps borrowing from the research and using more extreme "taboo" words would allow demonstration of defense.

With regard to the affective hierarchy, there is some evidence that addresses this question and could be seen as consistent with the arousability notion proffered above. Schotte, et al., (1990) demonstrated greater galvanic skin

conductance to affectively threatening stimuli in comparison to neutral cues in a dichotic listening paradigm (Schotte, et al., 1990). Other studies have shown greater arousal, measured both physiologically (e.g. higher heart rate and respiration and galvanic skin response) and psychologically (e.g. perceived sweating, shaking, and anxiety) using negatively toned emotional words (Kotze & Moller, 1990; Lewis and Lee, 1978; Kemp-Wheeler & Hill, 1987). Additionally, there have been effects demonstrated in selective attention to threat cues (MacLeod, et al., 1986) and Stroop interference, where longer response latencies to color naming of emotional words is interpreted as indicating heightened attention, semantic activation, and/or arousal to the words (Gotlib & McCann, 1984; Williams & Nulty, 1986; Dawkins & Furnhan, 1989; McKenna, 1986; McNally, et al., 1990). These studies in attention have been corroborated in the memory literature, as well, where there is data that has demonstrated superior recall and recognition performance on affective over neutral stimuli (Bock, 1987; Osgood & Hoosain, 1981; Osgood, 1971; Russel, 1978).

Further, in another memory study, Bock (1987) showed that words were recalled best based on their arousability and that this was independent of the affective quality of the words. This was a follow-up study to one in which he showed that affective ("self-referent") processing occurred before semantic processing. In that study, 'affective' was

operationally defined as "emotional arousability" and "relatedness to concerns", while 'semantic' was operationally defined as "defineability" and "concreteness". The self-referent condition took shorter processing time and showed superior recall (Bock & Klinger, 1987). Viewed together, these studies suggest, then, that subjects' enhanced performance on depressive material might have had something to do with the arousability of the stimulus words.

Looking at this converging evidence showing facilitative processing advantage for affective over neutral information physiologically, attentionally, in memory, and in subjective (psychological) arousal, it seems there is a basis to assert that emotionality and arousal enhance perception. Such an assertion appears to give the finding of nonconscious perception of depressive words at least some potential bases.

Response Bias (Categorization of Neutral Words)

Another major Experiment 1 question was whether there would be evidence of response bias and whether there were differences between depressed and nondepressed subjects. Here there was a significant tendency for subjects, regardless of status, to respond pleasant more often than unpleasant. That nondepressed subjects responded pleasant more often than unpleasant to neutral words is not surprising. In fact, it is consistent with what Vestre and Caulfield (1986) referred to as the "normal positive biasing

effect," (p. 35), where nondepressed subjects show a positive skew in orientation/information processing. It is also consistent with the "Pollyanna hypothesis" (Osgood & Hoosain, 1983) and the depressive accuracy literature that demonstrates nondepressive/"normal" tendency to be biased in various information processing tasks including: e.g. judgment of control (Martinson, et al., 1984) and recall of personal events (Riskind et al., 1982).

What remains to be explained, however, is why depressed subjects failed to show a negatively skewed response bias (depressive distortion) or more symmetry between pleasant and unpleasant responding (depressive accuracy). One possible explanation that has already been suggested in light of the negative finding for mood congruity effects in nonconscious perception, is that this sample of subjects labeled as "depressed" was not severely depressed enough to show the distorting effects. In a review of the literature, Reuhlman (1985) suggested that more severe levels of depression (e.g. BDI scores $x > 25$) are needed to demonstrate clearly distorted thinking. However, given that this sample was "moderately" depressed (mean BDI 17.2, range 12-28) it is inconsistent with what would be predicted by Reuhlman's (1985) review where at least a symmetry in pleasant/unpleasant (depressive accuracy) responding should have been evidenced. More recently, Matt, Vazquez, and Campbell (1992) conducted a meta-analytic review essentially

corroborating the same pattern reported by Reuhlman (1985). They again showed that the level of depression plays the role of a crucial variable in showing effects, where only in the severe ranges does distortion clearly pervade. They too showed the symmetry between valences in the mild to moderate ranges. The failure to replicate the Doppler and Stanners (1990) finding and the depressive accuracy literature where nondepressed asymmetry and depressive accuracy was demonstrated is difficult to explain.

Perceptual Accuracy (Conscious Identification Data)

This series of analyses was concerned with the possibility of differential perceptual accuracy on trials where subjects (depressed and nondepressed) correctly identified the word despite the noise mask. None of the interactions were significant nor was the main effect for depression.

However, the main effect for relevance was significant. High relevance words were shown to be identified with significantly greater frequency than low relevance words. This finding seems to support the notion that tailoring stimulus materials to the individual can contribute to enhanced effects for consciously identified stimuli; in this case greater accuracy in identification. This corroborates the supposition that the idiosyncratic nature of a person's memory needs to be addressed to maximize effects. It might also lend support to the position that for relevance to have

an effect, words have to be mediated consciously.

The main effect for valence was also significant in the conscious identification results. Simple effects tests revealed that subjects correctly identified more depressive than pleasant words, more pleasant than words than neutral words, and also more affective (combining depressive and pleasant words) than neutral words. This pattern of results raises two issues. The first is the depressive identification advantage for subjects. Second is the strong identification advantage for affectively valenced words (depressive and pleasant) in contrast to the neutral words.

One possible explanation that pertains to both findings is to invoke a similar argument as that proffered above for the nonconscious perception effect. In a similar way, perhaps arousability of the words also contributed to the correct identification of the words. As previously elucidated, Doppler and Stanners (1990) suggested that there is no absolute scale of pleasantness or depressiveness. Perhaps as words approximate neutrality, their perceptibility is attenuated because their arousal value is reduced. Conversely, words may become more salient as they become more differentiated from neutrality and arousal value increases. Alluded to above, there are data from the perception, attention and memory literature that have demonstrated superior measures (e.g. semantic categorization, galvanic skin response, recall) of

performance on affective stimuli over neutral (Bock, 1987; Osgood & Hoosain, 1981; Osgood, 1971; Russel, 1978). And as was shown in the analysis of the identification data, depressive words show nonconscious processing advantages over pleasant. Thus, affective word processing may be moderated by arousal where depressiveness represents the relatively highest arousal levels.

The reviewed memory literature would have predicted that depressively valenced words would have a higher threshold for identification for nondepressed subjects in contrast to pleasant words because of their incongruity with nondepressed mood. This would also be predicted by perceptual defense. In this study it might apply to both groups of subjects, if indeed this sample was insufficiently depressed. It should be noted that this is not, however, the first negative result in attempting to show mood congruity effects (Bower, et al. 1978; Isen, Shalker, Clark, & Karp, 1978; among others). It appears reasonable to suggest that arousability could account for some of these negative findings.

