THE EFFECTS OF MOOD INDUCTION ON NONCONSCIOUS PERCEPTION

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PREFACE

For many years, researchers have been interested in studying the effects of emotional states on various cognitive processes. The present study investigated the effects of depressed, neutral and elated moods as induced by a musical mood induction procedure (MIP) on nonconscious perception of pleasant and unpleasant words. Experiment I was designed to determine if the particular musical MIP employed was sufficient to produce a mood effect that would last the necessary amount of time and if mood states would be produced that were significantly different from each other. Significant results were indicated for both of these questions. Experiment II then used this established MIP to look at the effects of different mood states on nonconscious perception of affect-laden words. Words were presented through a dichotic masking technique. Significant results were indicated for the presence of nonconscious perception but not for the influence of mood on nonconscious perception. Further results are discussed.

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CHAPTER I

INTRODUCTION

Theory

For many years, researchers have been interested in studying the effects of emotional states on cognitive processes. Through this research, mood states have been shown to influence several cognitive processes, ranging from mood-dependent memory
retrieval to person-perception judgements to mood-congruent productions in free association tasks (Mayer & Bower, 1985; Forgas & Bower, 1987; Bower 1981). In 1981, Bower proposed a network theory to account for these results.

Network theories state that human memory is an associative network of semantic concepts and schemata used to describe an event (Bower, 1981). "The contents of consciousness are the sensations, concepts, and propositions whose current activation level exceeds some threshold. Activation presumably spreads from one concept to another, or from one proposition to another, by associative linkages between them "(Bower, 1981, p 134). Fundamental to Bower's (1981, 1987) associative network theory are two assumptions. The first is that emotions are unique, special purpose nodes

and are represented in the same associative network as are words, concepts, and propositions of a verbal symbolic nature. The node, by whatever means, will serve to activate selectively those memories, themes, perceptual categories and thoughts that have been associated with the emotion in the past. In other words, the resting activation level for associated words would be raised, thus allowing full activation to occur more easily or with less information for these associated words. This theory would predict that stimuli whose affective significance matches the person's mood state (i.e., mood-congruent stimuli) would provoke greater attention (subjects spending more time processing the stimuli) and faster perception (Bower, 1987). The basic idea is that arousal of an emotion primes into readiness concepts and categories that are congruent with how one is feeling.

Over the years, supporting evidence has been found for the influence of emotions on cognitive processes and especially for the effects of mood-congruent stimuli. This mood-congruent hypothesis has been studied in a variety of cognitive areas such as thought content, memory recollection, word learning and recall, and word recognition and classification (Teasdale & Fogarty, 1979; Fogarty & Hemsley, 1983; Perrig & Perrig, 1988; Powell & Hemsley, 1984). Despite the variety of cognitive areas studied, a consistent pattern of results has emerged, with good

evidence that mood at the time of retrieval, either induced or naturally occurring, selectively effects the type of cognitions available. In other words, results indicate consistently that depressed mood increases the accessibility of unpleasant memories and words, and pleasant mood increases the accessibility of pleasant memories and words (Snyder & White, 1982; Isen, Shalker, Clark, & Karp, 1978).

In a preliminary study, Clore (1980, as cited in Bower, 1981) tested this mood-congruent hypothesis by presenting words in a tachistoscope to subjects whose moods had been induced and having them classify the words as pleasant or unpleasant in quality. The subject's moods were induced through the use of hypnosis. On critical trials the centered target word was surrounded top and bottom with distractor words of the opposite quality. Clore expected that these distractor words would intrude on the subjects ability to report target words, especially when distractor words agreed with the subjects mood. Although the effect was small, the results supported the hypothesis in that subjects in pleasant moods made more errors in the "unpleasant target, pleasant distractor" condition than in its reverse.

Postman and Brown's (1952) results also could be interpreted as support for the predicted perceptual effect that pleasant mood would prime or increase the activation level of pleasant words, and unpleasant mood would increase

the activation level of unpleasant words. In their study, subjects first received either a success or failure experience on a perceptual task. Subjects were later presented with words that had either success or failure related meanings on slides. The degree of brightness was manipulated in order to determine the threshold. Results indicated that subjects were able to report the items that were congruent with their prior experience at significantly lower thresholds than the matched neutral words. The thresholds for incongruent items were identical to those for the neutral words. Based on the assumption that success leads to happiness and failure leads to sadness, then these results can be interpreted as support for a mood-congruent effect.

Powell and Hemsley (1984) studied the mood-congruent hypothesis in subjects with naturally occurring depressed mood states and normal control subjects. They presented subjects with neutral and unpleasant words in a tachistoscope and asked them to identify the words. They found that the depressed subjects were able to recognize more unpleasant words than were the control subjects, indicating that depressed subjects have a relatively greater access to unpleasant material. This result supports Bower's (1981) associative network theory.

Further support for Bower's (1981) theory, which suggests that mood state serves as a cue by which material

in memory is accessed, is indicated in a study by Isen, Shalker, Clark, and Karp (1978). Isen et al. investigated the effect of "good" mood on cognitive processes. They induced mood states in subjects by having them win or lose a computer game. Subjects were then presented auditorialy with a list of positive, negative and neutral words and were asked to remember as many as possible. After repeating the computer game, subjects were asked to recall as many words as possible from the list. Results indicated that mood state at time of recall significantly affected the number of pleasant words recalled. In other words, subjects in a positive mood state at the time of recall recalled significantly more positive words.

A study investigating Bower's (1981) mood congruent hypothesis in the area of memory was conducted by Snyder and White (1982). In their study, Snyder and White induced elated and depressed moods through the use of Velten's (1967) procedure (to be discussed later). Subjects were then asked to report events and experiences that occurred during the previous week of their lives. Results indicated that subjects in the elated condition reported significantly more happy events than did the depressed subjects, and the subjects in the depressed condition reported significantly more sad events than did elated subjects. This suggests that individuals are particularly more likely to remember those events and experiences that are congruent with their

current mood state.

Bower's (1981) associative network theory and the influence of mood have also been studied in the area of social perception. Evidence suggests that the way the perceiver feels at the time is one of the most important influences on social judgements or perceptions (Forgas & Moylan, 1987). Studies have shown that people tend to find others more attractive when they feel good, and tend to interpret facial expressions, social support, and social situations differentially depending on their prevailing mood (Forgas, Bower, & Krantz, 1984; Cohen, Towbes, & Flocco, 1988; Bollenbach & Madigan, 1982)

Forgas and Bower (1987) conducted a study looking at the effects of mood on person-perception judgements. They induced happy and sad moods through the use of bogus success/failure feedback to the subjects, then presented subjects with person descriptions containing positive and negative details. Subjects were then asked to make impression-formation judgements of each character. After a four min distractor task, subject's cued recall and recognition memory for details about the target person were tested. Results indicated that overall, happy subjects formed more favorable impressions and made more positive judgements than did sad subjects. They further found that cued recall and recognition memory were superior for mood consistent characteristics. These results provide support

for Bower's (1981) spreading activation model in the area of social perception.

Experiments employing speed of response as a dependent measures have generally failed to produce significant results (Gerrig & Bower, 1982; Challis & Krane, 1988; Clark, Teasdale, Broadbent, & Martin, 1983). In these studies, subject's moods were induced through a variety of methods (hypnosis, self-referent statements, music). Subjects were then presented with a forced-choice task on the affect laden words that were presented in a tachistoscope. Subjects were asked to either choose which of two words was presented or to decide if the letters presented were a word or nonword. The speed of response was measured. It was found that decision times for mood-congruent words were not faster than the decision times for mood-incongruent words as was expected based on the associative network theory (Bower, 1981).

One possible explanation for why these forced choice tasks have failed to produce significant results is that the dependent measure is speed of response. It may be that although mood state increases the accessibility of mood-congruent stimuli, it may not effect the speed at which a subject can respond to such stimuli.

Mood Induction

Measurements of Mood

In order to study the mood-congruent effect and the effect of emotions on cognitive processes in general, it was necessary to develop methods of inducing moods in the laboratory and ways of measuring their effectiveness. Laboratory mood induction procedures (MIP) have taken a number of forms, including: self-referent mood statements; hypnosis; personal recollection of past events; affect laden stori s or films; manipulation of success/failure tasks; and, music (Velton, 1968; Bower, 1981; Brewer, Doughtie & Lubin, 1980; Fiedler & Stroehm, 1986; Forgas & Bower, 1987; van Rooijen & Vlaander, 1984; Mackie, et al, 1989; Pignatiello, Camp & Rasar, 1986; Postman & Brown, 1952). Techniques for measuring the effectiveness of these particular MIPs also have taken a number of forms. Some of the more widely used measurements include: self-report ratings such as 7 or 9 point bipolar scales and visual analogue scales (Brown & Taylor, 1986; Kraiger, Billings & Isen, 1989; Madigan & Bollenbach, 1982; Mackie et al., 1989; Teasdale & Russell, 1983; Teasdale & Fogarty, 1979); behavioral measures such as writing speed, time estimation, and counting speed (Coleman, 1975; Velten, 1968; Kenealy, 1988; Polivy & Doyle, 1980); and, responses to the Multiple Affect Adjective Checklist (MAACL, Zuckermin & Lubin, 1965)

and the Depression Adjective Checklist (DACL, Lubin 1967) (Frost, Graf & Becker, 1979; Aderman, 1972; Challis & Krane, 1988; Pignatiello, Camp & Rasar, 1986). Of the methods mentioned above, the MAACL and a more specific version of the MAACL, the DACL, are the most used. These measures consist of a variety of positive and negative mood adjectives. Subjects are asked to check those adjectives that describe how they are feeling "now". Research has shown the MAACL to be sensitive to transient changes in mood (Miller & Seligman, 1975; Coleman, 1975; Frost et al, 1979).

