THE PROCESSING OF FACIALLY EXPRESSED EMOTION IN PERSONS WITH SELF-REPORTED DEPRESSION AND ANXIETY

by

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The Processing of Facialy Expressed Emotion In

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ABSTRACT

The purpose of the present study was to assess whether persons who report significant levels of anxious and depressed symptomatology process facial expressions in a manner different from normal control subjects. Earlier studies tested for putative deficits in the accuracy of qualitative identification of emotion by depressed persons. Procedures were included to investigate the existence of such deficits. Additionally, employing a model which posits that emotions can be represented along two orthogonal dimensions of arousal and pleasantness, procedures were included for assessing whether anxious and depressed persons differ from normal controls in the levels of arousal and pleasantness that they assign to others' facial expressions of different emotions.

As hypothesized, although anxious and anxious, depressed subjects ascribed higher levels of arousal to others' facial expressions, they appeared to be no less accurate than normal control subjects in the accuracy with which they categorized facial expressions as representing particular emotions. In contrast to the differences noted in perceived arousal, multidimensional scaling procedures illustrated that all three groups were very similar in terms of the "mental maps" they form of the interrelations between different emotions.

Results have interesting implications in that they call into question past findings of qualitative emotion perception
differences between depressed and normal persons. In addition, they suggest that it is imperative to include an anxious control group in any study which seeks to assess the emotion processing of depressed populations.
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PART A

INTRODUCTION
Facial expressions of emotion serve a pivotal role in human social interactions, and cross-cultural research has indicated that the ability to identify facial expressions of emotion is common across different socio-cultural groups (Izard, 1971). Deficits in the ability to accurately decode facial expressions have been noted to correlate with and may cause social isolation in psychiatric patients, but may be remediable through training. Among psychiatric populations, depressed patients are one group seen as being particularly prone to social withdrawal (Beck & Young, 1985). Accordingly, such remediation may temper the degree of isolation in these persons. Unfortunately, the empirical study of emotion recognition in depressed populations has been marked by inconsistent findings which have precluded conclusions on the nature or even existence of such deficits among depressed persons.

This study is intended to serve two related purposes. First, it is argued that significant levels of anxiety are frequently present in depressed persons and that inconsistent findings in past research on emotion recognition in depressed persons stem from a lack of attention to anxiety levels in these populations. With the above in mind, it is hypothesized that high levels of anxiety in depressed persons in particular influence their perception of emotion in others' facial expressions. The second purpose is to show that the emotion recognition of depressed and anxious persons differs from that of normal persons specifically in terms of quantitative attributions of perceived emotional
intensity and degree of pleasantness, but not in terms of qualitative or categorical identifications of emotions (e.g., happy, sad, angry).

Many studies with depressed patients have produced results suggesting that they differ from normal controls in their processing of emotional information. The implications of these findings are that depression biases people towards recall of more self-rated unpleasant memories than self-rated pleasant ones, thus perpetuating their negative mood state (Teasdale & Fogarty, 1979; Teasdale, Taylor & Fogarty, 1980; Teasdale & Taylor, 1981; Derry & Kuiper, 1981; Bradley & Matthews, 1983; Fogarty & Hemsley, 1983). Findings from other studies, especially those employing depressives as non-psychotic psychiatric controls for schizophrenics, also have suggested a bias or deficit for both groups, in processes involved in initial perception of emotional stimuli. Specifically, a deficit or bias in the recognition of emotion from facial expressions has been posited for these patients based upon empirical evidence of their inferior performance on emotion recognition tasks (Izard, 1959; Dougherty, Bartlett & Izard, 1974; Muzekari & Bates, 1977; Walker, 1981; Mandal, 1986; Zuroff & Colussy, 1986).

It is this initial perception of emotional stimuli with which the present study is concerned. Since accurate perception of others' emotional states is a necessary cornerstone of successful functioning in human social groups, the person who
misreads emotion displays is likely to "misperceive cues regarding the process and likely outcome of interpersonal exchanges" (Walker, 1981), and their reactions to others may often be inappropriate, leading to frequent censure and further lowering of self-esteem (Bell & Hall, 1954; Rose, Frankel, & Kerr, 1956; Rothenberg, 1970). Both confirmation of existence and delineation of a coherent picture of types of emotion recognition deficits in depressed populations have been precluded by the diversity of questions, strategies and diagnostic groups employed in studies to date. Without a coherent picture, it is impossible profitably to introduce educational or pharmacological interventions aimed at remediating deleterious effects of any deficiencies in emotion recognition.

Another line of research, and one that often seems to have remained separate from the work with depressives, is the investigation of processing of emotional stimuli in anxious populations. Much evidence exists that anxiety causes attention to be biased towards emotionally arousing stimuli (Parkinson & Rachman, 1981; Burgess, Jones, Robertson, Radcliffe, Emerson, Lawler, & Crowe, 1981; MacLeod, Mathews & Tata, 1986). That is, anxious persons appear to perceive emotionally threatening information more easily than do people who are low in anxiety. Therefore, a major purpose of this study is to examine whether any previously noted negative (or positive) biases in the emotion recognition of depressed persons are primarily the
result of their anxious arousal. It is expected that anxious arousal will cause persons to perceive elevated arousal levels in facial expressions of emotion.

Another purpose of this study is to account for equivocal past findings by demonstrating that any differences between depressed and normal persons, in assessing facial expressions of emotion, is not so much in the qualitative categorical identification of different expressions but in the rating of the valence (pleasantness-unpleasantness) and intensity (high-low arousal) of a facial expression, on a Likert type scale, after a qualitative discrimination of that expression has been made (e.g., happy, sad, angry, etc.). In this regard, the few studies which have compared the qualitative emotion recognition performance of normal subjects with that of depressed patients have produced inconsistent findings. However, Mandal (1986) found that, when asked to judge the similarity of different facial expressions without previously categorizing those expressions, normal subjects consistently employed both an arousal and a pleasantness dimension in their judgments. In contrast, depressed subjects apparently discounted arousal in the encoder's face and appeared particularly sensitive to a pleasantness dimension. Theoretical support for Mandal's findings and the hypotheses of the present study, comes from Beck's (1967) theory of depression, which predicts that depressed persons will have negative perceptions of the world. It might be further inferred that they therefore should tend to
perceive facial expressions as less pleasant than they actually are.

The present views are somewhat in contrast to those of some past research which has looked for qualitative emotion processing differences between depressives and normals. Research evidence will be reviewed regarding differences in emotion identification in terms of processing both past and present content. This review concludes with two suggestions. One is that qualitative differences between normals and depressives actually exist in the area of differential accessibility to happy and sad memories, rather than in the differential processing of current emotional stimuli. Another suggestion is that the role of arousal as a dimension for emotion processing deserves greater attention.