## Introduction: Experiment 2

There is research in nonconscious perception demonstrating processing of information of a limited semantic scope. This is exemplified in studies of "priming" where a semantically related or unrelated word (sometimes presented below conscious threshold) either facilitates or

inhibits the processing of a subsequently presented word (Groeger, 1988, 1984; Marcel, 1980). Elsewhere, priming has been defined as facilitation in the processing of a stimulus as a function of a recent encounter with the same or related stimulus (Cofer, 1967). Greenwald (1992) has interpreted this kind of result as indicating the "limited" capabilities of the unconscious in contributing to information processing. His point argues against the traditional belief (i.e. psychodynamic theories) that the unconscious is much more complex in its abilities. However, it does not necessarily follow logically from demonstrations of semantic priming that unconscious memories might not be involved and influential. Nor is it apparent that because subliminal inputs are processed in a limited way that unconscious cognition is likewise limited (Erdelyi, 1992). That is, there is no inherent reason to look at nonconscious processing starting with an assumption that it is simplistic. On the contrary, there is a need to develop empirical approaches that address the apparent sophistication in human information processing and make them demonstrable.

This experiment attempts to take one step toward extending empirical demonstration of the complexity of the unconscious. It also includes an individual differences factor; something largely ignored in research into nonconscious processing. By involving a depressed sample,

the results can also apply to psychological aspects of information processing as they may relate to clinical and theoretical issues. Additionally, this experiment is unique in its extension of a well documented phenomenon (semantic priming) into the emotional (affective) domain.

The numerous findings alluded to earlier in perceptual defense (New Look) research have indicated the following phenomena. Duration thresholds for correct report of emotionally threatening, or anxiety provoking words or pictures differ significantly from those stimuli more neutrally toned. Galvanic skin responses recorded prior to correct recognition are higher for emotional than for neutral stimuli. And, pre-recognition guesses as to the nature of tachistoscopically presented stimuli differ between neutral and emotive stimuli (Dixon, 1981). One may notice that this does not speak directly, as yet, to a dimension of individual differences. It has been pointed out elsewhere that there is a very limited amount of research done in the area of perception that has looked at individual differences as a factor (Dixon & Lear, 1962; Henley & Dixon, 1976; Cherry, 1993).

One such study that did factor in individual differences investigated the effect of depression (mild) on tachistoscopic recognition of neutral and unpleasant words. The results showed that depressed subjects recognized more depressive than neutral words leading the authors to

speculate that depression may involve a breakdown of perceptual defense (Powell and Hemsley, 1984). The results are, at least in part, consistent with much of the literature reviewed in Experiment 1 indicating effects on perceptual threshold levels (i.e. "New Look"). If one assumes depressive information is to be defended against, then this result could be viewed as a sort of defensive breakdown where depressed individuals are less effective in screening negatively valenced material. Again, this relegates nondepressed subjects to represent our notion of "normalcy", as Powell and Hemsley (1984) did. Perhaps contrary to this to some degree, there is some literature that suggests that depressives may be more 'accurate' and that nondepressives may be skewed toward a positive valence in information processing as was found in Doppler and Stanners (1990). Nonetheless, there are numerous results that show mood congruence as generally facilitative in processing information (e.g. Matt, 1992; Bower, 1983; Beck, 1967; etc.).

Semantic Priming

Semantic priming has been demonstrated to be a robust phenomenon showing that presentation of a word can influence the perception/cognition of a subsequently presented word, depending on the semantic relationship between the two words (Becker & Killion, 1977; Meyer, Schvaneveldt, & Ruddy, 1975). More recently, priming effects have been

demonstrated using visual and auditory masks and degraded stimuli to investigate nonconscious semantic (meaning) activation.

In one study, Marcel (1980) presented three word sequences. The first word in each sequence was designated the context word (e.g. hand or tree). The second word was a polysemous word, which by definition, has alternative meanings, (e.g. palm). The third word was a target word (e.g. wrist). The purpose of the context word was to bias the semantic interpretation of the polysemous words and thus influence, through priming, the processing of the target word. So, if there were a sequence with 'hand' and 'palm', 'wrist' would be facilitated, whereas 'tree' and 'palm' would inhibit 'wrist' as a response. The question was whether conscious or unconscious (absence of recognition) presentation of the polysemous word would differentially facilitate processing of the target word.

Subjects were to make lexical (word-nonword) decisions on the third word in the sequence (target) where the second word in the triad was polysemous. When all three words were clearly visible, decision times were faster if all three words were unrelated (e.g. tree, race, wrist) than if the first two and last two were related to each other, but first and third were not (e.g. tree, palm, wrist). The fastest decision times occurred when all three words in the triad were related (e.g. hand, palm, wrist). So the meaning of

the second word decreased decision time to the target word only when it was preceded by a word to which it was semantically related in the same way that it was to the target word. Decision time was increased when the relationship between first and second and second and third word was different. This result was interpreted as evidence that only one meaning of the polysemous word was available when all words were clearly visible.

The unconscious condition was one in which the polysemous word was visually masked (unidentifiable). It was in this condition that the pattern of results was quite different. Lexical decisions to the third word in triads in which words one and two and words two and three were related (e.g. tree, palm, wrist), as well as trials in which all three were related (e.g. hand, palm, wrist), were both facilitated relative to lexical decisions for triads made up of three unrelated words (e.g. tree, race, wrist). The results imply that both meanings of the polysemous word were activated when it was unidentifiable. The difference between subthreshold and suprathreshold presentation was that in the subthreshold condition, two meanings of polysemous masked word influenced decision times as opposed to one meaning being facilitated in the suprathreshold condition (Groeger, 1988). This led the author (Marcel, 1980) to infer qualitative differences in conscious and nonconscious semantic activation.

Groeger (1984) showed similar qualitative differences in consciously and nonconsciously presented stimulus items in a study again using the visual modality. He presented single target words and required subjects to select the target from a subsequent matrix of words. These matrices never contained the actual target words. Rather, the words were either semantically or structurally related. Again, there was an unconscious presentation condition in which tachistoscopic levels of awareness were determined for each subject. When targets were presented without awareness (nonconsciously), subjects responded to semantically related words. When the target words were identifiable, subjects selected visually similar words.

Groeger (1988) produced similar results using the auditory modality. With prime words presented in awareness, subjects chose phonologically related target words. However, when prime words were presented below a level of identifiability, semantically related words were chosen.

Stanners, Cherry, and Carver (1989), alluded to above, also demonstrated semantic priming in the absence of correct identification of the prime words. Subjects were presented stimulus words using the dichotic masking paradigm (Stanners & Doppler, 1990). The prime word was presented to the right ear and a noise mask presented to the left ear. The word/mask level was calibrated so that the prime was made unidentifiable (subject misidentification of the word).

Three seconds after the prime, a target word was presented. The target was also masked but at a lower level of noise than the prime. Identification data were conditionalized on their respective primes being misidentified. The results indicated both a facilitation priming effect for related words and an inhibitory priming effect for unrelated words.

When viewed together, the studies seem to suggest that semantic activation with nonconscious presentation of prime words can be demonstrated. Bower's (1981) theory of emotion and memory provides a theoretical basis for looking at semantic activation with an affective/emotional component. Priming is a phenomenon that provides data consistent with the propositional network/activation models of memory, while Bower's model builds on these basic concepts. Recall that when there is a semantic relationship between words, the presentation of one should, via propositional connections, activate those semantically related. By extension, the emotional model of memory (Bower, 1981) would predict a similar process of activation between words with congruent emotional valences. Again, emotional state should enhance the salience of mood congruent material in a priming task. The extension, then, moves beyond the semantic relationship between words, to an affective/emotional level. Thus, Experiment 2 attempts to demonstrate "emotional (or "affective") priming".