Mood Induction Procedures

In this section I will review the more widely used of the mood induction procedures and present relevant research as to the effectiveness of each.

The mood induction procedure described by Velton (1968) is the most widely used MIP. In this method, subjects are encouraged to read and "try to feel the mood suggested" (p. 474) by a set of 60 self-referent elation or depression statements, or a set of 60 neutral statements, ordered to arouse the desired mood in a progressive fashion. There were also two demand characteristic control groups instructed to act (role play) the way they thought subjects in the induced-emotion groups would act. Following induction, seven behavioral task measures were obtained. These consisted of: a writing speed task (writing backwards from

100 by 1's for one min); a distance approximation task (putting hands a specified distance apart with eyes closed); a decision time task (pick up a pair of tins, both of which are identical in weight, and decide which is the heavier); a perceptual ambiguity task (identifying when a fluctuation in the perspective of an ambiguous figure is perceived); a word association task; responding to the Multiple Affective Adjective Checklist (MAACL); and, spontaneous verbalizations (number of words uttered by subjects during the course of these behavioral tasks). Four of these measures (writing speed, decision time, word association, and the MAACL) distinguished significantly between the elated and depressed conditions with the neutral condition falling between them. The two role-playing groups obtained less extreme means than the induced-mood groups on all measures -- five of the means were in the wrong direction. Velton concluded that the treatments had indeed induced "true" elation and depression and that subjects were not simply responding to the obvious demand characteristics of the situation.

Despite some limited support (Strickland, Hale & Anderson, 1975; Madigan & Bollenbach, 1986; Brown, 1984; Rexford & Wierzbicki, 1988) and wide use, the Velton MIP has met with several objections (Buchwald, Strack & Coyne, 1981).

"To mention some of them: sizeable percentages of

> subjects fail to respond to the Velton MIP; the perhaps considerable influence of demand characteristics cannot be excluded; cognitive priming may partly account for induction effects, especially if cognitive performance tasks are used; the effects of the depression induction on other negative moods (e.g., anxiousness, hostility) seem to be inconsistent, sometimes suggesting non-specific negative influence, sometimes not; private self-consciousness and especially sex differences may play an important role as covariates" (Albersnagel, 1988, p.80).

A further objection states that mood change resulting from the Velton procedure tends to abate quickly when not frequently refreshed (Frost & Green, 1982; Isen & Gorgoglione, 1983).

Another MIP that has been widely used is hypnosis. Bower (1981) gives an overview of the advantages and disadvantages of this method. Advantages of hypnosis as a MIP, according to Bower, include: the ability to produce almost any emotion quickly and at an intensity that can be varied by instruction; the emotion can apparently be kept going for several minutes; and, the emotional reactions appear to be physiologically "real". Disadvantages of hypnosis as a MIP include: only 20-25% of people are highly hypnotizable; and, hypnotizable subjects may be extraordinarily compliant with any demand characteristics

conveyed by the experimenter which may complicate the results.

A relatively new alternative to the above MIP's has been developed by Sutherland and others (Sutherland, Newman, & Rachman, 1982; Clark, 1983; Pignatiello, Camp, & Rasar, 1986). This method employs music as a means of inducing moods. Subjects are presented with non-lyrical pieces of music of differential qualities in order to produce a specific mood. Sutherland et al. (1982) found the musical MIP to produce larger changes in sad mood; to produce more sustained mood changes; and, to be less "wasteful" of subjects than the Velton technique. In Clark's (1983) review, he states that musical MIP's had significantly greater effects than the Velton technique in producing despondency and happiness in the subjects. He concluded that the major advantage of the musical MIP is that almost all subjects respond to it. Pignatiello, Camp, and Rasar (1986) stated further advantages to the musical MIP as: musical MIP's have fewer demand characteristics in that subjects are not told the intent of the music; there is an absence of gender effects--thus indicating similar effects for men and women; and, it is non-lyrical (non-verbal) and as such, it may be more generalizable (could be used with low verbal or non-verbal populations).

Further support for the use of music as a means of inducing mood is presented by Kenealy (1988). This

experiment was designed to determine whether it is possible to produce happy and sad moods (as defined by differential scores of subjects on a number of self-report and behavioral variables, like those used by Velton, 1968) in the laboratory by playing music to subjects. This was to be done without explicitly communicating to the subjects the instruction to "work at getting into the mood." Kenealy replicated the five original Velten (1968) groups (happy, sad, neutral, demand happy, and demand sad). It was expected that the "happy" group would feel significantly more happy than the "sad" group and vice versa. The means of the neutral group were expected to fall between the means of the "happy" and "sad" groups. Those subjects in the demand groups were told the music was "happy" or "sad" as a means of investigating explicit demands on the subject imposed through communication. It was expected that these subjects would act and report themselves significantly more "happy" or "sad" as a result of these explicit cues. Kenealy further added two counter-demand groups (told that people listening to this music tended to feel the opposite mood due to "social comparison effect") as suggested by Polivy and Doyle (1980). It was expected that if demand characteristics were responsible for mood effects, subjects in these groups would show an emotional effect in the opposite direction. Her results indicated that the music MIP produced significant differences between the "happy" and

"sad" groups on five of the six self-report measures and on all four of the behavioral measures. Further, explicit demand characteristics were found not to have contributed substantially to the mood effects found.

Nonconscious Perception

In all the studies reviewed to this point, the material presented has been consciously processed by the subject. One of the questions addressed by this experiment is whether mood would influence the perception of stimuli that the subject was unable to identify, in other words, nonconscious perception.

The phenomena of nonconscious perception, as defined by Dixon (1971), refers to the process by which a stimulus activates semantic information without conscious identification as determined by some form of self-report. This phenomenon has been studied in both the visual field (Marcel, 1978, 1983a) and the auditory modality (Bookbinder & Osman, 1979; Dennis, 1977; MacKay, 1973). Studies in both fields have indicated support for the occurrence of nonconscious processing, through the use of priming tasks. Priming is a context effect in which the processing of one word is affected by a word that accompanies or immediately precedes it (Meyer & Schvaneveldt, 1971).

Marcel (1978, 1983a), using a visual priming procedure presented subjects with two strings of letters. The first

string, a "prime" word, was followed by a visual mask as a means to prevent conscious identification of the prime word. He then presented subjects with the second string of letters or "target" word and asked them to decide if the target was a word. The time it took the subjects to make their decision was measured. He found that even though the subjects could not consciously identify the prime words, the priming effect still appeared. In other words, subjects were able to make the decision more quickly when the first string of letters was semantically associated with the second string as compared to an unrelated word or nonword being presented as the first string.

Studies conducted in the auditory modality have tended to use a dichotic listening methodology. In dichotic presentation, different auditory messages are simultaneously presented to the subjects right and left ears through the use of stereo headphones. Subjects are then asked to either attend to the messages in both channels (divided attention) or to only one of the messages (focused attention or monitoring).

Bookbinder and Osman (1979) used a monitoring method of presentation. Subjects were asked to attend to one channel and not the other. They were presented with target words in the attended channel and asked to identify them. Results indicated that when semantically-related words were presented in the unattended channel, the subject's

recognition of the targets increased. A major limitation of this method is that subjects may have momentarily switched their attention from one channel to the other and therefore they may have been consciously aware of the prime word.

In attempting to investigate the potential problem in dichotic listening studies (i.e., switching of attention), Dennis (1977) employed a shadowing method and compared it to the monitoring method as discussed above. In shadowing, the subject was asked to repeat the message in the attended channel out loud as it was being presented and to ignore the other channel. Subjects were asked at the end of a passage if a particular target word had occurred in the unattended channel. Dennis found that subjects identified 57% of the targets correctly using the monitoring method but only 36% when using shadowing. This appears to support the possibility that subjects were in fact switching their attention between channels in monitoring tasks but it does not eliminate the possibility that they were also doing so in the shadowing tasks.

MacKay (1973) further employed the shadowing technique in investigating the possibility of attentional shifts. In his second study (Study 2), MacKay had his subjects repeat sentences with ambiguous meanings ("The hunters noticed the bark.") that were presented to the attended ear, while a disambiguating word ("dog") was presented to the unattended ear. Subjects were later asked to interpret the sentences

through a forced choice recognition task. Results indicated that the presence of the disambiguating word had induced the appropriate interpretation of the sentence. MacKay (1973, Study 2) then attempted to account for the possibility that subjects had momentarily switched their attention to the unattended channel. He did so by stopping the subjects after the last sentence and asked if they could identify the unattended word. MacKay's conclusion, based on the fact that only one of the 36 subjects correctly identified the word, was that nonconscious processing had taken place. A problem with MacKay's interpretation is that the identification test was given only once, thus not accounting for possible switching of attention on earlier trials. Another problem that applies to both MacKay's (1973) and Dennis' (1977) studies is that the duration between the presentation of the word and the recognition or identification tasks may have allowed subjects to consciously perceive the word and then rapidly forget the disambiguating or prime word.

Newstead and Dennis (1979, Experiment 3) followed up MacKay's experiment and introduced additional controls as an attempt to insure that attention switching did not occur. Instead of having the disambiguating words coming out of silence as in the MacKay study, Newstead and Dennis preceded and followed the disambiguating word with other words. The reason was that it was expected that words coming out of

silence would be more likely to induce an attentional shift than if words were continually presented. Newstead and Dennis also eliminated the time duration or break between the sentences which may have allowed subjects to recover the disambiguating word from a precategorical memory. Newstead and Dennis were unable to replicate the MacKay results with these controls. However, when the controls were relaxed (Newstead & Dennis, 1979, Experiment 4) the MacKay results were replicated.