Studies Examining Biases in Recall of Emotion by Depressed and Normal Subjects

A more coherent corpus of research has accrued concerning recall (than attentional processing) of emotions under different mood states and by different clinical populations. Researchers in this area often cite Bower's (1981) associative network model of memory and emotion as support for hypotheses of mood-related recall differences between normal and depressed subjects. This model posits that depressed persons should display recall biases which favour recall of mood-congruent negative information.
Therefore, depressed patients in these studies would be expected to remember more unpleasant events than would normal subjects. In this vein, the results of a number of studies indicated that memory is affected by mood state, such that depressed subjects were able to recall more self-rated unpleasant memories than pleasant ones (Teasdale & Fogarty, 1979; Teasdale, Taylor & Fogarty, 1980; Derry & Kuiper, 1981; Teasdale & Taylor, 1981; Bradley & Matthews, 1983; Fogarty & Hemsley, 1983). Such findings are consistent with Bower's model, by which emotions are seen as network nodes to which are linked concepts previously associated with the emotion in question (i.e., the emotion activates established links to past personal experiences).

In the following pages, four studies will be reviewed which differ in methodology but which all appear to support the view that depression biases persons to recall unpleasant material. On two separate occasions, Fogarty and Hemsley (1983) asked depressed patients and normal control subjects to recall past life experiences which they associated with a series of stimulus words. Not only did depressed subjects display an increased probability for recalling sad memories, but there was also, within the depressed group, a significant relationship between severity of depressed mood and percentage of sad memories recalled. Those patients who rated themselves less depressed on the second occasion also showed a decrease in the proportion of sad memories recalled. Such a finding is consistent with Bower's
finding that the best recalled events were those that were affectively congruent with a mood which had been hypnotically induced in subjects at the time of recall.

In a similar study, Clark and Teasdale (1982) saw depressed patients with diurnal mood variations, at two different times during the day. Each patient was reported to be substantially more depressed on one of these occasions than on the other. Like Fogarty and Hemsley, these researchers asked patients to retrieve past life experiences associated with stimulus words. When the second interview was finished, patients were asked to rate the past life experiences for happiness/unhappiness at the time of the experience and also for current happiness/unhappiness. These researchers found that memories of happy experiences were more often retrieved on the less depressed occasion.

Another study which lends further support to the thesis of mood congruent recall was conducted by Tabachnik, Crocker and Alloy (1983). Results suggested that depressed subjects did not exhibit a bias seen in normal persons. Specifically, a "false consensus" effect in which persons characterize themselves as similar to others and a consistent bias towards enhancing oneself relative to others were both exhibited by normal subjects, but not by depressed subjects. Such a bias would appear adaptive given the needs of human beings to affiliate and feel some sense of communion with others in their environment. Although not mentioned by these authors, the lack of a
self-enhancing bias in the depressed subjects may be the result of more mood-congruent negative life experiences being available to the memory of these subjects.

Further support of qualitative differences at a recall level was provided by Mandal and Palchoudry (1985) who found that, after depressed and normal subjects accurately identified happy and sad photographs, depressed subjects gave significantly more verbal associations for the sad than for the happy photographs. Normals did not differ in the amount of associations given for the two kinds of stimuli. Thus, depressed patients appeared to have greater access to sadness-relevant information than they did to happiness-relevant information. However, the following section indicates that similar positive findings have not been obtained in present processing of semantic material. Thus, at least with semantic stimuli, it appears that past studies produced a consistent finding of mood-congruent recall in depressed persons which does not seem to generalize to an attentional bias in decoding present emotional content.

**Deficits in Decoding Present Emotion Content**

Research evidence has supported Bower's (1981) model with respect to differences between depressed and normal populations in their recall of past emotion content. Bower's model also posits that present selective attention of depressed persons should be biased towards the encoding of material which is
semantically congruent with their own negative mood. Contrary to expectations, MacLeod, Mathews and Tata (1986) have noted that attempts to find an attentional bias favouring the encoding of depression-related words uniformly have produced negative findings. Thus, findings to this stage accord with Bower's associative network model of emotion and memory (1981) in providing evidence for bias in the processing of past emotion content but, contrary to Bower's model, provide no evidence for depressed people showing a bias towards attending to depression-related words. However, the foregoing findings were produced with semantic stimuli. It is still possible that reliable differences between depressed and normal subjects could be observed in a different emotion channel (e.g., facial expression). The present study was designed to assess whether any such differences do exist.

Before elaborating the components of the present study, a review of the literature on the development of emotion recognition, and posited recognition deficits among clinical populations will be presented in order to: (1) present evidence as to the primacy of the visual channel in the communication of emotional information, (2) indicate the rationale for and origins of studies examining visual emotion processing by psychiatric patients in general, and depressed patients in particular, and (3) provide empirical support for the belief that it is not meaningful to assess depressed persons' processing of emotion information from facial expressions
without first taking into account their anxiety levels.

The majority of the research with clinical populations has been conducted with schizophrenics and has consistently found emotion recognition deficits among these patients. The findings from this research will be reviewed here because studies with schizophrenics have contributed experimental designs, test materials, comparison clinical populations, and the rationale for later emotion recognition studies with depressives. The smaller number of studies with depressed populations have been less consistent in their findings: some have reported emotion recognition deficits in depressed persons, others have not. In addition, samples used have not been homogeneous with respect to depressive diagnostic category. However, by indicating the general trend (or perhaps lack of trend) in the findings from emotion recognition studies, the following review should help elucidate the rationale for the present study and clarify the need for examining the role of a perceiver's anxious arousal in studies of emotion recognition from facial photographs. The first step in this process is to examine studies which have established the role of the visual channel as the primary indicator of others' emotions throughout most of the lifespan.

**Primacy of the Visual Channel**

The seriousness of a deficit in recognizing emotion from facial expressions is directly proportional to the importance of
facial expressions in modulating human interactions. The following section presents evidence on the primacy of the visual channel in communicating emotional information in order to reinforce the assertion that any emotion recognition deficits in depressed persons would place them at risk for significant interpersonal difficulties.

In humans, emotion is conveyed in any or all of four communication channels, namely facial gestures, bodily gestures, auditory tone and semantic message. There is strong evidence to support the view that each of these channels can be utilised by young children when assessing the emotional states of others. Recognition of emotion from facial expressions has been shown to develop from a mean accuracy of about 45 percent of photographed facial expressions correctly categorized at 30 months, to an adult level of 75 percent accuracy at 10 years (Izard, 1971; Ekman & Oster, 1979). The other visual channel, bodily gestures, is also used by young children (Bugental, Kaswan, Love, & Fox, 1970).