Experiment 2 investigates nonconscious perceptual

processing and sensitivities between depressed and nondepressed subjects. It is predicted that priming will be facilitated in affectively congruent (matched) conditions and relatively inhibited in unrelated conditions for both depressed and nondepressed subjects. This overall priming effect is based on Bower's model of emotional memory (1981). It is also predicted that there will be between group differences with nondepressed subjects showing relatively greater facilitation for pleasantly valenced material and less facilitation for depressively valenced materials. This prediction is based on numerous findings (e.g. Doppler & Stanners, 1990; Ruehlman, 1985; Matt, et al., 1992) where nondepressed subjects perform better on more pleasant than unpleasant words/stimuli. This would also support Bower's model where a relatively nondepressed mood would facilitate information processing of congruent material (mood-congruity effect).

With regard to the depressed subjects, the literature reviewed thus far in both studies makes it plausible to look for symmetry between positive and negative valences of stimulus words. That is, depressed subjects might show equivalent priming between pleasant and depressive valences. That pattern of results would corroborate the perceptual accuracy findings. Recall that those data indicate that mild to moderately depressed subjects process the emotional spectrum of information with more parity or more objectively

[sadder but wiser] (Matt, et al., 1992; Reuhlman et al., 1985). Alternatively, the depressed group might demonstrate more facilitation on negatively valenced words than nondepressed subjects. If found, that result would be interpreted as further support for the mood-congruity effect. This theoretical position accounts for facilitation on negatively valenced stimuli in the depressed group.

## Method

### Subjects

Participants (n = 40, 20 in each level of 'depression') were chosen from classes offered in the Department of Psychology at Oklahoma State University. These included introductory and other undergraduate courses in psychology. They completed the Beck Depression Inventory during an in-class screening and on the day of test. The college student's scores on the BDI were within the same parameters established in the Experiment 1 Method section (nondepressed subjects mean = 2.05, range 0-4; depressed subjects mean 19.1, range 11-32).

### Materials

The sources of the pleasant, neutral, and depressive words were the same as in Experiment 1.

Response sheets had two lines for each trial. The first line was used by the respondents to write down what they thought they heard the prime word to be. The second was used to write down what they thought the target word to

be (Appendix G).

Procedure.

An audio cassette tape was prepared with 20 pairs of prime-target words matched for pleasant valence (pleasant prime/pleasant target), 20 pairs for depressive valence (depressive prime/depressive target), and 20 pairs for "Unmatched" valence (50% pleasant prime/depressive target and 50% depressive prime/pleasant target). This resulted in 60 trials where no more than three consecutive occurrences of any particular arrangement was allowed in the otherwise random ordering. Words were recorded in the same manner as they were in Experiment 1 using a sound level meter to control the volume of each word and insure approximately equal loudness for each word. Another tape was made with the same arrangement but with the prime and target words reversed in order to counterbalance word order presentation. That way each word pair was represented in both prime and target position. This manipulation eliminated potential confounds of word frequency or word structure in targets across the conditions.

All tapes were recorded with same male voice. For the prime words, the calibration procedure used in Experiment 1 was repeated to adjust the noise level individually for each participant. Recall that words were presented through stereo headphones to the right ear and mixed with noise presented on the left channel. Calibration was done so that

the minimum amount of noise was used to produce a high level of misidentification or no identification of the prime word.

The target words were recorded with noise on the left channel, and words on the right channel. This combination was presented binaurally so the college students heard the word/noise combination through both channels. The level of noise mixed with the target words was determined in a pilot experiment to produce approximately 30% correct responses. This allowed for enough variability in the response measure (percent correct identification) to avoid floor and ceiling effects. This criterion had been used previously with efficacy (Stanners and Cherry, 1989).

The practice trials and data trials went as follows. The subjects heard a trial number (e.g. "trial number 5.") followed approximately one second later by the prime word presented in the right channel, which was masked in the left channel and presented dichotically. Subjects then used a three second interval to write down what they thought the prime word was. There is evidence that a longer latency than three seconds (e.g. six secs.) leads to rapid dissipation and can compromise the size of the priming effect (Stanners and Cherry, 1989). After the three second interval the target word, mixed with the noise, was presented binaurally. This was followed by a 10 second interval of silence during which the subject wrote down what they thought the target word was and waited for the next

trial. Standard instructions were read to each participant (see Appendix F). The format of the answer sheet is detailed in the materials section.

## Results: Experiment 2

The first question was whether there was evidence of an overall nonconscious priming effect. The data set for the analysis consisted of correctly identified target words given an affectively congruent prime word. The data were conditionalized by using targets only when the prime word had been misidentified. The logic was that affective nonconscious priming could be inferred if the prime was not correctly identified but facilitated perception of the congruent target (contrasted with unmatched/incongruent prime-target pairs).

Trials on which no response was given for the prime word were not used because of the possibility that the subject actually did consciously identify the prime word but for some reason failed to write it down. Using only misidentified primes appears to remove any argument of conscious mediation of the correct prime and allows for a strong inference of nonconscious priming.

Nonconscious priming was tested using a 2-way mixed factor analysis of variance (ANOVA). The between subjects factor was 'depression' (depressed and nondepressed). The within subjects factor was 'valence' ([matched] P/P, pleasant target given a pleasant prime; D/D, depressive

target given a depressive prime; and [unmatched] D/P, depressive target given a pleasant prime or P/D, pleasant target given a depressive prime). All word pair configurations were counterbalanced. The ANOVA indicated that the main effect for valence was significant $F$ (2, 76) = 3.71 $p$, < .029. The valence factor means were as follows: matched depressive = 3.925, matched pleasant = 3.625, and unmatched 3.025.

Simple effects of the valence factor were tested. As predicted, the results indicated priming effects for matched depressive versus unmatched, $t$ (76) = 2.47, $p$ < .01, and matched pleasant versus unmatched, $t$ (76) = 1.78, $p$ < .05. The comparison between pleasant was not significant. The $t$ value of the matched pleasant versus unmatched comparison was borderline significant. Therefore an additional comparison was done to test affective priming combining the affectively congruent conditions (matched depressive and pleasant) and comparing this joint condition to the unmatched condition. Significance was indicated, $t$ (76) = 2.57, $p$ < .01, showing better identification of matched than unmatched target words. The joint mean for the matched levels (P/P and D/D) was 3.775, which was contrasted to the unmatched mean of 3.025.

Another point of interest was whether depressed and nondepressed subjects demonstrated differential effects in priming. There was a significant main effect for

'depression', $F$ (1,38) = 5.81, $p$ < .02. Depressed subjects identified significantly more target words than did their nondepressed counterparts (marginal means: depressed = 3.983 and nondepressed = 3.083). The interaction of depression and valence was nonsignificant.

## Discussion: Experiment 2

The overall purpose of Experiment 2 was threefold. First, it was an attempt at replication of the Stanners, Cherry, and Carver, (1989) study which demonstrated nonconscious priming using the dichotic masking paradigm. The result showing identification of significantly more matched prime/target pairs than unmatched pairs, when the prime word was misidentified, replicates the nonconscious priming effect.