Johnston and Dark (1982) investigated the extent to which a dichotically presented word would bias the interpretation of a visually-presented test word which had two distinct meanings. They compared a divided attention condition with a focused attention condition (as defined above), with the bias-inducing word occurring in the unattended channel for the focused attention condition. Results indicated a significant biasing effect for the divided attention condition but not for the focused attention condition. These results could be interpreted as indicating that attention is necessary for semantic processing to take place.

All of these dichotic listening studies have the same major problem -- the assumption that since the prime word is presented in the unattended channel it is not consciously comprehended. But in all cases, it is possible that attention was switched momentarily and therefore subjects

became aware of the prime. As Holender (1986) in his extensive review of this body of research notes, there appears to be no way to insure that momentary shifts in attention have not occurred.

In 1971, Dixon developed a set of three criteria that must all be met to establish subliminal perception:

> (a) positive indirect evidence of semantic activation together with negative direct evidence of stimulus identification at the time of presentation, (b) positive indirect evidence of semantic activation together with the inability to report the semantic content of the stimulus retrospectively; (c) positive indirect evidence of semantic activation that is qualitatively different from what would be observed with conscious identification, assuming criterion (a) was met.

Holender (1986) made reference to the above criteria and stated that most studies have not included all three of these requisites and therefore have not insured that semantic activation was not accompanied by conscious identification of the stimulus at the time of presentation. One study by Stanners, Cherry, and Carver (1989) has attempted to meet all three of Dixon's (1971) criteria through a dichotic masking procedure.

The dichotic masking procedure employed by Stanners et al. (1989) involved the auditory presentation of a word to

one ear accompanied by a simultaneous white noise mask to the other ear at a level such that the word could not be identified. This procedure eliminated the problem of attention switching since only one information source was presented. The goal of this technique, in addition to meeting Dixon's (1971) criteria, was to present the person with as much information as possible while preventing the identification of the word. This goal was accomplished by presenting the prime in the right ear and the mask in the other so that a clear signal would reach the brain and masking would occur only at the level of the brain. Secondly, the noise level for the mask was set individually for each subject. And finally, the subjects were required to respond immediately after the presentation of the prime word to determine if it was conscious. Stanners et al., using this procedure, were able to demonstrate a semantic priming effect of unidentifiable prime words. Results indicated both a facilitative priming effect for associatively related words and an inhibitory priming effect for unrelated words. These results can be interpreted as support for the process of nonconscious perception.

Purpose and Hypotheses

It was the purpose of Experiment 1 to determine if the 8-10 min of music used to induce each of the three mood conditions (elated, neutral, depressed) was sufficient to

produce a mood effect that could last throughout the experimental trials. Experiment 1 also served to determine if the music would induce mood states that were significantly different from each other. The music selected consisted of a revised version of the selections of non-lyrical music developed by Pignatiello, Camp, and Rasar (1986) to induce elated, depressed, and neutral moods. They found these pieces of music to significantly alter the subjects' mood state. The effect of the music on the subjects' mood was assessed through the use of the DACL (Lubin, 1967). In Experiment 1, subjects listened to the appropriate music for their assigned mood condition and responded at intervals of 0 min, 10 min, and, 20 min to one of three forms of the DACL. It was hypothesized that if moods were induced, there would be a significant difference of DACL scores between groups with the depressed mood group scoring highest followed by neutral mood and then elated mood. It was further expected that mood would endure throughout the 20 min as indicated by significant differences between groups on the 20 min DACL.

Experiment 2 served to investigate whether nonconscious perception of affect-laden words was another of the varied cognitive processes that is affected by different mood states. After exposure to the musical MIP used in Experiment 1, subjects were presented with words through the dichotic masking procedure used by Stanners et al. (1989) in

order to meet Dixon's (1971) criteria for establishing the presence of subliminal perception. This involved the auditory presentation of a word to one ear accompanied by an auditory noise mask presented to the other ear at a level such that the word could not be identified. The noise level for the mask was set individually for each subject and subjects were required to respond immediately after the presentation of the word to determine if it was conscious. For the purposes of this experiment, the term "conscious" was defined as the ability to correctly identify the word.

The independent variables for the experiment were the mood conditions (elated, neutral & depressed); the word types (affective & neutral) and the response types (pleasant & unpleasant). The dependent variables were the proportion of affective words correctly categorized but misidentified and the frequency of pleasant, neutral, and unpleasant words correctly identified.

It was hypothesized that if nonconscious perception was occurring, it would be seen that when subjects misidentified the presented word, they would still be able to correctly classify that word. And, if mood states were influencing the perception of nonconscious material, based on Bower's (1981) associative network theory, it would be predicted that of those words misidentified, subjects in an elated mood would correctly classify more pleasant words than unpleasant or neutral words, and subjects in the sad mood

would correctly classify more unpleasant words than pleasant or neutral words. The neutral word condition was presented as a measure of possible response bias, that is, the tendency to use the response categories with differential frequency in the absence of any semantic information.

CHAPTER II

EXPERIMENT 1

The purpose of Experiment 1 was to test the methodology that will be utilized in Experiment 2. This consisted mainly of determining if the 8-10 minutes of music used to induce each of the three mood conditions (elated, neutral, depressed) was sufficient to produce a mood effect that could last throughout the experimental trials.

Methods

Subjects

Sixty subjects (22 males, 38 females) were recruited from introductory psychology courses at Oklahoma State University. Participants were awarded extra-credit points for their participation.

Materials

The music presented to induce elated, depressed, and neutral moods was a revised version of that successfully used by Pignatiello, Camp, and Rasar (1986). Their MIP consisted of three 20-min tapes, one for each of the three moods. Forty-five pieces of music were originally chosen on

an intuitive basis for particular qualities that appeared elating, depressing, or neutral. These 45 selections were then placed in random order and rated on a 7-point Likert scale ranging from "very depressing" to "very elating" (4 being neutral) by music therapy interns and non-music related students. Of these 45 selections, 19 were chosen for the mood tapes on the basis of the most consistent ratings across gender and level of music training. Ordering of the selections on the tapes was such that all three tapes commenced with the same selection (rated neutral) and then became either more elating, more depressing, or remained neutral with each successive selection.

The revision of Pignatiello, Camp, and Rasar's (1986) musical MIP was based on Albersnagel's (1988) finding that 20 min exposure time was much too long, i.e., leading to complaints of distraction and boredom by the subjects. In his experiment, he reduced the exposure time to 7 min and his results indicated substantial mood changes. Kenealy (1988) also employed a shortened exposure time (8-10 min) and found significant differences between the "happy" and "sad" groups. Based on these results, the exposure time in the proposed experiment was reduced to 8-10 min. This was accomplished by selecting a shortened exposure time of each of the 19 pieces selected and used by Pignatiello, Camp, and Rasar and leaving the order of presentation the same (See Appendix A).

The effectiveness of the mood induction procedure was assessed by using the Depression Adjective Checklist (DACL, Lubin, 1967). The DACL was found by Lubin to be a brief, reliable and valid measure of depression as a transient mood state and has been shown to be effective in several studies involving mood induction (Challis & Krane 1988; Pignatiello, Camp, & Rasar, 1986; Schare & Lisman, 1984). In the present study, forms E, F, and G, from Set 2 of the DACL were used because this set was applicable to both males and females (Brewer, Doughtie, & Lubin, 1980). The three forms are essentially equivalent and have been shown to be reliable and highly intercorrelated (Lubin, 1965). Each list consists of 22 adjectives which are endorsed more frequently by depressed patients (e.g., unhappy, glum, lost) and 12 adjectives which are checked more frequently by normals (e.g., peaceful, safe, great). The three Forms were counterbalanced for order of presentation, thus allowing one-third of the subjects to receive each of the following orders: E-F-G, F-G-E, G,E,F. Subjects, at all administrations, were instructed to mark an X beside the words that describe how they felt at that particular time. Total scores on the checklist can range from 0 to 34, with low scores indicating an elated mood and high scores indicating a depressed mood.

Apparatus

The three musical selections for the mood induction were presented by a stereo tape recorder/player.

Procedure

Upon arrival at the experiment, subjects were asked to read and sign a consent form (Appendix B). The subjects were then randomly assigned to one of the three mood conditions. Before listening to the musical selections, subjects were simply instructed to "listen carefully to the music" while the experimenter prepared for the next section of the experiment; they were not told that the tapes were designed to alter affect, as consistent with the presentation of the music by Pignatiello, Camp, and Rasar (1986) (See Appendix C). Subjects were then presented with the 8-10 min tape for their assigned mood condition. Following the mood induction, subjects were asked to respond to the first DACL (E, F, or G). They were instructed to respond based on how they felt at that time.

Subjects then participated in approximately 20 minutes of behavioral tasks similar to those use by Velten (1968). This was done to allow a passage of time equivalent to the time it would take to run the experimental trials in Experiment 2. The behavioral tasks that were employed included: filling out a demographic information sheet; a

writing speed task (writing backwards from 100 by 1's); a distance approximation task (putting hands a specified distance apart with eyes closed); and, a word association task.

Approximately 10 min into the behavioral tasks, subjects were stopped and asked to fill out the second DACL (F, G, or E). They were instructed to respond based on how they were feeling at that time. After completion of this form, subjects were returned to finish the last 10 min of behavioral tasks. Following the remainder of the behavioral tasks, subjects were asked to complete the final DACL (G, E, or F). They were again instructed to respond based on how they were feeling at that time. Before leaving the experiment, subjects were debriefed as to the purpose of the experiment. As part of this debriefing, those subjects in the depressed-mood condition were exposed to the 8-10 minutes of music used in the elated-mood condition. This procedure has been used with other MIPs and has been reported as an effective means of dispelling the residual negative mood induced by the depressive conditions (Madigan & Bollenbach, 1982; Rexford & Wierzbicki, 1988).