With respect to the other two channels, the ability to recognize verbal expressions of emotion would seem to be assured given normal development of lexical sophistication. In support of this assumption, findings from a study by Bullock and Russell (1982) suggest that children as young as 3 years of age use terms which are similar to those of older children and adults, when labelling facial expressions. In addition, with regard to sensitivity to vocal tone, Brooks, Brandt and Wiener (1969)
found that young children's choice of alternative actions in a multiple choice game were greatly influenced by differences in the tone in which reinforcement was given for those different choices. Thus, all four emotion channels can be used by children at a young age.

This study examines emotion processing in the facial expression channel only. The following section provides evidence that facial expression is the most important indicator of emotion for adults and children of 7 years and older. Thus, a deficit in processing emotion in this channel would significantly handicap a person's ability to interact appropriately in social situations.

Earlier investigations (Mehrabian & Wiener, 1967; Mehrabian & Ferris, 1967) found facial expression weighted over vocal tone and vocal tone weighted over verbal message when adult subjects were presented with two-channel messages in which facial expression could be incongruent with vocal tone and, in turn, vocal tone could be incongruent with verbal message. Additionally, empirical findings suggest that facial expression is more important than the other visual channel, bodily gestures, in communicating emotion (DePaulo & Rosenthal, 1978). Given this advantage of facial expression over bodily gestures, and the present use of facial expression only, future references to video primacy should be taken to refer to the relative importance of facial expressions compared to the vocal and verbal channels. Video primacy has been replicated in subsequent

An aspect of video primacy illustrated in the foregoing studies is that it is a developmentally linked phenomenon. Age-related differences in emotional channel processing were investigated by the present author in an earlier study (Mayhew & Strayer, 1985). It was found that verbal primacy among most 5-year-olds was replaced by video primacy in children of 7 years and older. Thus, facial expression would appear well entrenched as the primary source of emotional information, well before adolescence. One cautionary note regarding the foregoing is a finding (DePaulo et al., 1978) of an attenuation of video primacy as messages become very discrepant. In such a case, vocal tone seems to increase in importance. However, extreme discrepancies between visual and vocal messages are uncommon special cases. They do not detract from accumulating evidence of the general primacy of visual cues in conveying others' emotions.

Given this video primacy, as shown when different messages are conveyed across the three channels, the well established ability of older children and adults accurately to decode facial expressions of a range of emotions is an important skill.
Conversely, those persons who perceive something different in a facial expression of emotion from what is intended, or from what others see, may be misreading important interpersonal cues regarding the nature and intent of their social interactions. There are also occasions when people purposely manipulate their facial expressions to suggest an emotion that they are not actually experiencing, and detecting this is a social skill.

The focus of the present investigation is on reading veridical visual emotion cues without dissimulation. In particular, the purpose is to investigate responses of depressed persons in the more usual case where no deception is intended by the encoder. In this regard, Walker (1981) has noted:

"Considering the pivotal role of facial expressions in interpersonal contexts, the study of emotion recognition in psychiatrically disturbed subjects may provide useful information regarding their interpersonal functioning."

Specifically, one might expect those patients with the poorest emotion recognition skills to also experience the most problems in assessing the qualitative meaning of their social interactions (Walker, 1981; Colussy & Zuroff, 1985).

Several different explanations might account for deficits in emotion recognition found in depressed populations. Depressed persons may behave differently to the non-depressed purely because of attribution-biases reflecting internal processes (e.g., mood-congruent negative attributions for witnessed events) or they may actually perceive their fellow actors to be experiencing emotions not perceived by normal subjects. For
example, perhaps a vulnerability factor shared with schizophrenics such as abnormal metabolism of biogenic amines and/or social withdrawal, may influence their perceptual accuracy. Whatever the cause, it would be difficult to dismiss the injurious effects on social functioning of incompetent or idiosyncratic emotional perception. In this connection, Zuroff and Colussy (1986), commenting on their results suggesting that schizophrenic and depressed subjects actually misread negative emotions as positive, referred to the unexpected disappointments which would constantly arise for persons who perceive others to be more positive towards them than is actually the case. For example, such persons are likely to incite hostility if they insist on approaching persons who are sending non-verbal messages of "stay-away". Despite the above, it seems only to have been in the past 30 years that researchers have sought to establish which deficits exist for which clinical populations, and to delineate their nature.

Although the focus of this study is on depressed populations, early research into emotion recognition deficits in psychiatric populations did not concentrate on depressed patients. In fact, their initial role was as non-psychotic "controls" for emotion recognition studies with schizophrenics. Given this situation, a review of such studies provides some early experimental information on paradigms used for investigating emotion recognition in different clinical populations.
It is actually not surprising that early investigations in this area focused on schizophrenics. These are the patients whose behaviour, as a group, deviates most from normality. Interventions were designed to facilitate social interaction and social learning among such patients (Muzekari & Bates, 1977). Notably, such interventions would also be advisable with depressed patients if one agrees with Lewinsohn (1974) that depression is characterized by interpersonal social skills deficits among its sufferers.

While Lewinsohn and his colleagues have more recently noted that the social skills hypothesis lacks empirical support and that such deficits are more likely secondary to depression (Youngren & Lewinsohn, 1980), this remains an interesting, though somewhat global hypothesis to investigate.

However, the intent of the present study was to investigate a more molecular process which may be at the core of adequate social functioning, namely accurate recognition of the affective states of others. Additionally, there is a problem with self-report social skills instruments in that several researchers have reported that self-reported differences in levels of social skills do not reflect differences in actual behaviour (Frisch & Higgins, 1986). Having noted the above problems, early emotion recognition studies with schizophrenics will now be reviewed.
Early studies illustrated that schizophrenic patients exhibited perceptual anomalies when assessing non-emotional stimuli (Harris, 1957; Pishkin, 1966; Zahn, 1959). Additionally, findings from studies by Culver, Marx (both in Buss & Lang, 1965) and Cohen, Senf and Huston (1956), comprising both affective and neutral stimuli, suggested that the perceptual performance of schizophrenics is disrupted by the introduction of affective stimuli (e.g., pictures of a maternal figure, affectively charged words), even in the presence of a normal level of perceptual accuracy on non-affective items (e.g., size estimation of a square). In the above studies, there was no indication of whether schizophrenic subjects were receiving medication. However, Cohen et al. did note that administration of intravenous sodium amytal and amphetamine sulphate improved the schizophrenics' performance with non-affective stimuli.