Second, Experiment 2 expanded nonconscious priming by using affective word pairs rather than previously used semantically related pairs. The positive result for priming effects seems to suggest that words that are emotionally similar, or matched for valence, facilitate the perception of each other relative to word pairs of opposing (unmatched) valences. This finding fits into Bower's (1983) theory of emotional memory where the activation of affective words has been shown to raise related words (or memories) closer to a threshold of perception and awareness. Similar mood congruence effects have been robustly demonstrated in consciously mediated memory studies (see "Memory and

Emotion" section) and meta-analysis (Matt, 1992), but the present finding represents the only demonstration of nonconscious emotional priming. This demonstration of activation on the emotional level expands on the semantic relationship previously demonstrated consciously (e.g. Becker & Killion, 1977) and nonconsciously (e.g. Groeger, 1984, 1988; Marcel, 1980).

The third question in Experiment 2 was concerned with differential, or between-subjects, priming effects. It was hypothesized that this effect would show up in the form of an interaction between depression and valence which took the form of a nondepressed subject advantage on pleasant material and depressive parity or advantage for depressed subjects. Mood congruent effects were not statistically significant.

However, there was a difference between the two groups of subjects in the significant main effect for depression. Depressed participants showed greater nonconscious priming effects than the nondepressed group. This main effect showing depressed subjects identifying more target words than the nondepressed group was an unexpected finding and quite difficult to explain. If any result would have been predicted, it would have gone the other way where the amotivational and processing slowness sometimes seen in more severe levels of depression would have led to poorer performance by a depressed group. Again, perhaps depression

levels have to be much higher in order to demonstrate effects. Speculatively, perhaps a more ideal participant would be those who have more chronic problems with depressive mood (e.g. dysthymia [APA, 1994]) due to the increased likelihood of encoding memories when feeling down. This, as opposed to college students who face more situational mood depressing events (e.g. impending exams, romantic breakups).

## General Discussion

These studies attempted to link nonconscious perceptual research to individual differences in depression and to evaluate the effect of individually tailoring stimulus materials. In Experiment 1, evidence was shown for self-relevance, nonconscious perception, response bias, and perceptual accuracy of emotionally toned words. However, the predicted mood congruity effects were not evidenced. With no consistent pattern emerging, the results do not lend resolution to some of the mixed findings and controversy in the literature (Erdelyi, 1992), especially as they relate to valence and the presence or absence of depression. Despite this, there were some interesting findings.

The addition of the relevance factor was useful in the identification data contributing to greater effects for high relevance words. It would appear that future research using single word stimulus presentations might benefit from including such a condition.

The results from the categorization data and matched prime target data showed evidence for the demonstrable effects of nonconscious perception, even from the standpoint of most stringent criteria. The overall nonconscious priming effect and the nonconscious perception effect stand as growing support for the use of dichotic masking in future research.

The pleasant response bias toward "pleasant" in nondepressed subjects was the predicted result. The failure for depressed subjects to show a response bias toward "unpleasant", or at least symmetry between pleasant and unpleasant is difficult to explain. Perhaps higher BDI levels are needed or consideration of a different instrument for psychometrically defining depression. Another alternative to the use of dysthymia or more chronic low mood as discussed above would be to use the Instrument to Diagnose Depression (IDD). The IDD assesses depressive symptomatology based on DSM III-R criteria which is possibly more valid in assigning subjects to the dichotomous categories of depressed and nondepressed. It should also be pointed out that the use of the BDI may have some inherent problems in that by having a good deal of heterogeneity in the items, the potential exists to have very different people represented by the same score. That is, one person's 16 may constellate more around somatic or neurovegetative symptoms while another person's may be more based in the

dysphoria or mood symptoms. Research exists that has considered these issues in using the BDI in the context of chronic illness [e.g. rheumatiod arthritis] (Young, 1992).

Another consideration would be related to the unpleasantness of the depressive materials. Perhaps the words, like subject depression levels, need to represent more of an extreme to exert effects.

In addition to expected results, a convergent, albeit somewhat unanticipated, pattern emerged. This includes the main effect results from nonconscious categorization and conscious identification from Experiment 1. Cumulative evidence of a processing advantage of affectively toned (depressive or pleasant) material over neutral provides support for the supposition that degree of departure from neutrality might be a better way of conceptualizing affectivity than the traditional categorization into discrete categories (e.g. pleasant and depressive). As alluded to in the Experiment 1 discussion, there is also the possibility that the depressive materials were sufficient to produce arousal but insufficiently negative to produce an aversive reaction that might produce perceptual defense effects.

The pattern that emerged showed better performance on depressive words, which implies that they may be more affectively extreme and arousing which enhances their perceptibility; nonconsciously and consciously. Viewed

together with the Cherry (1993) findings showing the same depressive and affective processing advantage, it becomes more plausible to hypothesize that an affective hierarchy exists and that deviation from neutrality heightens perception.

It may also be of interest to note that in the two demonstrations of nonconscious perception (categorization and priming) the main effect for depression was only evidenced for priming. What this could suggest, is that depression somehow effects affective priming of words differently than it does categorization of words. Although replication would be necessary to speculate further, if such a difference did exist, it could have a fairly significant impact on models of memory and emotion where, to my knowledge, current theory/models would have no provision to explain such a difference.

In considering future directions for research, the argument that arousability plays a role in perceptibility could be addressed by having groups of words (self-report rated independently and/or generated using GSR measures) representing "arousability" and "extreme negativity" levels in the valence factor. By adding these levels, contrasts could be made between high and low "arousing", "extremely aversive/depressive", and "pleasant" words. This would provide data to replicate the arousal hypothesis and possibly show a threshold, of sorts, for invoking perceptual

defense. This would add to future studies in emotional information processing in general, and also to the potential for demonstrable differences between consciously and nonconsciously mediated processing.

It would be interesting to conduct a priming study addressing similar questions as those discussed directly above. More specifically, including a "neutral" condition would allow for testing of the arousability hypothesis under priming conditions. The proposed "extreme" word and level of depression condition could also be used to attempt demonstration of both perceptual defense and mood congruent differences between groups.

Additional priming studies would also be of interest in expanding existing research. Effects using nonconscious primes have been demonstrated before (Groeger, 1984, 1988 and Marcel, 1980). The evidence from this study showing priming on an affective level appears to extend previous findings of semantic activation when primes were presented below a conscious awareness threshold. Another interesting direction for future research would be to include a conscious prime presentation condition and compare it to an unconscious prime condition. Both Groeger (1984 and 1988) and Marcel (1980) have shown differences in levels of information processing between nonconscious (semantic/meaning) and conscious (phonetic and structural) processing in visual and auditory tasks. Recall that

Groeger (1988) showed consciously presented primes facilitated phonologically related words while nonconconsciously presented primes facilitated semantically related words.