Results

It was expected that if mood was induced, there would be a significant difference in DACL scores between groups, with the depressed mood subjects scoring the highest

followed by neutral mood and then elated mood subjects. It was further expected that if the mood endured throughout the 20 min of behavioral trials, there would be a significant difference between mood groups at replication three. Finally, it was expected that there would be no significant difference with regard to order of presentation of the DACL's. All of these predictions proved to be correct.

A 3 X 3 X 3 analysis of variance (ANOVA) with a mixed factors design was conducted on the DACL scores. The between-subjects factors were mood condition (elated, neutral, depressed), and order of presentation of the DACL forms (EFG, FGE, GEF). The within-subjects factor was that of replication (early, middle, and late administration). Greenhouse-Geisser adjustments to degrees of freedom were made to correct for the departure from symmetry of the variance-covariance matrix for the repeated factors. As was expected, a significant main effect of mood was demonstrated, F (2,51) = 4.78, $p < .05$. The main effect of replication was also significant, F (1.90, 96.93) = 4.30, $p < .05$. The main effect of order as well as any interactions involving the factor of order were not significant.

The analysis of most interest to this study involved comparing the three levels of mood at each of the three replications. In order to make these comparisons, a simple effects ANOVA of the three moods at each of the three replications was conducted. Results indicated a significant

simple effect for Mood at Replication 1, F (2,51) = 5.75, p < .01, and for Mood at Replication 3, F (2,51) = 3.30, p < .05, but not for Mood at Replication 2. Tukey's HSD post hoc comparisons of the means at each of the significant replications was conducted. These results for replication 1 indicated that the depressed group (M = 12.25) scored significantly higher than the elated group (M = 7.45) and neither were significantly different from the neutral group (M = 10.40). The post hoc comparisons for replication 3 indicated again that the depressed group (M = 11.80) scored significantly higher than the elated group (M = 8.45) and neither were significantly different form the neutral group (M = 10.30). See Figure 1 for a visual representation of these results.

Discussion

The results indicated that the use of this particular musical mood induction procedure did indeed have a significant effect on the subjects reported moods. These results are consistent with Pignatiello, Camp, and Rasar's, (1986) findings. In order to lessen the involvement time for each subject as well as to avoid the possibility of boredom on the subjects part, a shortened version of the Pignatiello, Camp, and Rasar (1986) MIP was used, therefore making the results of this study consistent with Albersnagel's (1988) and Kenealy's (1988) findings that an

exposure time of much less than 20 min is sufficient to induce a mood. In this study an exposure time of slightly less than nine min was used to produce these significant mood differences.

As can be seen in these results and in Figure 1, scores on the DACL at both early (immediate) and late (20 min) administrations were significantly different between the elated and the depressed mood conditions. This finding supports the hypotheses that the induced mood would last for the needed length of time (20 min) for the experimental trials in Experiment 2. There is no obvious explanation for the fact that the reported mood conditions were not significantly different from one another at the middle administration. It should be noted, however, that the order of the DACL scores remained in the expected direction with the depressed group scoring highest, followed by the neutral mood group then the elated mood group. The fact that the scores changed somewhat and thus did not show a significant difference at replication 2 is possibly simply due to random variations in mood over time.

The fact that there were no significant differences with regard to the order of presentation of the three forms of the DACL supports Lubin's (1965) finding that the different forms of the DACL are essentially equivalent.

Now that there was evidence that the revised version of Pignatiello, Camp, and Rasar's (1986) musical MIP does in

fact induce significant moods for the requisite length of time, it was possible to move on to the main experiment. The next experiment looks at the possible influences mood has on the perception of stimuli that the subject is unable to identify. In other words, does mood affect nonconscious perception? Experiment 2 also considers what effect mood may have on conscious perception as indicated by a differential perceptual identification accuracy. This refers to whether subjects in different mood conditions would differ in their ability to correctly identify pleasant, unpleasant and neutral words.

CHAPTER III

EXPERIMENT 2

Methods

Subjects

Sixty subjects (30 males, 30 females) were recruited from undergraduate psychology courses at Oklahoma State University. They were awarded extra-credit points for their participation. All subjects were right handed by self designation and native speakers of English.

Materials

The music presented to induce elated, depressed, and neutral moods was the same as that used for Experiment 1. The effectiveness of the mood induction procedure was again assessed by using the Depression Adjective Checklist (DACL, Lubin, 1967). In this study, only Form B of the DACL was used since measurement was only needed to insure that mood induction had in fact produced a mood state that differed between groups. The items on Form B consist of 22 adjectives which are endorsed more by depressives (e.g., unhappy, glum, lost) and 12 adjectives which are endorsed more by normal subjects (e.g., peaceful, safe,

great). Subjects were instructed to mark an X beside the words that describe how they felt at the time of participation. Total scores on the checklist can range from 0 to 32, with low scores indicating an elated mood and high scores indicating a depressed mood.

Pleasant words for the listening task were selected from an evaluation study conducted by Stanners and Gordon (1990). In this study the experimenters played words on a tape to groups of students (n=200) 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 in this study. Unpleasant words were chosen from the adjectives endorsed more by depressed subjects on various forms of the DACL, being careful not to overlap with any of the adjectives listed on Form B of the DACL. In two other studies, Stanners and Gordon (1990) 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 from those nearest to chance level categorization.

Response sheets had three lines for each trial. The first two lines were used to check one of the two categories (pleasant or unpleasant). The third line was used for

subjects to write down the word if they could identify it. (See Appendix D).

Apparatus

The three musical selections for the mood induction and the words for the calibration, practice, and experimental trials were presented by a stereo tape recorder/player. During the presentation of the experimental trials, a sound-operated relay detected the onset of each word in the right channel and then simultaneously switched on 1 sec of output from a white noise generator to the left channel of the stereo headset. One sec of noise has been shown to be sufficient to mask words from onset to offset (Stanners, Cherry, & Carver, 1989). The noise and voice levels were measured by a General Radio, Model 1551-c sound level meter.

Procedure

Throughout this experiment, subjects were presented with a pleasant, unpleasant, or neutral word in the right ear and the noise mask in the left ear. The words were presented to the right ear because previous research has shown stronger contralateral pathways than ipsilateral producing a right ear advantage for verbal presentation of material (Kimura, 1961). It has also been shown that at least 85%, and possible as many as 99% of right handed subjects are left hemisphere dominant for language (Branch,

Milner, & Rasmussen, 1964; Reynolds, & Flagg, 1983; Segalowitz & Bryden, 1983); therefore, only right-handed subjects were used in the experiment.

Upon arrival at the experiment, subjects were asked to read and sign a consent form (Appendix B). They were then read a set of instructions stating the general nature of the experiment and describing their first task (See Appendix E). They were told that they would hear a word mixed with noise and they were to try to identify that word and write it on their answer sheet. They were told that if they had an idea of what the word was but were not completely sure, to write down that answer.

Subjects were then given an answer sheet and headphones to begin the calibration trials. During these trials, the subjects first heard a trial number and then a word in the right channel and white noise in the left channel, simultaneously. There was a 10-sec delay between trials for the subject to respond. The words for the calibration were neutral in regard to affective value and equated approximately for frequency and syllabic content with the pleasant and unpleasant words. After every five trials the tape was stopped and the subject's responses checked. The noise level was adjusted upward after each set of five until the subject missed all five in a row. If the initial noise level produced five incorrect responses, then the noise level was adjusted downward until they got at least one

correct response and then adjusted back up. This calibration procedure was done to find a noise level that resulted in a lack of correct identification on a high proportion of trials.

Once the noise level for the mask was set, the subjects, randomly assigned to one of the three mood conditions, were asked to listen to a selection of music. Subjects were not told that the tapes were designed to alter affect, as consistent with Pignatiello, Camp, and Rasar's (1986) presentation of the music, they were simply instructed to "listen carefully to the music" while the experimenter prepared for the next section of the experiment (See Appendix C). Subjects were then presented with the 8-10 min tape for their assigned mood condition. Following the mood induction, subjects were asked to respond to the DACL, Form B. They were instructed to respond based on how they felt at the time of participation.

Subjects were then read a new set of instructions (Appendix F) describing the next task. They were asked to rate the words as pleasant or unpleasant and then write down the word if they could identify it. They were given a set of 10 practice trials consisting of five words that were pleasant and five that were unpleasant to acquaint the subjects with the task. Following these practice trials, the tape containing the pleasant, neutral, and unpleasant words was played. Subjects were asked to continue to

categorize the words and to report them when possible (Appendix G). There were 25 of each type of word for a total of 75 trials. The words were ordered randomly, with the restriction that no more than three consecutive words from the same category be allowed to occur.

Following the experimental trials, subjects were debriefed as to the purpose of the experiment. As part of this debriefing, those subjects in the depressed-mood condition were exposed to the 8-10 min of music used in the elated-mood condition as done in Experiment 1.

CHAPTER IV

RESULTS

There were two major questions being considered in this experiment. First, was whether or not there was evidence of nonconscious perception. Second, was whether there was evidence for differential perceptual identification accuracy between mood conditions.

Before considering these two questions, a manipulation check was needed to determine if the music had indeed had the desired effect on the subject's mood. A one-way ANOVA was conducted on the DACL scores across mood groups. The result proved to be significant, F (2,57) = 15.98, $p < .001$. Tukey's HSD post hoc comparisons of the means revealed that DACL scores for the elated group were significantly lower (M = 5.70) than the neutral group (M = 8.70), with both significantly lower than the depressed group (M = 12.40)..