The above findings give the first indication that affect-laden stimuli cause difficulty for a psychiatric population, beyond the level of previously noted general perceptual disturbances. A major step in the direction of establishing ecological validity concerning the effects of such a deficit on interpersonal relations was taken by Izard (1959). This was achieved by employing photographs of facial expressions instead of such stimuli as TAT cards and gestalt completion tasks (i.e., producing a complete percept from an incomplete
silhouette), as used in earlier studies. Izard used photographs of normal, neutral facial expressions with a group of paranoid schizophrenics who were matched with normal subjects on age, education and occupational level. Both verbal and non-verbal response measures were used to examine the differences between schizophrenics and normals in their reported perceptions of photographs of normal adult faces. The verbal measure required subjects to report everything that they ascertained about a person depicted in each photograph (e.g., feelings instilled in the perceiver by the person in the photograph). The non-verbal response required subjects to rank photographs according to the degree of liking they felt for the persons in the photographs. The schizophrenic subjects were found to express significantly more ambivalence, sudden attitudinal shifts and unfavourable feelings towards the photographed persons than did the normal subjects. Izard solicited immediate perceptions of photographs rather than imaginative products. Of course, possible production of imaginative responses could not be ruled out. However, by not asking for an imaginative production and by discouraging fantasy on the part of his subjects, he felt justified in considering the schizophrenic patients' responses more as perceptual reports than as conventional projective responses.

The responses of these paranoid schizophrenics were regarded as indicating that they were strongly inclined to perceive others as tense, suspicious, hostile, and threatening. Hence, facially expressed affect appeared to evoke different responses.
in these schizophrenics in contrast to normal subjects. One would also presume that their tendency to view others in a negative light would be likely to affect their social functioning. Several studies followed upon Izard's initial work in an attempt to clarify the parameters of such anomalies in the emotion processing of psychotic populations. A review of these studies follows, which by progressively expanding the scope of populations of interest, leads naturally into the employment of depressed patients as non-psychotic psychiatric control subjects.

Pervasiveness of Differences in Emotion Recognition between Schizophrenic and Non-Psychotic Subjects

Expanding the investigative scope to include recognition of facial expressions of emotion in general, Dougherty, Bartlett and Izard (1974) sought to determine whether schizophrenics are less accurate than normals in recognizing the facial expressions characteristic of all 8 emotion categories (later to be expanded to 9 with the addition of a separate "contempt" category) termed by Izard as "fundamental". Subjects were female schizophrenics with at least two years of high school and five years hospitalization, and normal females of a similar mean age, with about five years of high school. The education difference was not meaningful, given that normal 10-year old children possess adult level emotion recognition ability (Izard, 1971). No details were given of medication dosage (if any) among the
Izard's cross-cultural test of emotion recognition (1971) was used by these researchers. The materials for the procedure were 32 photographs representing 4 facial expressions each of the 8 fundamental emotions: fear, shame, anger, disgust, sadness, surprise, joy, and interest. In the first of two conditions employed, subjects were required to give a free response description of the emotion conveyed in a photograph, with the experimenter instructions, "Tell me, in your own words, how each person feels and what emotion is being expressed". In the second condition, subjects placed each photograph within the given category which best described it (i.e., Interest, Excitement, Enjoyment-Joy, Surprise-Startle, Distress-Anguish, Disgust-Contempt, Anger-Rage, Shame-Humiliation, Fear-Terror).

Normal subjects were significantly more accurate in their classification of emotional expressions than were schizophrenic subjects. The mean percent of correct responses was 78 percent for the normals and 44 percent for the schizophrenics, a difference which was significant at the p<.001 level. Unfortunately, the authors did not give mean accuracy scores for individual emotions nor did they offer an explanation for this finding. However, Walker, Marwit and Emory (1980) suggested that such a deficit is, at least partially, a direct consequence of social withdrawal leading to a lack of opportunities for assessing facial expressions of emotion.
Problems due to social withdrawal should also characterize other chronically hospitalized psychiatric populations. For several reasons to be addressed later, the present study used only outpatients who were continuing to function in the community, at least at a minimally adequate level. Thus, the social withdrawal hypothesis was not addressed directly. However, as an analogue measure, all subjects were administered the social introversion (SI) scale of the MMPI-168 (Overall and Gomez-Mont, 1974). Reasons for selecting this particular scale to assess the viability of a social withdrawal hypothesis will be presented in the Method section.

Social withdrawal may well lead to overall emotion recognition problems but Dougherty et al. found that their groups differed not only in overall accuracy but also in patterns of accuracy. This difference in patterns appears less explicable from a social withdrawal standpoint. Specifically, although normals were more accurate than schizophrenics in decoding all but one of the emotion categories, they were a great deal more accurate than schizophrenics in decoding Disgust-Contempt and Shame-Humiliation but showed no real advantage in decoding Enjoyment-Joy. This seemed to suggest that schizophrenics have particular problems with negatively valenced emotions. Once again, Dougherty et al. provided no explanation for this finding. However, Walker (1981) and Muzekari and Bates (1977) both agreed with findings from past research (Gitter, Mostofsky & Quincy, 1971; Izard, 1971) that negatively valenced
emotions are also the most difficult for normal subjects to identify accurately. Therefore, although schizophrenics did show particular problems with negative emotions, relative to their own mean decoding accuracy scores, they did not display an aberrant ranking in terms of relative accuracies in decoding different emotions.

General concept-formation difficulties cannot be ruled out as causal in some of the above-noted deficits because the sorting behaviour of schizophrenics on non-emotional tasks was not investigated. However, earlier studies such as Culver's (in Buss & Lang, 1965) provide strong evidence that deficits in schizophrenics' emotion recognition extend beyond those typical of general concept formation problems. They are particularly evident when these patients are called upon to identify affect-laden stimuli (e.g., pictures of a maternal figure) as opposed to affectively neutral stimuli (e.g., size estimation of a square). Because past research in this area has remained open to question, Benton's Facial Recognition Test (Benton & Van Allen, 1968) will be administered to all subjects in the present study, in order to ensure that any noted differences are not the result of general facial recognition difficulties.

Thus far, studies discussed suggest a reliable difference of an uncertain nature between normals and schizophrenics in the assessment of facial expressions of emotions from photographs. To determine whether these differences also would obtain in videotapes of expressions along with contextual cues, Muzekari
and Bates (1977) presented both still photographs and video scenes to schizophrenic and normal males and females. For both kinds of stimulus material, schizophrenic subjects were significantly less accurate than normal subjects in assessing emotion. No main effect for sex was found in this or other studies examining this factor.