Other interesting possibilities exist for the dichotic masking paradigm. Becker et al. (1993) used dichotic listening to measure perceptual asymmetry in adolescents with ADHD (attention deficit hyperactivity disorder). They were able to show lower right ear advantage for the ADHD group presented with positive word pairs, while the control group showed higher right ear advantage for positively valenced word pairs. The authors inferred that this abnormal response by the ADHD subjects lends evidence to a reward system dysfunction hypothesis in ADHD. As the literature review indicates, there are flaws inherent in dichotic listening that are addressed by dichotic masking. Therefore, it seems reasonable to prefer to use dichotic masking to address similar questions. A final example would be to use it in studies of drug effects on auditory perception of different valences. Hartley et al. (1990) demonstrated lateralized differences in perception of different valenced words, again, using dichotic listening where positive and neutral valences showed a right ear advantage, but not negative words. Lastly, if depressive mood congruity could be shown more reliably with higher levels of depression or PTSD patients could be shown to be

sensitized to particular threat cues, then dichotic masking could possibly be used as a pre-test and post-test measure of treatment outcome (e.g. psychotherapy versus chemotherapy versus no treatment). Response bias, conscious identification or nonconscious perceptual patterns could be dependent variables showing symptom attenuation by different response patterns at pre-test and post-test. Presumably, effective treatment would desensitize a patient to these threatening depressive words or threatening stimuli. Showing differences post-treatment (e.g. single subject design) using these measures might be quite useful in assessing treatment efficacy.

Further study using dichotic masking is interesting to consider. However, it will be important to get improved methodological control over the stimuli and their presentation. At present, the technology exists that would take each word and digitize it making it amenable to tighter audiological control. That way, the noise calibration could still be used to accommodate individual differences in hearing ability. As it was in these experiments, the sound variation was somewhat loosely controlled in comparison to what could be available with digital technology.

Generally speaking, these two experiments enhanced knowledge in the area of nonconscious processing. Additionally, the findings contribute to a greater

understanding of the idiosyncratic contributions to a person's processing of information. Importantly, these studies address the emotional domain and therefore imply both an experimental and clinical relevance. Dichotic masking allows for exploration in the area in a way that answers prior methodological criticisms and can thereby lead to inferences about extended domains of information processing. Study in this area has been limited and challenging due largely to phenomena that, by definition, do not avail themselves to conscious or 'observable' scrutiny.

References

Bandura, A. (1973). Aggression: A social learning analysis. Englewood Cliffs, New Jersey: Prentice Hall.

Amster, H. (1964). Evaluative Judgment and recall in incidental learning. Journal of Verbal Learning and Verbal Behavior,3,466-473.

Bargh, A. & Tota, M. (1988) Content dependent automatic processing in depression: Accessibility of negative constructs with regard to self by not others. Journal of Personality and Social Psychology, 54, 925-939.

Baumeister, R. F. (1989). The optimal margin of illusion. Journal of Social and Clinical Psychology, 3, 176-189.

Beck, A. T., Ward, C. H., Mendelson, J., Mock, J., & Erbaugh, J.(1961). An inventory for measuring depression. Archives of General Psychiatry, 4, 561-571.

Beck, A. T. (1967). Depression: Clinical, Experimental, and Theoretical Aspects. New York: International University Press.

Becker, D., Doane, J., & Wexler, B. (1993). Effects of emotion on perceptual asymmetry in adolescent inpatients with attention-deficit hyperactivity disorder. Journal of the American Academy of Child and Adolescent Psychiatry, 32(2), 318-321.

Bock, M. (1986). The influence of emotional meaning on the recall of words processed for form or self-reference.

Psychological Research, 48, 107-112.

Bock, M. & Klinger, E. (1986). Interaction of emotion and cognition in word recall. Psychological Research, 48, 99-106.

Bollenbach, M. & Madigan, D. (1982). Effects of induced mood on social cognitions. Psychological Reports, 51, 763-769.

Bower, G. H. (1981). Mood and Memory. American Psychologist 36, 129-148.

Bower, G. H. & Mayer, J. D. (1985). Failure to replicate mood-dependent retrieval. Bulletin of the Psychonomic Society, 23,39-42.

Bradley, B. & Mathews, A. (1988). Memory bias in recovered clinical depressives. Cognition and Emotion, 2, 235-245.

Bradley, B. & Mathews, A. (1983). Negative self-schemata in clinical depression. British Journal of Clinical Psychology, 22, 173-181.

Bruner, J. (1992). Another look at New Look 1. American Psychologist, 47, 780-783.

Bruner, J. & Postman (1947) Emotional selectivity in perception and reaction. Journal of Personality, 16, 69-77.

Cherry, D. (1993). The Effects of Mood Induction on Nonconscious Perception. Unpublished doctoral dissertation.

Cofer, C. (1973). Construction process in memory. American Psychologist, 61(5), 537-543.

Christenfeld, R., Lubin, B., & Satin, M. (1978). Concurrent validity of the depressive adjective checklist in a normal population. American Psychologist, 135:5, 582-584.

Clark, D. M. & Teasdale, J. D. (1982). Diurnal variation in clinical depression and accessibility of memories of positive and negative experiences. Journal of Abnormal Psychology, 91, 87-95.

Dawkins, K. & Furnhan A. (1989). The colour naming of emotional words. British Journal of Psychology, 80, 383-389.

Dixon, N. F. (1971). Subliminal perception: The nature of a controversy. London: McGraw-Hill.

Dixon, N. F. & Lear, N. (1962) Perceptual regulation and mental disorder. Journal of Mental Science, 108, 356-361.

Doppler, M. J. & Stanners, R. F. (1990). The perceptual effects of depression. (Unpublished manuscript).

Dykman B. M. & Volpicelli, J. R. (1983). Depression and negative processing of evaluative feedback. Cognitive Therapy and Research, 7(6), 485-498.

Ellis, A., & Greiger, R. (Eds.) (1977). Handbook of rational-emotive therapy. New York: Springer.

Erdelyi, M. (1992). Psychodynamics and the unconscious. American Psychologist, 47, 784-787.

Erdelyi, M. (1990). Repression, reconstruction, and

defense: History and integration of the psychoanalytic and experimental frameworks. In J. Singer (Ed.) Repression, and dissociation: Implications for personality, psychopathology, and health. (pp. 1-31). Chicago: Chicago University Press.

Erdelyi, M. (1986). Experimental indeterminacies in the dissociation paradigm of subliminal perception. The Behavioral and Brain Sciences, 9, 30-31.

Erdelyi, M. (1974). A New look at the New Look: Perceptual defense and vigilance. Psychological Review, 81, 1-25.

Eriksen, C. W. (1963). Perception and personality. In J. M. Wepman & R. W. Heine (Eds.), Concepts of personality. Chicago: Aldine.

Eysenck, H. J. & Eysenck, S. B. G. (1975). Manual for the Eysenck Personality Questionnaire. Hodder & Stoughton: London.

Fennel, M. & Campbell (1984). The Cognitions Questionnaire: Specific thinking errors in depression. British Journal of Clinical Psychology, 23, 81-92.

Forgas, J. P., Bower, G. H., & Krantz, S. E. (1984). The influence of mood on perceptions of social interactions. Journal of Experimental and Social Psychology, 20, 497-513.

Freud, S. (1965) The Interpretation of Dreams. Avon Books: New York, New York.

Golin, S. (1989). Schema congruence and depression:

Loss of objectivity in self- and other- inferences. Journal of Abnormal Psychology, 98, 495-498.

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

Greenwald, A. (1992). Unconscious cognition reclaimed. American Psychologist, 47, 766-799.

Groeger, J. A. (1984). Evidence of unconscious semantic processing a forced-error situation. British Journal of Psychology, 75, 305-314.

Groeger, J. A. (1988). Qualitatively different effects of undetected and unidentified auditory primes. Quarterly Journal of Experimental Psychology, 40A, 323-339.