Having shown a significant difference between the groups for mood, the question of nonconscious perception was considered. If subjects could be shown to have gained some information about the affective status of a stimulus item without being able to identify the word then nonconscious perception would have been demonstrated. The data for this analysis was based on those trials in which the word

presented was identified incorrectly and could therefore be regarded as not consciously perceived. The measures were the proportion correct on a particular word type; the proportion of pleasant words correctly categorized as pleasant (P(P/P)) was compared with the proportion of unpleasant words correctly categorized as unpleasant (P(U/U)). This was done for all three mood conditions. This comparison, however, does not take into account the possibility of response bias. Response bias refers to the tendency of subjects to respond "pleasant" more often than "unpleasant" (or vice versa) independently of any semantic information. In this experiment, response bias was dealt with by using subjects' performance on neutral words as a baseline. The subjects' tendency to respond to a neutral item as "pleasant" or "unpleasant' more often than chance (50%) was considered evidence of a response bias. Bias was thus measured by the proportion of neutral words categorized as pleasant (P(P/N)) and the proportion of neutral words categorized as unpleasant (P(U/N)). Therefore, when considering response bias in the nonconscious perception data, we needed to compare the differences between P(P/N) and P(U/N) to the difference between P(P/P) and P(U/U). If the difference between the latter was significantly greater or smaller than the difference between the former, then nonconscious processing would be supported.

A 3 X 2 X 2 analysis of variance with one between- and

two within-factors design was conducted on the above mentioned data. The between-subjects factor was mood condition (elated, depressed, neutral). The within-subjects factors were the word type (affective, neutral) and the response type (pleasant, unpleasant). An overall nonconscious effect would be indicated by a significant interaction between word type and response type. And evidence that subjects in different moods nonconsciously processed information differently would be indicated by the three-way interaction between mood condition, word type and response type. A significant effect was found for the main effect of response type, F (1,55) = 28.4, $p < .001$ (pleasant = .6255, unpleasant = .3735). The interaction between response type and word type was also shown to be significant, F (1,55) = 11.26, $p < .001$. The means for response type and word type are presented in Figure 2. Tukey's HSD post hoc comparisons of the presented means indicated that all four conditions differed significantly from each other. Means of the affective words were adjusted to account for the large positive response bias. Response bias, in this experiment, was measured by the porportion of neutral words classified as pleasant and unpleasant, which would be expected to be .50, or chance level, if there were no response bias present. The adjustment was made by determining the difference between .50, or chance level, and the actual means for the neutral

words, which, for the presented data, was .16, then adding or subtracting this amount from the appropriate means of the affective words. A two-tailed t-test was then conducted on these corrected means of the affective words to determine if they differed significantly from a chance level of .50. This proved to be significant for both unpleasant (t = 2.266, $p < .05$) and pleasant (t = 2.373, $p < .05$) responses. The three-way interaction between mood condition, word type and response type did not prove to be significant.

The second question to be answered was whether there was evidence for differential perceptual identification accuracy among the mood conditions and types of words. This refers to whether elated, neutral and depressed subjects would differ in their accuracy of identifying pleasant, unpleasant, or neutral words. The hypothesis follows from Bower's (1981) associative network theory. If the presence of an emotion partially activates words associated with that emotion, then it would follow that less information would be needed in order to activate an associated word over its threshold thus becoming consciously identified. Therefore, it was expected that there would be some congruence between mood condition and word type. In other words, subjects in the elated mood condition were expected to have a higher frequency of correctly identified pleasant words than unpleasant words, with neutral words falling somewhere in the middle. Similarly, subjects in the depressed mood

condition were expected to have a higher frequency of correctly identified unpleasant words than pleasant words, again with neutral words somewhere in between. Those subjects in neutral moods were expected to have approximately the same number of correctly identified words in each of the word types because they are receiving no partial activation from a mood state.

The data for this analysis was based on those trials in which the words presented to the subjects were correctly identified, and therefore were conscious. A 3 X 3 analysis of variance with a between- and within-factor was conducted. The between-subjects factor was mood condition (elated, neutral, depressed). The within-subjects factor was word type (pleasant, neutral, unpleasant). An overall mood congruence effect would be indicated by a significant interaction between mood condition and word type. This prediction was not supported by the data. However, the main effect of word type was significant, F (1.97, 112.20) = 57.76, $p < .001$. Tukey's HSD post hoc comparisons of the means at each mood type indicated that correct identification of unpleasant words was significantly greater (M = 4.917) than pleasant words (M = 3.767), and both were significantly greater than the neutral words (M = 1.367).

Based on having specific hypotheses, a further examination into these data looked at pleasant and unpleasant words independently comparing the depressed to

the neutral mood conditions and the elated to neutral mood conditions using one-tailed *t* tests. It was expected that subjects in the depressed mood condition would get more unpleasant words and fewer pleasant words correct than the neutral mood subjects. It was also expected that elated mood subjects would get more pleasant and fewer unpleasant words correctly identified than the neutral mood condition subjects. Although three of the four results were in the expected direction, none reached significance at the .05 level.

CHAPTER V

DISCUSSION

This investigation focused on three main questions: (1) does the musical MIP significantly influence subjects moods; (2) does mood influence how material is perceived nonconsciously; and, (3) are there differential levels of perceptual identification accuracy among the mood conditions? Each of these areas, along with their corresponding results will be discussed in turn.

In order to conduct a study looking at the influences of mood on any cognitive process, it must first be established that there is indeed a mood present. This investigation used a variation on an already established musical mood induction procedure (Pignatiello, Camp, and Rasar, 1986). Both Experiment 1 and Experiment 2 established that the new MIP did in fact induce moods that were, by subjects' report, significantly different between the mood groups with the depressed mood condition subjects receiving the highest DACL scores, followed by the neutral and then the elated mood subjects. It was further established that the induced mood lasted throughout the needed duration of 20 min. These results lend further support for those investigators who have stated that music

can be used to induce mood states (Sutherland, Newman, & Rachman, 1982; Clark, 1983; Pignatiello, Camp, & Rasar, 1986). And because exposure time was shortened from 20 min to less than 9 min, the results support Albersnagel's (1988) and Kenealy's (1988) studies that indicated that exposure times between 7 and 10 min was sufficient to induce an altered mood.

Once it was determined that significantly different moods were indeed present, the question of interest turned to that of nonconscious perception. First, it was important to determine if subjects, in general, were able to gain some information from material that they were unable to identify. Secondly, whether a subject's mood state would influence the perception of stimuli presented but not correctly identified was considered? Results indicated support for the presence of nonconscious perception but not for the influence of mood on perception of such unidentified material. Figure 2 is a visual representation of the proportion of affective words correctly classified in comparison to neutral words classified as pleasant and unpleasant, in other words, the response type by word type interaction. The neutral words served as a measure of response bias in this experiment, and, as can be seen, regardless of the subjects mood, they were more likely to respond to unidentified neutral stimuli in a pleasant direction than in an unpleasant direction. Therefore, the presence of nonconscious perception must be

looked at in relation to this strong positive response bias. If there were no response bias present, it would be expected that the proportion of unidentified neutral words classified as pleasant and unpleasant would be equal and at a chance level of .50. Therefore, the best estimate of response bias was the difference between .50, or chance level, and the actual means for the neutral words, which, for the presented data, is .16. It is important to understand that the mean for pleasant words correctly classified as pleasant (.590) is being increased simply by the positive response bias of .16. Therefore, when considering the response bias, it can be seen that the mean would actually be lower (i.e. .590 - .16 = .430) than indicated. The same would be true for the unpleasant words correctly classified as unpleasant but in the opposite direction. This mean of .408 is being pulled down by the response bias of -.16. When this is considered, it can be seen that performance would have been better (i.e. .408 + .16 = .568) had it not been affected by the response bias. With this in mind, it can be understood that the strong nonconscious perception effect being demonstrated by the results is actually quite different than what might be expected by visual inspection of Figure 2. These results indicate that there is a difference in nonconscious perception for pleasant and unpleasant words when response bias is taken into account. Thus, when performance is corrected for response bias, correct

classification of unpleasant words becomes higher than correct classification of pleasant words. In other words, subjects were able to receive some information about the unpleasant words presented. Although they could not identify what the word was, they were able to correctly classify it as unpleasant a significant proportion of the time. This facilitated nonconscious perception effect was not demonstrated with pleasant words, and was not affected by the subjects mood condition.

Support for the presence of a general nonconscious perception effect was also demonstrated in the Stanners, Cherry, and Carver (1989) study. That study also employed all of Dixon's (1971) criteria for establishing the presence of subliminal perception and at the same time reported significant nonconscious effects of unidentifiable words. It should be noted that in the Stanners et al. (1989) study, a semantic priming procedure was used where the prime word was presented nonconsciously. The present study, in contrast, used a classification procedure thus demonstrating nonconscious perceptual effects in two different tasks.

The fact that facilitated nonconscious perception (significantly greater than .50) was indicated only for the presentation of unpleasant emotionally toned words and that inhibited nonconscious perception (significantly less than .50) was indicated for the pleasant toned words is somewhat more difficult to explain. One line of explanation is

related to the emotional tone of the words and comes from the literature regarding both positive and negative emotionally toned words, and their effects on memory and attention. Several studies have shown that emotional words are remembered and attended at a higher rate than are neutral words (Matthews & Southall, 1991; Hayward & Strongman, 1987; Batova & Khomskaya, 1984). Attentional effects of emotional toned words has been demonstrated through the use of Stroop test procedures. These procedures have shown subjects to be slower at naming the colors of emotional words than neutral words, indicating a heightened attention to the words presented (Gotlib & McCann, 1984; Gotlib & Cane, 1987; Williams & Nulty, 1986; Dawkins & Furnhan, 1989; McKenna, 1986). Memory effects of emotional words has been demonstrated in the study by Hayward and Strongman (1987). Subjects were asked to learn a list of emotional and neutral words and were then tested with either a cued or free recall procedure. The results of this study indicated that memory for the emotional words was superior to that for the neutral words. These results appear to relate to the present experiment in that in order for a word to be remembered and attended to, it must at some level be perceived. Therefore, if emotional words have been shown to enhance memory and attention then, it is plausible that emotionality might also enhance perception.