Although such information would have been extremely informative, neither Dougherty et al. (1974) nor Muzekari and Bates (1977) commented on the implications of their findings for the cognitive or affective processing of schizophrenic subjects. Additionally, in the area of etiology, Walker, McGuire and Bettes, as recently as 1984, have stated that the research to date is insufficient to allow for specification of the cause of emotion decoding deficits. Two plausible theories have been proposed. The first is an assumed deficit in processing emotional stimuli, fundamental to the psychobiology of schizophrenia. Unfortunately, even the most recent studies in this area (Zuroff & Colussi, 1986) are unable to suggest a possible physiological substrate for this deficit. The second theory implicates a loss of opportunity to "read" others, caused by social withdrawal (and probably causing further withdrawal).

Obviously, if emotion recognition problems were noted in non-schizophrenic clinical populations, one would have to address the possibility of common biological deficits or investigate the extent to which severe social isolation also typifies the lives of other psychiatric populations. However,
non-psychotic subjects were not included at this stage. The
next direction taken was a focus on whether such deficits,
however caused, could be observed across age groups of psychotic
subjects.

Accordingly, Walker, Marwit and Emory (1980) included
samples of schizophrenic children to see whether the aforenoted
perceptual differences exist in children as well as adolescents
and adults. Some questions have been raised as to whether child
psychotics can be compared to adults. However, Fish (1977),
after a comprehensive review of the literature on
symptomatological characteristics of childhood schizophrenia,
adduced that the pattern of clinical symptoms is similar in
psychotics of all ages (e.g., thought disorder, social
impairment).

Walker et al. included three groups, namely 8-12 year olds,
13-19 year olds and adults, with each group comprising 16
psychotic and 16 normal subjects. Normal controls were
matched with psychotic subjects on the basis of age, sex and
educational level. Each psychotic had been independently
diagnosed by a psychiatrist and a psychologist. All of the adult
psychotics were assessed as "process" psychotics on the
basis of the Phillips (1953) scale of pre-morbid adjustment, and
only those manifesting thought disorder were included. The
patient sample comprised simple, hebephrenic, undifferentiated,
and schizoaffective types. The measure used was, as with the
previous studies, the Izard cross-cultural test of emotion
recognition. Walker and her co-workers required subjects to match photographs to printed emotion labels, in order to minimize the need for vocabulary skills. However, all subjects also completed the vocabulary scale of the Wide Range Achievement Test (WRAT). Schizophrenics were significantly less accurate than normals in correctly identifying emotion expressions and their labels. In fact, normal children were superior to schizophrenic adults. There were no significant differences between schizophrenics and normals on the WRAT vocabulary section. Interestingly, in that it may illustrate the insidious course of social withdrawal, the pattern of results seemed to indicate a general deficit in the recognition of all emotions in schizophrenic adults but a specific deficit in negative emotions for schizophrenic adolescents and children. Normal subjects were also poorer in recognition of facial expressions of negative rather than positive emotion. This finding is in accord with past research (Gitter, Mostofsky, & Quincy, 1971; Izard, 1971) and suggests that schizophrenics are displaying exacerbation of an effect already present, to some extent, in normals.

Summarizing the above studies, it appears that increasing social withdrawal in adulthood may lead to a general emotion recognition deficit which supplants a more specific (perhaps biologically based) problem with negative emotions, already present in psychotic children. This is a difficult hypothesis to investigate. It is far easier to discuss the global concept of
social withdrawal than it is to break it down into component parts, amenable to psychometric measurement. Not surprisingly, there appears to be a dearth of appropriate instruments for measuring social withdrawal and those that do exist appear particularly susceptible to response bias. Additionally, and crucially for any studies proposing inpatients as a socially withdrawn group, many inpatients actually experience a far greater number of social interactions in hospital than they do prior to admission. Thus, a comparison of inpatients with outpatients cannot of itself satisfy the requirements for a high versus low social withdrawal paradigm. However, a finding of significant emotion perception deficits in persons scoring high on the social introversion scale of the MMPI-168 may suggest that introverts are poor emotion decoders and that, accordingly, this hypothesis deserves further attention. Having considered the origins and rationale for emotion recognition studies with psychiatric populations, the review will now turn to a consideration of the emotion processing of depressed populations.

Introduction of Non-Psychotic Clinical Groups into Emotion Recognition Studies

Findings presented to this point provide strong evidence for an inferiority of schizophrenics to normal controls on recognition of facial expressions of emotion. Given this evidence, researchers became interested in discovering whether
these deficits were a unique, intrinsic part of the psychobiology of schizophrenia, a vulnerability factor common to schizophrenics and depressives (perhaps anomalies in metabolism of biogenic amines) or a consequence of social withdrawal, which would not be unique to schizophrenia and could apply to other clinical groups. This interest led to the introduction of depressed patients into emotion recognition studies, and this is the clinical population to which this study is addressed.

The reason for the focus on depressed patients is that consideration of emotion recognition deficits in non-psychotic populations has been somewhat ignored, coming about as a by-product of research into schizophrenic processes. This neglect seems unfortunate. Depression is the most common presenting problem encountered by mental health professionals (Klerman, 1982). The point prevalence of non-bipolar depression in industrialized nations is 3 percent for males and 5-9 percent for females (Boyd & Weissman, 1982). If depressed patients generally suffer from emotion recognition deficits, similar to those suggested from findings with schizophrenics, we are faced with a situation in which a very large proportion of psychiatric inpatients and outpatients are experiencing significant problems in reading emotional messages from other people, and would be candidates for some kind of remedial emotion recognition training.

Nevertheless, the original function of depressed patients in emotion recognition studies was to act as controls. For example,
Walker (1981) compared the emotion recognition accuracy of schizophrenic, anxious-depressed, unsocialized-aggressive and normal children on Izard's photographs of facial expressions of emotion. Clinical groups were chosen according to formal psychiatric diagnoses based on DSM-II criteria. Schizophrenics all showed thought disorder and social withdrawal, the anxious-depressed group all had diagnoses of over-anxious reaction of childhood or depression and all manifested significant anxiety, fears, loss of appetite, sleep disturbance, and depressed affect. The unsocialized-aggressive children uniformly displayed rebelliousness, physical and verbal aggression and destructiveness. No subject had any known organic problem or mental retardation. The depressed group was chosen for Walker's study as it represented a non-psychotic psychiatric group who are known to manifest some social withdrawal, and the aggressive children comprised a non-psychotic psychiatric group among whom little social withdrawal is noted. The schizophrenic children were significantly less accurate than all others as had been shown by past studies with both schizophrenic adults and children. More interestingly, anxious-depressed (but not unsocialized aggressive) children were also significantly less accurate than normal controls. Thus, Walker's (1981) findings were important in establishing a basis for investigating emotion recognition deficits in non-psychotic psychiatric populations.