Hartley, L., Serna, P., Arnold, P., Mulligan, B. (1990). Listening, priming, and emotion under a neuroleptic drug. Physiology and behavior, 47(5), 837-841.

Henley, K. & Dixon, N. (1976) Preconscious processing in schizophrenia: An exploratory study. British Journal of Medical Psychology, 49, 161-166.

Hill, A. B. & Bellew, M. (1987). The recall of self congruent and self incongruent information about the personality of others. Personality and Individual Differences, 9, 727-733.

Holender, D. (1986). Semantic activation without conscious identification listening, parafoveal vision, and

visual masking: A survey and appraisal. The Behavioral and Brain Sciences, 9, 1-66.

Isen, A.M., Shalker, T.E., Clark, M., & Karp, L. (1978). Affect,accessibility of material in memory, and behavior: A cognitive loop? Journal of Personality and Social Psychology, 35, 1-12.

Ingram, R. E. (1989). Unique and shared cognitive factors in social anxiety and depression: Automatic thinking and self-appraisal. Journal of Social and Clinical Psychology, 8, 198-208.

Isen, A. M., Shalker, T. F., Clark, M. & Karp, L. (1978). Affect, accessibility of material in memory, and behavior: A cognitive loop? Journal of Personality and Social Psychology, 36, 1-12.

Jacoby, L. L.; Lindsay, S.; & Toth, J. (1992). Unconscious influences revealed. American Psychologist, 47, 802-809.

Janowsky, D.S., Kraft, A., Clapton, P., & Huey, L. (1984). Relationships of mood and interpersonal perceptions. Comprehensive Psychiatry, 25, 246-251.

Johnston, W. A., & Dark, V. J. (1982). In defense of intraperceptual theories of attention. Journal of Experimental Psychology: Human Perception and Performance, 8, 401-421.

Kemp-Wheeler, & Hill, . (1987). Anxiety responses to subliminal experiences of mild stress. British Journal of

Psychology, 78, 365-374.

Kendall, P. Hollon, S., Beck, A, Hammen, C., Ingram, R.(1987). Issues and recommendations regarding the use of the Beck Depression Inventory. Cognitive Therapy and Research, 11, 289-299.

Kendall, P. C., Howard, B. L., & Hays, R. C. (1989). Self-referent speech and psycholopathology: The balance of positive and negative thinking. Cognitive Therapy and Research, 13, 583-598.

Kimura, D. (1961). Cerebral dominance and the perception of verbal stimuli. Canadian Journal of Psychology, 15, 166-177.

Kitayama, S. (1990). Interaction between affect and cognition in word perception. Journal of Personality and Social Psychology, 58, 209-217.

Kotze, & Moller, (1990). Effect of auditory subliminal stimulation of GSR. Psychological Reports, 67, 931-934.

Krantz, S., Hammen, C. L. (1979). Assessment of cognitive bias in depression. Journal of Abnormal Psychology, 88, 611-619.

Krantz, S. & Liu, C. (1987). The effect of mood and information valence on depressive cognition. Cognitive Therapy and Research, 11:2, 185-196.

Kucera, H. & Francis, W. N. (1967). Computational analysis of present-day American English. Providence, RI: Brown University Press.

Kuiper, N. A. & MacDonald, M. R. (1982). Self and other perception in mild depressives. Social Cognition, 1, 223-239.

Kuiper, N. A., Olinger, L. J., MacDonald, M. R., & Shaw, B. F. (1985). Self-schema processing of depressed and nondepressed content: The effects of vulnerability to depression. Social Cognition, 3, 77-93.

Laird, J. D., Wagner, J., Halal, M. & Szegda, M. (1982). Remembering what you feel: The effects of emotion on memory. Journal of Personality and Social Psychology, 87, 144-154.

Lewicki, J., Hill J., & Cyzewska (1992). Nonconscious acquisition of information. American Psychologist, 47, 796-801

Lewinsohn, P. M. & Rosenbaum, M. (1987). Recall of parental behavior by acute depressives, remitted depressives, and nondepressives. Journal of Personality and Social Psychology, 52, 611-619.

Lloyd, G. G. & Lishman, W. A. (1975). Effects of depression on the speed of recall of pleasant and unpleasant experiences. Psychological Medicine, 5, 173-180.

Loftus, E. F., Klinger, M. R. (1992). Is the unconscious smart or dumb? American Psychologist, 47, 761-765.

Lowenstein, D. A. & Hokansen, J. E. (1986). The processing of information by mildly and moderately dysphoric

college students. Cognitive Therapy and Research, 10, 447-460.

Lubin, B. (1965). Adjective checklists for the measurement of depression. Archives of General Psychiatry, 12, 57-62.

MacKay, D. G. (1973). Aspects of a theory of comprehension, memory and attention. Quarterly Journal of Experimental Psychology, 25, 22-40.

Marcel, A. J. (1980). Conscious and preconscious recognition of polysemous words: Locating the selective effects of prior verbal context. In R. S. Nickerman (ed.), Attention, and performance, VIII (pp. 435-457).

Martin, D. J., Abramson, L.Y. & Alloy, L. B. (1984). Illusion of control for self and other in depressed and nondepressed college students. Journal of Personality and Social Psychology, 46, 125-136.

Martin, M., Ward, J. C., & Clark, D. M. (1983) Neuroticism and the recall of positive and negative personality information. Behavior Research and Therapy, 21, 495-503.

Matt, G., Vazquez, C., & Campbell, W. (1992) Mood-congruent recall of affectively toned stimuli: A meta-analytic review. Clinical Psychology Review, 12, 227-255.

Mayo, P. (1982). Personality traits and retrieval of positive and negative memories. Personality and Individual Differences, 4, 465-471.

Mayo, P. (1988). A further study of the personality-congruent recall effect. Personality and Individual Differences, 10, 247-252.

McClelland, D. C. & Atkinson, J. W. (1948) The projective expressions of needs: I. The effect of different intensities of the hunger drive on perception. Journal of Psychology, 25, 205-222.

McDonald, M. R. & Kuiper, N. A. (1984). Self-schema decision consistency in clinical depressives. Journal or Social and Clinical Psychology, 2, 264-272.

McKenna, F. P.(1986). Effects of unattended emotional stimuli on colour naming performance. Current Psychological Research and Reviews, 5, 3-9.

McLeod, C., Mathews, A. (1986) Discrimination of threat cues without awareness in anxiety states. Journal of Abnormal Psychology, 95, 131- 138.

McNally, R. J. & Foa, E. B. (1987). Cognition and agoraphobia: Bias in the interpretation of threat. Cognitive Therapy and Research, 11, 567-581.

McNally, R. F., Foa, E. B., & Donnel, C. D. (1989). Memory bias for anxious information in patients with Panic Disorder. Cognition and Emotion, 3(1), 27-44.

McNally, R. F., Kaspi, S. P., Rieman, B. C., & Zeitlan S. B. (1990) Selective processing of threat cues in Posttraumatic Stress Disorder. Journal of Abnormal Psychology, 99, 398-402.

Meichenbaum, D. (Ed.) (1977). Cognitive-Behavioral Modification: An Integrative Approach. New York: Plenum.

Merikle, P. M. (1992). Perception without awareness. American Psychologist, 47, 792-795.

Meyer, D. & Schvaneveldt, R. W. (1971). Facilitation in recognition pairs of words: Evidence of a dependence between retrieval operations. Journal of Experimental Psychology, 90, 227-234.