Studies have also shown that of the emotional toned

words, negatively toned, or taboo words create a sense of anxiety in subjects that pleasant toned words do not seem to create (McGinnies, 1949; Broadbent & Gregory, 1967; Bootzin & Natsoulas, 1965). Several studies, when investigating the effects of emotional words on a variety of cognitive tasks, have chosen to use negatively toned emotional words (Tyrer, Lewis & Lee, 1978; Kotze & Moller, 1990; Kemp-Wheeler & Hill, 1987; Borgeat & Goulet, 1983). These studies have shown heightened physiological responses (i.e. increased heart rate, increased respiration rate, increased GSR, muscle tension, and shaking) as well as, heightened psychological responses (perceived sweating, shaking and anxiety level) to be caused by even mildly stressful stimuli such as unpleasant or negatively toned words. It would appear to follow, then, that unpleasant words are actually producing more of an emotional response in the subjects than are pleasant words.

Based on these two explanations, the facilitated nonconscious perception of unpleasant words, becomes somewhat more understandable. It has been demonstrated that emotionally toned words are attended to and remembered at a higher rate than are neutral words. It has also been demonstrated that unpleasant words are considered to produce more of an emotional response than are pleasant words. Therefore, it follows that the unpleasant words in this experiment were more emotional in tone and were attended to

at a higher rate than are pleasant words, thus resulting in a facilitated nonconscious perception for unpleasant words.

The above mentioned explanation, however, does not account for the inhibited nonconscious perception effect demonstrated for the pleasant words. In general, it appears that the difference between the unpleasant and pleasant words can be attributed to the differences in emotional tone of the two word types. But there appears to be no obvious reason as to why pleasant words are also correctly categorized at a lower rate than were neutral words. No research was found to support neutral words being perceived at a higher rate than pleasant words. It would appear necessary to investigate this further if an explanation for this unexpected result were to be found.

As mentioned above, the results of the present study indicated that there was significant evidence of a positive or pleasant response bias on the part of the subjects. In other words, when subjects were unable to identify the presented item, they were more likely to classify the item as pleasant than unpleasant, regardless of their mood condition. This result is somewhat surprising when one considers the cognitive distortion literature. This body of literature posits that one's mood, particularly depression, distorts one's thoughts and behaviors in a negative direction (Beck, 1967, 1976; Bandura, 1973; Ellis, 1977). If this theory can be applied to various cognitive

processes, the literature would suggest that subjects in a depressed mood condition would be more likely to respond to unidentified information in a negative or unpleasant direction. In other words it would be expected that if a response bias occurred, it would be in the direction of elated mood subjects being more willing to respond with pleasant classifications and depressed mood subjects responding with more unpleasant classifications due to their induced mood states. This, however, was not the case. Those subjects in the non-depressed mood conditions (elated and neutral) did indeed respond in a pleasant direction more often than in an unpleasant direction. However, the opposite was not true. The subjects in the depressed mood conditions were not more likely to respond unpleasant more often than pleasant. This evidence of a pleasant response bias was not entirely unexpected. Doppler and Stanners (1990) in a similar nonconscious perception study also found that their nondepressed subjects were more likely to respond "pleasant" to unidentified words. But, as in the present experiment, the opposite was not found to be true. Depressed subjects were not more likely to respond "unpleasant" to unidentified words. Further support for this occurrence of nondepressed subjects having a tendency to respond in a positive manner while the opposite is not true is seen in a study by Vestre and Caulfield (1986). In their study, they gave neutral personality descriptions to

subjects who were either depressed or nondepressed. When asked to interpret these evaluations, they found that the depressed subjects were more accurate in their interpretations, whereas nondepressed subjects interpreted their evaluations in more positive terms. As it can be seen, in all three of these reported studies, there was a tendency for nondepressed subjects to be biased to respond in a positive or pleasant manner.

A final possibility as to why cognitive distortion was not demonstrated in the current study is that induced mood states were studied rather than clinical depression. Several investigations have suggested that induced mood states effect cognitive processes at a different level than does a clinical mood (Williams et al., 1988, Bower, 1987). Therefore, it is likely that the induced, transient mood state was not sufficient to effect the subject's tendency to response in a negative biased manner.

The final question of interest in the present investigation was whether there was a differential perceptual identification accuracy between the mood conditions. This referred to whether elated, depressed, and neutral mood subjects would differ in their ability to correctly identify pleasant, unpleasant, and neutral words. The results indicated no significant evidence for this effect. However, as can be seen in these results and in Figure 3, the frequency of unpleasant words correctly

identified was higher for all three mood conditions indicating a differential perceptual accuracy regardless of mood. This may lead one to suspect a difference in overall volume levels for this set of words. Although the volume level was set individually for each of the subjects and remained at that presentation level for the entire experimental trials, there was a possibility that when recording the words, the volume level fluctuated between words due to simple change in the experimenter's voice. In order to investigate this possibility, an analysis of the recorded volume levels across word types was conducted. This analysis indicated no significant volume level differences between the pleasant words (mean = 52.00 db), neutral words (mean = 52.24 db), and unpleasant words (mean = 52.56 db). This possibility ruled out, it becomes quite difficult to explain such unexpected findings.

One notable result is that the affective words, both pleasant and unpleasant combined, were correctly identified at a much higher rate than the neutral words. One possible explanation comes from the earlier discussion of the effects of the emotional tone of a word on memory, attention, and therefore, possibly perception. As was discussed earlier, the affective tone of a word has been shown to enhance that word's ability to be remembered and attended to as compared to neutral words (Matthews & Southall, 1991; Hayward & Strongman, 1987; Batova & Khomskaya, 1984). Therefore, it

would seem likely that the ability to correctly identify an emotional word would also be enhanced over neutral words because memory would have to be accessed in order to identify a word. As was also discussed earlier, negatively toned or unpleasant words seem to have a higher degree of emotionality than do pleasant words. The fact that unpleasant words were correctly identified more often than were pleasant words would, therefore, seem due to their being attended to and perceived at a higher rate as a result of higher emotional tone.

Another possible explanation for the higher correct identification of affective words over neutral words lies in the area of expectation. There have been several experiments that have explored what effect a subject expecting or having foreknowledge about the presentation of a emotionally pleasant or unpleasant word would have (see Erdelyi, 1974, for a review). A study by Postman, Bronson, & Gropper (1953) found that when there was a clear expectation, on the part of the subjects, that an emotionally unpleasant word may be presented, the affective tone of the stimulus seemed to enhance perception of those unpleasant words. Another study conducted by Kitayama (1990) investigated a similar hypothesis using both positive and negative affectively toned words. It was hypothesized that the accuracy with which a briefly shown word was perceived depended on both the affective tone of the word

and the activation of the memory code through the subject's expectation of a particular word. The subjects were presented briefly (25 ms) with a target word on a screen and then were asked to chose which of two words had been presented. In the expectation condition, a word pair, in which both words matched in emotional tone, was presented for two sec and subjects were informed that one of the two words would be presented. The words presented were either neutral, positive, or negative in affectual tone. The results of this experiment indicated that in the presence of expectation, accuracy was higher for affective words than for neutral words. This study also showed that the valence of the affective words had no effect. Both of these studies are supported by the present experiment which indicates that subjects were better able to correctly identify affective words, both pleasant and unpleasant at a higher rate than neutral words. It should be noted that the cited studies have based "expectation" on the subject having knowledge of the actual words that may be presented. However, it may be possible that the simply informing subject's that they would be rating words as pleasant or unpleasant would likely cause them to expect the presentation of affectively pleasant and unpleasant words. Another basis for the presence of differential expectation of affective words in the present experiment would be the number of affective and neutral words presented. There were equal numbers of neutral,

pleasant, and unpleasant words presented. Therefore, affective words occurred two-thirds of the time with neutral words occurring only one-third. The result is that when a subject correctly identified a word, it was more likely to be an affective word, thus leading them expect affective words over neutral words.This expectation on their part may have led to the increase in the ability to correctly identify the affective words over the neutral words.

The present study led to several unexpected results. The proposed and expected nonconscious perception effect was supported but in an unexpected direction in regard to pleasant words. Further, the idea of a differential perceptual accuracy due to the different mood conditions was not supported by this study, although the main effect of word type was significant. This indicates that regardless of mood, subjects did show differential perceptual accuracy in that the unpleasant words were correctly identified at a higher rate than the pleasant or neutral words, and that the affective words were both identified at a higher rate than neutral words. Both of these unexpected results seem to be due in some part to the emotional tone of the words presented. It would appear that those words with an affectual or emotional tone are perceived and identified at a higher rate than are words with no such emotional link. And, that negative toned words are perceived at the highest rate of affective words.

One of the major points of interest to be taken from this study is that of the importance of considering the effects of response bias. If a control measure of some type on which to measure response bias were not present inaccurate conclusions would have been reached. This supports the need for all such studies to account for possible response bias.

One final finding of interest is that of the effects of music on subjects' reported mood states. This and other studies have shown music to be significantly influential in changing a persons mood. This finding would seem to increase the ease in which mood can be induced for research purposes. But, equally as important are the clinical implications of this finding. Music appears to be a major part of our society and most people are exposed to some music on almost a daily basis -- home radios, driving in their cars, waiting rooms, etc. It would seem that the possibility of improving a persons mood who is depressed through the use of music could be of great value. The use of music within clinical settings to influence clients' moods would appear to be worth considering. Even if the mood induced lasted only temporarily, it may be possible to use it as a learning tool for identification of different moods. Mood induction procedures may also help to elicit information about the client or to help them in attaining goals that may be difficult to address while the person is

in a depressed state. Future research would be needed to advance this world of possibilities into the clinical area of psychology, but it would appear to be a beneficial endeavor.