At this point, and before reviewing other studies of emotion recognition in schizophrenic and depressed subjects, it should
be mentioned that Walker, Marwit and Emory (1980) identified two issues which are germane to the present review. Firstly, it was impossible to obtain a sample of unmedicated schizophrenics. However, research has suggested that phenothiazines reduce behavioural discrepancies between schizophrenics and normals so that unmedicated schizophrenics may show even greater deficits than those who are medicated. In confirmation of this, Braff and Sacuzzo (1982) showed that neuroleptic medications improved visual processes in both schizophrenics and normal controls. Also, and perhaps more importantly, it was specifically noted that, with the exception of an unpublished dissertation by Shannon (1970), little information existed regarding emotion recognition in non-psychotic psychiatric patients (whether medicated or not).

Walker et al. neglected to mention a relevant study by Prkachin, Craig, Papageorgis and Reith (1977). This study involved videotaping depressed patients, psychiatric control, and normal control subjects while they were exposed to different aversive and non-aversive classical conditioning procedures. Findings illustrated that, although depressed subjects exhibited deficits in facially encoding their reactions to different procedures, they were just as accurate as both control groups in decoding others' reactions to the same procedures. However, in defence of Walker et al., a review of the relevant literature does support their assertion that, prior to 1980, very little information existed regarding emotion recognition in depressed
Thus, Walker's study (1981) was somewhat unusual in attempting to establish relative emotion recognition anomalies of schizophrenics in the context of other, albeit juvenile, psychiatric populations. As previously noted, she found that anxious-depressed children were more accurate than schizophrenics but, in turn, made significantly more recognition errors than unsocialized-aggressive children (who did not differ from normal controls). Such a finding is important to the rationale of the present study in that it appeared to illustrate that active psychosis need not be present for there to be impaired social perception. Additionally, Walker found that the anxious-depressed children displayed a particular bias in their pattern of errors in that they were the most likely group to mislabel positive or neutral emotions as negative. This finding appears difficult to reconcile with a social withdrawal hypothesis in which one would expect similar problems with both negative and positive stimuli. Unfortunately, Walker did not suggest any possible reasons for this bias in the anxious-depressed group, but it does suggest that their own affect may have been causing this group to interpret non-verbal emotion cues with a negative bias.

A question which arose from Walker's findings was whether depression suffered by children is actually exacerbated by a bias towards the perception of negative affect in others. If indeed this is the case, remedial training and practice in the
identification of discrete emotions would seem to provide a viable component of any therapeutic approach. One model for such training, suggested by Walker, McGuire and Bettes (1984), would include practice with photographs and videotapes in which facial expressions of emotion are depicted, and participation in modelled social interactions in which emotion cues are salient stimuli for the child patient.

Although not a population of interest in the present research, it should be mentioned that the finding that unsocialized-aggressive children do not evidence deficits in emotion processing fails to find support in the work of some other researchers. Although these children may be as accurate as normal controls in identifying emotions in photographs, there is evidence to suggest that unsocialized aggressive adolescents attend less to visual and vocal cues of emotion than do their normal peers (Eby, 1980). The present study does not incorporate electrooculographic or other measures for assessing the amount of attention that depressed patients pay to visual emotion cues. However, significant deficits in accuracy of categorizing facial expressions of emotion would suggest that an "attention deficit" hypothesis is worth pursuing in future research.

Findings from studies reviewed to this point support a contention that schizophrenics have difficulties in recognition of facial expressions of emotion. To return to populations important to the present research, findings from the above study by Walker (1981) also suggest that these problems may occur in
depressed populations. Studies that have included assessment of emotion recognition by depressed subjects as an important focus, rather than for control purposes, will now be reviewed.

**Studies in which Depressed Groups are an Important Focus**

The findings that depressed children showed deficits in emotion recognition (Walker, 1981) contribute to the rationale for including a qualitative emotion identification task in the present study. While Walker's depressed subjects were a comparison group for schizophrenics whose emotion processing was of primary interest, more recent studies followed a trend towards recognizing depressed populations as groups of interest in their own right (Walker, McGuire & Bettes, 1984; Mandal, 1986; Zuroff & Colussy, 1986). In the first of these studies, Walker, McGuire and Bettes (1984) examined the identification and recognition of facial stimuli (photographs) by schizophrenics and patients with affective disorders. These researchers were particularly concerned that no earlier studies had included "control" tasks which would indicate whether impairment reflected a general deficit in extracting information from facial features or a deficit specific to decoding emotions. Therefore, they included a task which, by requiring subjects to indicate whether pairs of photographs of same-sex adults depicted the same or different persons would, for the first time, effectively separate facial recognition and emotion recognition components. Schizophrenics performed as well as
normals on the facial discrimination task but performed at a level significantly below normals on emotion discrimination, emotion labelling and a multiple choice emotion task in which subjects were presented with an array of four facial expressions, each depicting a different emotion, and were required to point to the face depicting a specific emotion stated by the examiner.

Given the presence of the control discrimination task, these results suggested for the first time that previously noted emotion recognition deficits in schizophrenics were not purely a function of the labelling requirements of the task but existed also when schizophrenics were required to indicate whether two photographs portrayed the same or different facial expressions (the emotion discrimination task). The performance of affective patients fell midway between that of normals and schizophrenics on every task. It was not significantly better than that of schizophrenics. However, as it was not significantly worse than normals on any task, it could be claimed that these findings did not support Walker's earlier (1981) findings of significant emotion recognition deficits in an affectively disordered population.

The above conclusion is also open to a number of critical objections. In the above study, the emotion identification performance of the depressed group was not significantly better than that of schizophrenic subjects. Given this lack of significant differences between the performance of schizophrenic
and depressed subjects, the results of this study certainly did not preclude the possible existence of emotion recognition deficits in depressed persons. Schizophrenics consistently have been shown to display significant emotion recognition deficits (Dougherty, Bartlett & Izard, 1974; Muzekari & Bates, 1977; Zuroff & Colussy, 1986). If the performance of depressed subjects did not differ significantly from that of schizophrenics, such findings certainly do not establish that depressed and normal persons are homogeneous in performance and both different from schizophrenic populations.

Thus, although Walker, McGuire, and Bettes's findings did not suggest significant differences between normal and depressed subjects in processing facial expressions of emotion, they did suggest that further investigation was warranted. A relevant point to be noted here is that the affectively disordered patients comprised a heterogeneous group with half being diagnosed as schizoaffective and the other half carrying a diagnosis of major depressive disorder. Perhaps, if a more homogeneous group had been used (i.e., depressive disorder diagnoses only) the results obtained for the depressed group would have shifted toward the normal end of the emotion recognition accuracy continuum, because the schizoaffective patients may actually have shifted the group mean toward the schizophrenic end. However, given the uncertainties due to the use of a heterogeneous group of subjects, the findings from the study of Walker et al. failed to provide a solid base for
subsequent research into the emotion recognition processing of depressed persons.