Mullins, L. L., Peterson, L. Wonderlich, S. A., & Reaven, N. (1986). The influence of depressive symptomatology on the social responses and perceptions of adults. Journal of Clinical and Child Psychology, 15, 233-240.

Newstead, S. E., & Dennis, I. (1979). Lexical and grammatical processing of unshadowed messages: A re-examination of the MacKay effect. Quarterly Journal of Experimental Psychology 31, 477-488.

Norman, W. H., Miller, I. W., & Klee, S. H. (1983). Assessment of cognitive distortion in a clinically depressed population. Cognitive Therapy and Research, 7:2, 133-140.

Osgood, Ch.E. (1971). Exploration in semantic space: A personal diary. Journal of Social Issues, 27, 5-64.

Osgood, Ch. E. & Hoosain, R. (1983). Pollyanna II: Two types of negativity. Journal of Psychology, 113, 151-160.

Peterson, L., Wonderlich, S. A., Reaven, N. M., &

Mullins, L. L. (1987). Adult educators response to depression and stress in children. Journal of Social and Clinical Psychology, 5, 51-58.

Postman, L., Bronson, W.C., and Gropper, G. L. (1953). Is there a mechanism of perceptual defense? Journal of Abnormal and Social Psychology, 48, 215-224.

Powell, M. & Hemsley, D. R. (1984). Depression: A breakdown of perceptual defense? British Journal of Psychiatry, 145, 358-362.

Pyszczynski, T., Hamilton, J. C., Herring, F. H., & Greenberg, J.(1989). Depression, self-focused attention and the negative memory bias. Journal of Personality and Social Psychology, 57, 351-357.

Radenhausen, R. A. (1989). Effects of mood induction on ratings of self and experimenter. Journal of Clinical Psychology, 45, 134-138.

Ricters, J. & Pellegrini, D. S. (1989). Depressed mothers' judgments about their children: An examination of the depression-distortion hypothesis. Child Development, 60, 1068-1075.

Riskind, H. (1983). Nonverbal expressions and the accessibility of life memories: A congruence hypothesis. Social Cognition, 2, 300-311.

Riskind, H., Rholes, W. S., & Eggers, J. (1982). The Velten Mood Induction Procedure: Effects on mood and memory. Journal of Consulting and Clinical Psychology, 50,

146-147.

Roth, D. L., & Ingram, R. E. (1985). Factors in the Self Deception Questionnaire: Associations to depression. Journal of Personality and Social Psychology, 48, 243-251.

Ruehlman, L., West, S., & Pasahow, R. (1985). Depression and evaluative self-schemata. Journal of Personality, 53, 46-92.

Russel, J.A. (1978). Evidence of convergent validity on the dimensions of affect. Journal of Personality and Social Psychology, 36, 1152-1168.

Sackheim, P. & Wegner, J. (1986). Attributional patterns in depression and euthymia. Archives of Gereral Psychiatry, 43, 553-560.

Sacco, W. P. (1981). Invalid use of the Beck Depression Inventory to identify depressed college student subjects: A methodological comment. Cognitive Therapy and Research, 5:2, 143-147.

Schotte, D., McNally, R. J., & Turner, M. (1990) A dichotic analysis of body weight concern in bulimia nervosa. International Journal of Eating Disorders, 9, 103-119.

Silverman, H. & Weinberger, J. (1985) Mommy and I are one: Implications for psychotherapy. American Psychologist, 40, 1296-1308.

Snyder, B., & White P. (1982). Moods and memories: Elation, depression, and the remembering of one's life. Journal of Personality, 42, 221-238.

Stanners, R. F., Cherry, D. & Carver, S. (1989). The use of dichotic masking to produce semantic priming without conscious identification. (Manuscript in press.)

Stanners, R. F., & Gordon, J. (1989). Unpublished raw data.

Swallow, S. R., & Kuiper, N. A. (1987). The effects of depression on cognitive vulnerability to depressive judgments of similarity between self and others. Motivation and Emotion, 11, 157-167.

Tang, C. S. (1990). Predicting accuracy of judgment of contingency. Journal of Social Psychology, 46, 125-136.

Teasdale, J. D. & Dent, J. (1987). Cognitive vulnerability to depression: An investigation of two hypotheses. British Journal of Clinical Psychology, 26, 113-126.

Teasdale, J. D. & Fogarty, S. J. (1979). Differential effects of induced mood on retrieval of pleasant and unpleasant events from episodic memory. Journal of Abnormal Psychology, 88, 248-257.

Teasdale, J. D. & Taylor, R. (1981). Induced mood and accessibility of memories: An effect of mood state or induction procedure? British Journal of Clinical Psychology, 20, 352-372.

Velten, E. A. (1968). A laboratory task for induction of mood states. Behavior Therapy and Research, 6, 473-482.

Vestre, N. D., & Caulfield, B. P. (1986). Perception

of neutral of personality descriptions by depressed and nondepressed subjects. Cognitive Therapy and Research, 10:1, 31-36.

Warren, N. J., Stake, J. E., & McKee, D. C. (1982). Cognitive distortions, coping behavior, and depression in college students. Journal of American College Health, 30, 278-283.

Watkins, J. T., & Rush, A. J. (1983). Cognitive Response Test. Cognitive Therapy and Research, 7:5, 425-436.

Williams, J. M. G., & Broadbent, K. (1986). Autobiographical memory in suicide attempters. Journal of Abnormal Psychology, 95, 144-149.

Wohl, M. K. & Izawa, C. (1979). Discrete normative associations of selected words. Journal of General Psychology, 100(2), 183-198.

Young, L. D. (1992) Psychological factors in rheumatoid arthritis. Journal of Consulting and Clinical Psychology, 60(4), 619-627.

Young, R. K. (1982). Community Nursing Workbook: Family as Client. Norwalk, Connecticut, Appleton, Century-Crofts, 152.

Zajonc, R.B. (1980). Feeling and Thinking. Preferences need no inferences. American Psychologist, 35, 151-175.

APPENDIX A

**Consent Form**

I, _____, hereby authorize or direct Matt Doppler or associates or assistants of his choosing, to perform the following treatment or procedure:

**Procedure**: Participants will listen to a word, through headphones, accompanied by white noise. The participant will then be asked to write what was heard (prime word) and then to repeat that process after a three second latency (target word).

**Duration:** Participation will involve one session of about, but not exceeding, one hour.

**Confidentiality:** Participants will in no way be identified with their responses. Names will not be written on the response form and screening information will be destroyed.

**Benefits:** Participants will benefit from exposure to experimental techniques used in cognitive psychology. Results of this study will add to the literature of perception and depressive cognition.
This is done as part of an investigation entitled "The effects of depression on nonconscious perception." The purpose of the procedure is to determine if the participants can extract enough information from the masked auditory stimulus for it to be able to contribute to identification of a subsequently presented word, and to assess between-participant response characteristics.
I understand that participation is voluntary, that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this project at any time without penalty after notifying the project director. I certify that I am at least 18 years of age. I may contact Dr. John Chaney at 744-6027 should I wish further information about the research. I may also contact Jennifer Moore, University Research Services, 001 Life Sciences East, Oklahoma State University, Stillwater, OK 74078; telephone: (405) 744 5700. I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.
Date _____ Time _____

_____
(Signature of Subject)
I certify that I have personally completed this form and explained it to the subject before requesting the subject to sign it.