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APPENDIX A

MUSICAL SELECTIONS

Elated tape: (8 minutes and 50 seconds)

1) "Intermezzo", Leopold Stokowski conducts the National Philharmonic Orchestra, Great Performances Carmen and L'Arlesienne Suites, CBS, MY 37260. (time: 1:40)

2) "An Americaln in Paris" (Gershwin), Lionard Bernstein conducts the New York Philharmonic Symphony, Comulbia Records, M 31804. (time: 1:10)

3) "Ode to Joy" (Schiller), Karl Bohm conducts the Weiner Philharmoniker, Beethoven's Symphonie No. 9, Duetsche Grammephon, 2707073, started recording 3:37 into piece. (time: 1:05)

4) "Guadalcanal March" (Rodgers), Robert Bennett conducts, Victory At Sea, RCA, VCS-7064. (time: 1:10)

5) "Le Basque", (Galway), Annie's Song and Other Galway Favorites, RCA, ARL1-3061. (time: :55)

6) "Les Torreadors", (Bizet), Carmen Suite, Mercury, MG 50374. (time: 1:10)

7) "Overture", (Conti), Rocky II, United Artists, LA 972-1, omit first 0:18. (time: 1:40)

Depressed Tape: (8 minutes and 50 seconds)

1) "Intermezzo" (same as for elated tape)

2) "Egmont Overture", (Beethoven), Josef Krips conducts the London Symphony Orchestra, Everest, 3119. (time: 1:16)

3) "A Song to the Evening Star", (Wagner), Young Listener's Library, (Lillian Baldwin, ed.), Sound Book Press Society, Inc., MSB 33103B. (time: 0:49)

4) "Overture-Fantasy" from Romeo and Juliet,

(Tchaikovsky), Scheherazade rhapsodic mood music, Charles Gerhardt conducts, RCA. (time: 0:55)

5) "Introduction" from Scottish Fantasy, (Bruch), Op. 46, Sir Malcolm Sargent conducts the New Symphony Orchestra of London featuring Heiffetz as violinist, RCA, LSC-2603. (time: 1:00)

6) "Sonata No. 7 in D Major", Op. 10, No. 3, Second movement, Beethoven's "Piano Sonatas" (Vol. 3), Orpheus, B 118. (time: 0:45)

7) "Marche Funebre", Sonata #2 in Bb minor, Op. 35, (Chopin), (50th anniversary complete ed.), Westminister, XWN 18882. (time: 0:50)

8) "Symphony #6 in B minor", (Pathetique), Op. 74, 4th Movement, Otto Klemperer conducts the Philharmonica Orchestra, Angel, 35787. (time: last 1:35)

Neutral Tape : (8 minutes and 45 seconds)

1) "Intermzzo" (same as elated and depressed tapes)

2) "Canon in D Major", (Pachelbel), Jean-Francois Paillard conducts the Jean-Francois Chamber Orchestra, Musical Heritage Society, Inc., MHS 1060. (time: 1:18)

3) "Les Parfums de la Nuit", (DeBussy), Iberia, Lorin Maazel conducts the Cleveland orchestra, London, CS 7128. (time: 1:10)

4) "Othello Overture", (Dworak), Op. 93, Istvan Kertesz conducts the London Symphony Orchestra, London, CS 6527, omit first 3:27. (time: 1:35)

5) "Symphonic Variations for Piano and Orchestra", (Franck), Scheherazade Rhapsodic Mood Music, Massimo Freccia conducts, RCA. (time: 1:05)

6) "The Homecoming", (Hagood Hardy), courtesy of WLW87. (time: 2:00)

APPENDIX B

CONSENT FORM

I, (print name) _____
hereby authorize and direct Debbie L. Cherry, M.S., or assistants of her choosing, to perform the following procedures:

A. Procedure: In participating in this experiment, you will be asked to do the following things:
   1. Listen, through the use of headphones, to a set of words that will be mixed with noise, and try to identify the words presented.
   2. Listen to a short selection of music.
   3. Listen to and classify words as pleasant or unpleasant.
   4. Participate in a debriefing at the end of the study in which the purposes of the experiment will be discussed. At this time any questions will be answered.

B. Duration of Participation: Your participation will require approximately one hour.

C. Confidentiality: No identifying data will appear on your response sheets.

D. Risks: The risks in this study are minimal and do not exceed those ordinarily encountered in daily life.

E. Compensation for Participation: You will be awarded 1 extra credit point in your PSYCH 1113 (Introductory Psychology class for each hour or fraction of an hour in which you participate in this experiment. Whether or not you choose to participate in this experiment, there are other ways that you can get extra credit in that class. You can be involved in other experiments or you can do projects (e.g., book reports) that your instructor can explain and allow you to complete.

F. Purpose: The purpose of this experiment is to learn more about how people process information auditorialy.

My participation today is part of am investigation entitled "Auditory perception of pleasant and unpleasant

words.

I have been fully informed about the procedures listed here. I understand that my 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.

I understand that I may contact any of the experimenters at the following address and telephone number should I desire to discuss my participation in this study and/or to request information pertaining to the study's outcome: 215 North Murray, Department of Psychology, Oklahoma State University, Stillwater, OK 74078, (405) 744-6027. I may also contacy Terry Maciula, University Research Services, 001 Life Sciences East, Oklahoma State University, Stillwater, OK 74078: (405) 744-5700.

I have read and fully understand this consent form. I sign it freely and voluntarily. A copy of this form has been given to me. I hereby give permission for my participation.

_____ _____

Signature of participant Date

_____

Time AM PM

_____ _____

Signature of Witness Date

APPENDIX C

INSTRUCTIONS BEFORE LISTENING TO MUSIC

While I prepare for the next part of the experiment, I would like you to sit here and listen carefully to a selection of music.

Any questions?

APPENDIX D

RESPONSE SHEET

Trial No.	Pleasant	Unpleasant	Word
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____

APPENDIX E

INSTRUCTIONS FOR 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 no 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 I can adjust the noise to the correct level.

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

Any questions?

APPENDIX F

INSTRUCTIONS FOR THE PRACTICE TRIALS

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

To summarize, first make your pleasant-unpleasant judgement and make it on every trial. Then try to write the word down even though you may be unsure. You will have approximately 10 seconds to respond after each trial.

Any questions?

APPENDIX G

INSTRUCTIONS FOR THE EXPERIMENTAL TRIALS

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 judgement first on every trial. Then write down your best impression of what the word was. If you can't come up with a word, then put a line where the word would go.

There will be 75 trials in this part of the experiment. We understand that it is easy to let your attention wander after listening carefully for a while. Please do not let your attention drift, but try to concentrate on each word and do your best.

Any questions?

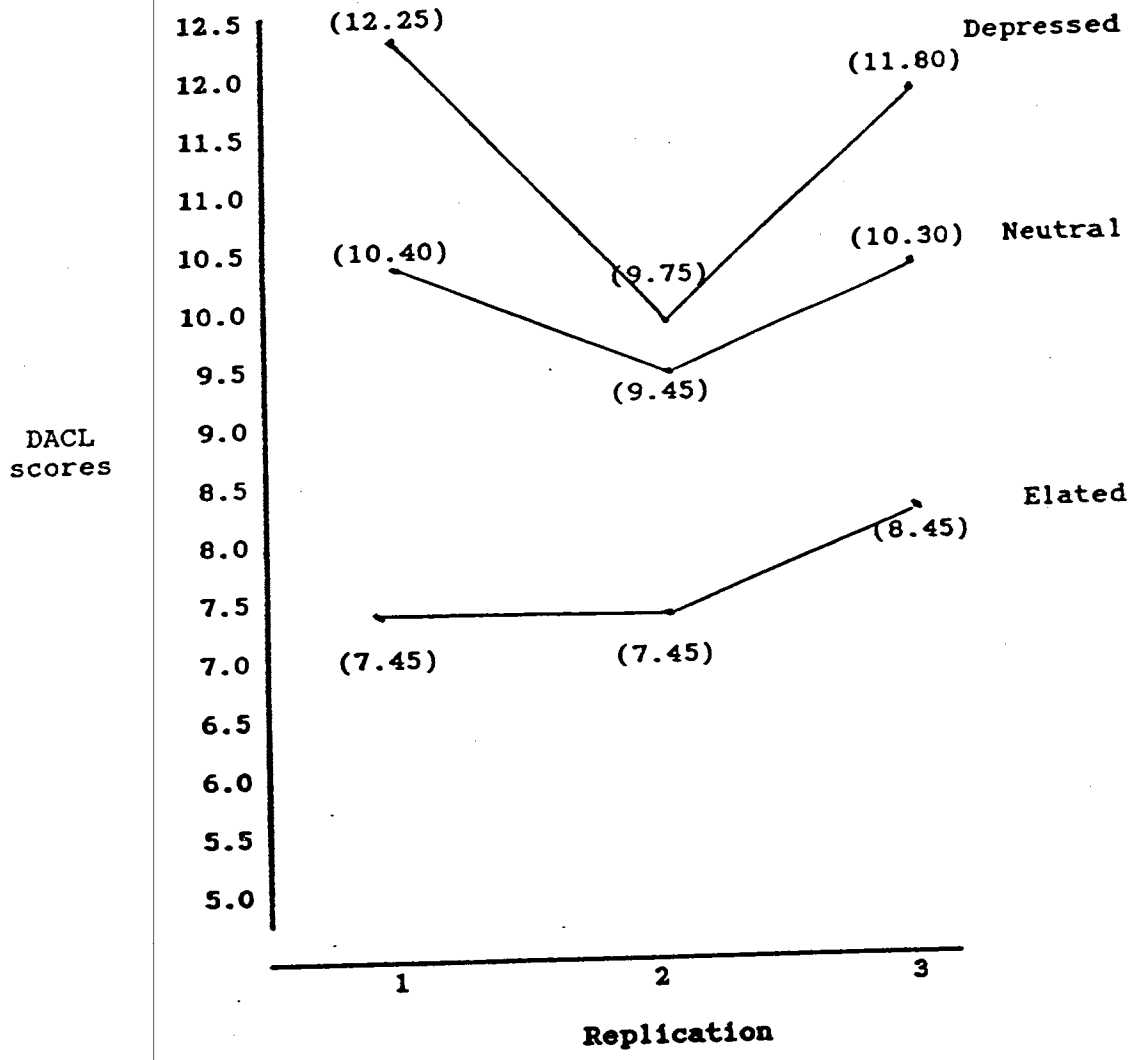

Figure 1: Mean DACL scores of the three mood conditions at each of the three replication.