Despite a lack of consistent findings, researchers continued to search for significant emotion recognition deficits or biases in non-psychotic psychiatric populations. In support of findings that anxious-depressed children exhibited significant emotion recognition deficits (Walker, 1981), and contrary to her later findings (Walker, McGuire & Bettes, 1984), Zuroff and Colussy (1986) reported significant emotion recognition deficits in depressed patients. Their subjects were schizophrenic inpatients, depressed inpatients and normal employees of a state psychiatric hospital. Two tasks were presented, the first being assessment of "liking" conveyed by an actress in a series of videotapes comprising congruent (non-verbal channels portray the same emotional valence as the verbal channel) and incongruent interpersonal communications. The second was a labelling mode of Izard's test in which subjects chose emotion labels for photographs shown to them. The main finding was incongruent with the earlier finding of a negative bias on the part of depressed patients when assessing facial expressions of emotion (Walker, 1981). When both schizophrenic and depressed subjects perceived a facial expression to be negative, they were as accurate as normal subjects. However, when perceiving a facial expression to be positive or neutral, schizophrenic and depressed subjects were similar and significantly more likely than normals to be inaccurate. That is, the patients were more likely than normals...
to mislabel negative emotions as positive or neutral and to mislabel one positive/neutral emotion as another. This deficit could conceivably lead to numerous disappointments for the schizophrenic or depressed person when others are actually experiencing negative emotions because their unjustified positive assessment of others' emotions would lead them to expect a positive response, when none would be forthcoming. Essentially, the depressed subjects were significantly less accurate than normals but did not differ significantly from schizophrenics.

Although supportive of depression-related anomalies, the aforenoted tendency for unwarranted positive assessments by depressed persons is in contrast to earlier findings of negative biases (Walker, 1981). However, Zuroff and Colussy noted that their findings were quite consistent with Lewinsohn's (1974) position on depression in which a deficit in interpersonal skills (in this case, an emotion recognition deficit) could give rise to depressed persons receiving a decreased rate of positive reinforcement from their environments. Because previous results have been equivocal, the present study includes procedures to assess whether a positive or negative bias operates in depressives' emotion perception by requiring subjects to rate degree of pleasantness of each photograph, on a numerical Likert type scale.

An attempt has been made in the foregoing literature review to establish whether the emotion recognition of depressives is
similar to that of normals or schizophrenics. Zuroff and Colussys study suggests similarity between schizophrenics and depressed populations in their assessment of emotion from facial stimuli. Nevertheless, the evidence for qualitative differences between normal and depressed persons in the processing of facially expressed emotion has not been strong.

However, qualitative categorization of discrete emotions, considered to this point, is not the only approach to assessing the emotion processing of different psychiatric populations. Just as emotion-related words differ in arousal level (e.g., calm vs. hysterical) and pleasantness level (e.g., content vs. discontent), so the quantitative dimensions of arousal and pleasantness contribute to the nature of facial expressions. This review will now address a study which investigated these quantitative dimensions in depressed and schizophrenic subjects.

Assessment of the Quantitative Aspects of Emotion Recognition in Depressed Persons

Mandal (1986) assessed similarity of emotion judgments by normal, depressed and schizophrenic subjects on the basis of the arousal and hedonic tone components of each emotion. He then employed factor analytic techniques to identify the dominant dimensions of affect in each group of subjects. Mandal's findings suggested that, whereas normal persons rate the similarity of emotions on the dual bases of arousal level and
the pleasantness of the emotion, schizophrenics attend particularly to arousal and depressed persons attend particularly to degree of pleasantness. Thus, depressives saw anger (high arousal, negative hedonic tone) and sadness (low arousal, negative hedonic tone) as very similar, but they were seen as very dissimilar by schizophrenics. On the other hand, sadness and happiness (low arousal, positive hedonic tone) were seen as very similar by schizophrenics but were very dissimilar for depressives. The correlations for control subjects were in the same direction as those for depressives but, in both cases, were much weaker. This would suggest that qualitatively, if not quantitatively, depressed patients are more similar to normals in emotion recognition than they are to schizophrenics. However, evidence will be presented in the subsequent discussion which will cause this suggestion to be qualified.

Mandal's subjects were all Indians and his procedures and statistical analyses were quite different from those employed in previous studies. He used 40 patients with multiple prior episodes of major depression and 48 chronic schizophrenics. Patients ranged from grade 9 to high school graduate in educational level and all groups resided in a Calcutta mental hospital. Although, his normal control group comprised 105 graduate students, education differences between patients and controls were not significant, given that past studies have shown that normal 10 year-olds can perform visual emotion recognition tasks with an adult level of accuracy (Izard, 1971;
Ekman & Oster, 1979). To reduce the possibility of unfamiliarity due to using photographs portraying unfamiliar Caucasian faces, Mandal's materials were sets of six photographs each of adult Indians, every set containing one photograph of each of happiness, sadness, fear, anger, surprise, and disgust. Six sets of photographs were actually used with one expression in each set being labelled as a "standard" and the other five placed randomly. The task for Mandal's subjects was to place each of the five "non-standard" affect photographs in order of their degree of similarity to the standard, without benefit of any specification of similarity criteria.

For each of the standard affects, Mandal pooled the obtained ranks of the non-standard responses given in separate matrices and analyzed them using Guilford's rank order scaling procedure. The scale values obtained were then further reduced to ranks for each standard affect in the three groups, and the rank difference tested in a Friedman two-way (emotion x group) non-parametric analysis of variance. The hypothesis was that the smaller the difference in rank totals due to differential assignment of non-standard affect ranks, the larger the group differences.

Mandal found that all three groups agreed on the judgment of similarity for the anger, disgust and fear standards but differed on the happiness, sadness and surprise standards. Schizophrenics saw happiness and surprise as similar to sadness, while controls and depressives saw them as highly dissimilar.
Thus, a similarity was noted in the processing of control and depressed subjects in terms of categorizing the similarity of emotions. The present study includes a multidimensional scaling procedure which produces a spatial map based on subjects' assessments of the similarity of different emotions. Thus, Mandal's findings regarding similarity of emotion processing in different clinical groups can be considered with reference to present subject groups.