_____
(Signature of Director or Associate)

APPENDIX B

Instructions for the Calibration Trials

We are studying some aspects of auditory perception in this experiment. Your task as a subject will change somewhat from one part of the experiment to another, but in all parts of the experiment, we want you to be a very careful listener.

In this part of the experiment we want you to try to identify words that are accompanied by a static-like noise. First you will hear a trial number and then a word mixed with noise. Try to identify the word and write it on the line next to the appropriate trial number. If you think you know what the word was but are not really sure, write down your answer. If you have not idea what the word was, put a line in the space where the word would go. You will have about 10 seconds on each trial.

I will stop you and check your answers after every group of five trials. This is so that I can adjust the noise to the appropriate level.

This is not a hearing or individual test of any kind, so don't worry about having to make any particular score. Just listen very carefully and do your best.

Do you have any questions?

## APPENDIX C

Instructions for the Practice Trials

In this part of the experiment, you will again listen to words accompanied by noise. This time, however, we want you to do two things after you hear the word and noise. The first thing we want you to do is to indicate on your answer sheet your best judgment of whether the word was a pleasant or an unpleasant word. It may seem a little strange to ask you judge a word you may be unsure of, but please go along with us. We simply want your best judgment even though you feel you may be guessing. After you make your pleasant/unpleasant judgment, try to write the word down on the appropriate line. If you are unsure of the word, it is perfectly all right to write down what you thought the word was. If no word occurs to you, then you may go ahead and put a line in the place where the word would go.

Any questions?

APPENDIX D

Instructions for the Experimental Trials: Experiment 1

In this final part of the experiment, your task will be exactly the same as in the previous part. Listen carefully to each word which will be accompanied by noise. Make a pleasant/unpleasant judgment first on every trial. Then write down what you thought the word was. If you can't be sure, write your best impression of what the word was. Otherwise, put a line where the word would go.

There will be 150 trials in this part of the experiment. We understand that it is easy to let your attention wander after listening carefully for awhile. If you need a short break, let the experimenter know and you can take one. Please do not let your attention drift, but try to concentrate on each word and do your best.

Any questions?

APPENDIX E

Response Sheet: Experiment 1

| Trial Number | Pleasant | Unpleasant | Word |
|---|---|---|---|
| 1. | _____ | _____ | _____ |
| 2. | _____ | _____ | _____ |
| 3. | _____ | _____ | _____ |
| 4. | _____ | _____ | _____ |
| 5. | _____ | _____ | _____ |
| 6. | _____ | _____ | _____ |
| 7. | _____ | _____ | _____ |
| 8. | _____ | _____ | _____ |
| 9. | _____ | _____ | _____ |
| 10. | _____ | _____ | _____ |

APPENDIX F

Instructions for the Experimental Trials: Experiment 2

In this part of the experiment you will do basically the same thing except that you will hear pairs of words. First you will hear a trial number and then two words with about three seconds in-between them. Each word will be mixed with the noise. Try to identify the words and write them on the lines next to the appropriate trial number. Write the first word on the first line and the second word on the second line. You will have about 10 seconds to write both words. As before, it is perfectly all right to guess; write whatever word you think you heard.

If you cannot identify one or both of the words or even make a guess, then put a line in the place where the word would go. Make sure that you write the word on the correct line. If on some trial you identify the words in reverse order; that is, you write down the second word and then identify the first word, put a check mark next to the trial number.

This is not any kind of individual test, so don't worry about mistakes or misses. Just try to do your best.

It is easy to let you attention wander after listening for awhile. Please do not let your attention drift, but concentration each word.

Any question?

APPENDIX G

Response Sheet 2

| | Word 1 | Word 2 |
|---|---|---|
| 1. | _____ | _____ |
| 2. | _____ | _____ |
| 3. | _____ | _____ |
| 4. | _____ | _____ |
| 5. | _____ | _____ |
| 6. | _____ | _____ |
| 7. | _____ | _____ |
| 8. | _____ | _____ |
| 9. | _____ | _____ |
| 10. | _____ | _____ |

Matthew J. Doppler

Candidate for the Degree of

Doctor of Philosophy

Dissertation: THE EFFECTS OF DEPRESSION ON NONCONSCIOUS PERCEPTION: AFFECTIVE JUDGMENT AND AFFECTIVE PRIMING

Major Field: Clinical Psychology

Biographical:

Personal Data: Born in Kenmare, North Dakota, on October 26, 1964, the son of Dennis Doppler and Wanda Walker.

Education: Graduated from Trinity High School, Dickinson, North Dakota. Received Associate in Arts degree from Bismarck State College, Bismarck, North Dakota in May of 1985. Completed Bachelor of Arts degree in Psychology, Sociology, and Liberal Arts for the Human Services in 1987 and 1988 at the University of Minnesota-Morris, Morris, Minnesota. Completed Master of Science degree in Psychology (1990) and Doctor of Philosophy in Clinical Psychology (1995) at Oklahoma State University, Stillwater, Oklahoma.

Experience: Involved in collegiate coaching and as an undergraduate research assistant while at the University of Minnesota-Morris for two years. Spent the following two years working on an inpatient psychiatric unit at Medcenter One, Bismarck, North Dakota. Served as research assistant and taught undergraduate introductory psychology at Oklahoma State, as well as doing clinical work several outlying practicum sites. Completed APA approved clinical internship through the Arkansas Division of Mental Health Services, Little Rock, Arkansas.

Membership: American Psychological Association

**OKLAHOMA STATE UNIVERSITY**
**INSTITUTIONAL REVIEW BOARD**
**HUMAN SUBJECTS REVIEW**

**Date:** 03-18-94 **IRB#:** AS-94-034

**Proposal Title:** THE EFFECTS OF DEPRESSION ON NONCONSCIOUS PERCEPTION (STUDY I OF II: AFFECTIVE JUDGEMENT)

**Principal Investigator(s):** Matt J. Doppler, Robert F. Stanners, John M. Chaney

**Reviewed and Processed as:** Expedited

**Approval Status Recommended by Reviewer(s):** Approved

APPROVAL STATUS SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING.
APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL. ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

---

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval are as follows:

COMMENT:

When the initial screening is performed, please have the students place the last 4 digits of their SS# on the form rather than their name. This will increase the confidentiality of the screening process.

Signature: _____ Date: March 31, 1994
Chair of Institutional Review Board

**OKLAHOMA STATE UNIVERSITY**
**INSTITUTIONAL REVIEW BOARD**
**HUMAN SUBJECTS REVIEW**

**Date:** 03-18-94 **IRB#:** AS-94-034

**Proposal Title:** THE EFFECTS OF DEPRESSION ON NONCONSCIOUS PERCEPTION (STUDY I OF II: AFFECTIVE JUDGEMENT; STUDY II OF II: AFFECTIVE PRIMING)

**Principal Investigator(s):** Matt J. Doppler, Robert F. Stanners, John M. Chaney

**Reviewed and Processed as:** Modification

**Approval Status Recommended by Reviewer(s):** Approved

APPROVAL STATUS SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING.
APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

---

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval are as follows:

Signature: _____ Date: July 19, 1994
Chair of Institutional Review Board