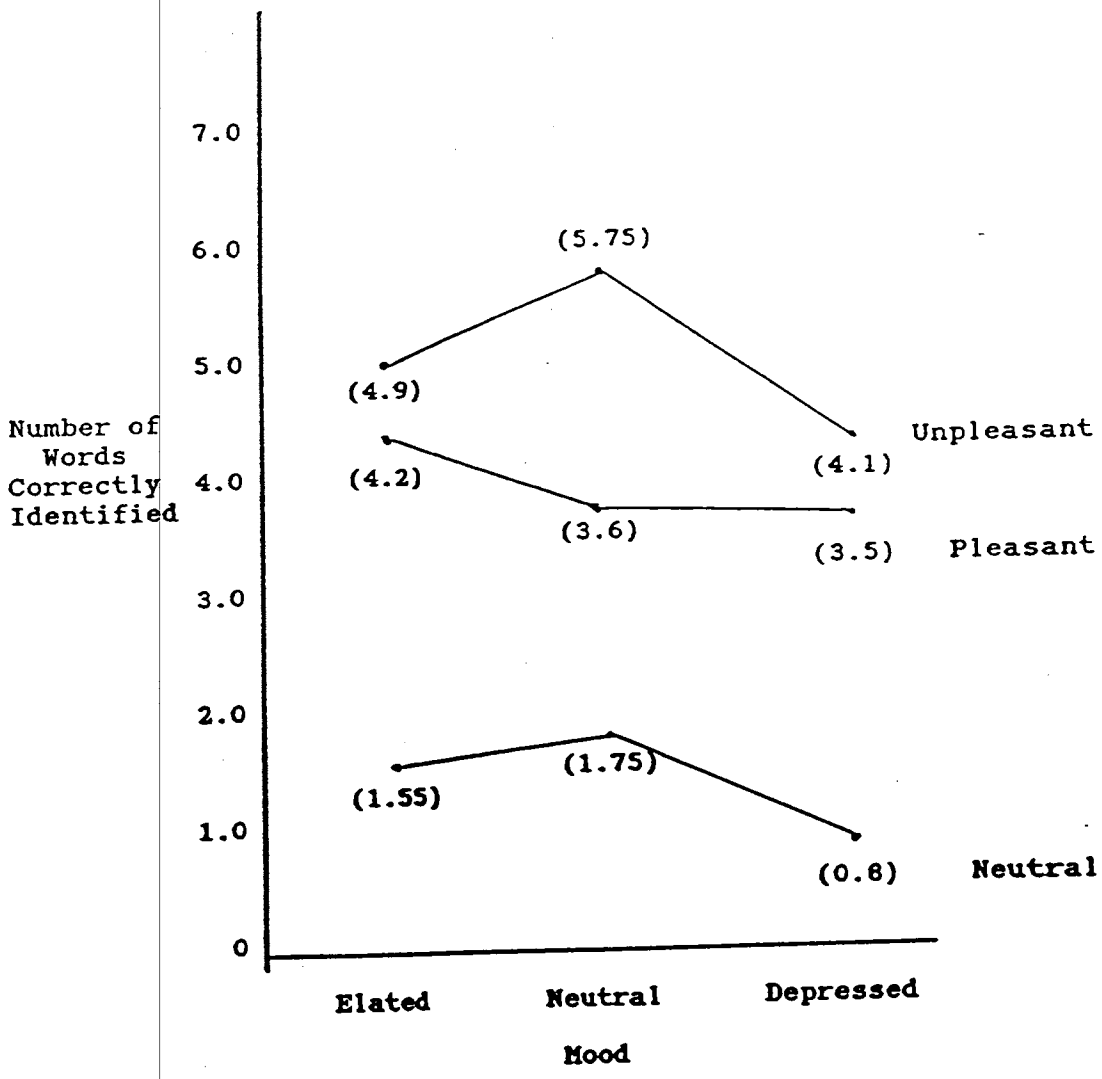

Figure 3: Frequency of each word type correctly identified across all three moods.

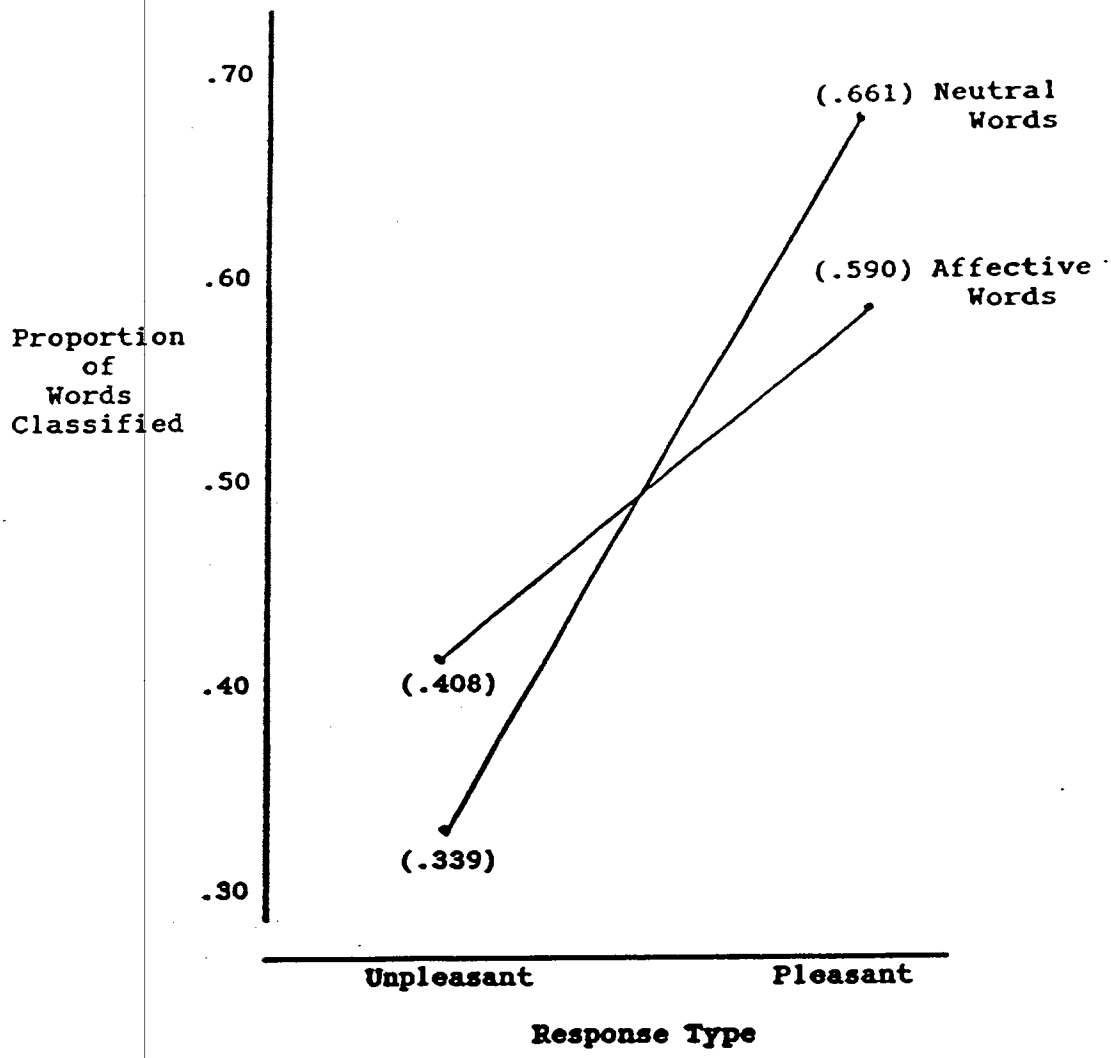

Figure 2: Proportion of affective words correctly classified and neutral words classified as pleasant or unpleasant given incorrect identification.

VITA

Debra Lynne Cherry

Canidate for the Degree of

Doctor of Philosophy

Thesis: THE EFFECTS OF MOOD INDUCTION ON NONCONSCIOUS PERCEPTION

Major Field: Clinical Psychology

Biographical:

Personal Data: Born in Carthage, Missouri, March 26, 1965. Married June 6, 1987 and have one child.

Education: Received a Bachelor of Science Degree in Psychology from Missouri Southern State College in May, 1987; received a Masters of Science Degree in Clinical Psychology from Oklahoma State University in July, 1988; completed requirements for the Doctor of Philosophy Degree at Oklahoma State University in May, 1993.