A second analysis was carried out in which the averages of the rank difference between pairs of affect (e.g., happy to sad, sad to happy) were regarded as similarity scores for each subject. In an analysis of variance, groups were shown to differ markedly in several judgments, especially in judging the similarity of happy and sad. However, this time, although more similar to depressives on most judgments, controls were more similar to schizophrenics in judging the similarity between fear and sadness, anger and sadness, and disgust and sadness. Therefore, one would be unjustified in concluding that normals and depressives are identical in their emotion processing and that both are consistently different from schizophrenics. Rather, Mandal's depressed patients seem to have been quite different from normals in the way that they assessed the similarity of negative emotions.

Finally, a correlation was computed between the rank orders of all possible pairs of "standard" affect (i.e., the average of rank differences between pairs of affect, happy-sad and
sad-happy, etc.) to obtain a correlational matrix for each group. Each of these matrices was then factor analyzed in centroid method and factors were rotated graphically. Analyses showed that for the schizophrenic group, high-arousal affects (fear, anger and disgust) loaded highly on factor 1 and low-arousal affects (sadness, happiness and surprise) loaded highly on factor 2. This contrasts with normals for whom factor 1 had high loadings of happiness and surprise and low loadings of sadness, fear and anger (a pleasantness dimension); and factor 2 had as the highest loadings, fear and anger and low loadings of sadness, happiness and surprise (an arousal dimension).

Depressed subjects, however, produced results different from both of the foregoing. Specifically, depressed subjects produced high loadings on factor 1 for both pleasant and unpleasant affects, but the loadings lay in opposite directions. Thus, whereas controls used both a pleasantness and an arousal criterion to rate the similarity of affects, depressed subjects were particularly sensitive to a pleasantness dimension. Such a finding is expected on the basis of the weight of past evidence (Walker, 1981; Zuroff & Coluss, 1986) which suggests selective attention to certain affective valences.

Mandal's data analysis methods were unusual and accordingly have been presented in full. Given the above, this review of Mandal's study should conclude with a critique of his data analysis methods. Although his approach is basically sound, the
complexity of his analyses may leave the reader somewhat perplexed as to how certain results were actually arrived at. Closer scrutiny suggests that his findings are supportable. However, some form of multidimensional scaling may have constituted a more appropriate method for analyzing his data and presenting his findings. With this in mind, the present study employs multidimensional scaling to assess the similarities assigned to different emotions by depressed, anxious and normal subjects, and to compare Mandal's findings with those from present subjects.

The foregoing is a comprehensive review of the small number of studies which have investigated whether depressed persons display deficits or biases in their recognition of facial expressions of emotion. Those who claim deficits have offered no coherent theory to explain any such difficulties. Additionally, individual results have been contradictory, suggesting a negative bias, a positive bias or no significant difference from normals. A possible explanation for the inconsistency is that "depressed" populations have included anxious depressed (Walker, 1981), schizoaffective (Walker, McGuire & Bettes, 1984), and a depressed group who scored higher on the MMPI schizophrenia scale than the schizophrenic subjects of the same study (Zuroff & Colussy, 1986).

In concluding this review of emotion recognition studies with depressed populations, the evidence thus far appears to support the existence of reliable differences between normal and
depressed persons in recall of affective stimuli. It does not provide the same strong evidential base for positing consistent differences between these two groups in their recognition of emotion from facial expressions. The reason for this lack of consistency may well relate to a failure to consider the influence of anxiety on emotion recognition. Studies examining attention given to emotional material by anxious subjects will now be addressed.

The Influence of Anxious Arousal on Emotion Recognition

There is a problem which complicates attempts at specifying any influence of depression upon a person's emotion perception. Specifically, of those studies investigating differences between schizophrenics and depressives in recognition of facial expressions of emotion, only Mandal's (1986) subjects would seem to be pure depressives (diagnosis of major depressive disorder). Of the others, Zuroff and Colussy's (1986) depressed subjects actually scored higher on the MMPI schizophrenia scale than did their schizophrenic subjects (an unusual occurrence), and 50 percent of the "depressed" group of Walker et al. (1984) were schizoaffective. In these cases, it would be difficult to dismiss the possibility of some shared deficit or attribution bias between the depressed and schizophrenic subjects that might not exist with a more strictly defined depressed group. The Walker (1981) study is a different case because her depressed subjects were explicitly anxious-depressed. Additionally,
patient anxiety was not controlled in the other studies. Thus, the possibility is raised that anxious arousal led to any noted emotion recognition difficulties in depressed groups studied. Such a possibility gains support from the following studies of the possible effects of anxiety on attention to and perception of emotional material. Also included are findings from work with subjects in whom a state of general arousal has been induced. Although arousal can be positive (e.g., elation) or negative, anxiety states involve high levels of negative arousal.

Initial studies related to the perception of emotional semantic stimuli. Findings by Parkinson and Rachman (1981) and Burgess et al. (1981) suggested increased perceptual sensitivity to stress- or fear-relevant words among anxious subjects, and findings by Mathews and MacLeod (1985) and Ray (1979) suggested that threat-related distractor words are particularly disruptive to the task performance of anxious subjects. These findings led MacLeod, Mathews and Tata (1986) to look for a possible anxiety-related encoding bias in a dot probe detection task. A group of 16 anxious subjects and a group of 16 normal controls were compared on time taken to perceive, on a visual display unit screen, a dot appearing in the area where, immediately prior, a neutral word, a physically threatening word or a socially threatening word had appeared. The procedure was such that a pair of words was presented together, one in the upper half and one in the lower half of the visual display unit screen. Anxious patients detected the probe more quickly, in
both parts of the screen when it had been preceded by a threat word. In contrast, normals detected probes more rapidly when a preceding threat word had appeared in the other half of the screen.

From these findings, it seems that there may be a protective perceptual bias in normal subjects which shifts their attention away from minor threatening stimuli. Anxious subjects, on the other hand, appear to shift their attention towards the emotionally threatening stimuli. Given the presence of significant levels of anxiety in a large proportion of depressed persons, one might question whether the seemingly greater access to negative emotions, reported as typical of depressed subjects in certain studies, is really due to an anxiety induced attentional shift towards threatening stimuli. Past researchers have suggested that such attentional biases might well result from the anxiety which is frequently present in depressed persons. For example, MacLeod et al. posited that:

"anxiety is characterized by attentional biases operating at a perceptual level to facilitate the pickup of mood-congruent, emotionally threatening information, whereas depression is characterized by biases operating at the retrieval stage that facilitate the recall of mood-congruent, emotionally negative information."

Therefore, unless depressed subjects were also anxious, one would not necessarily expect recognition differences between such subjects and normals when processing emotionally threatening information. As additional support for this view, MacLeod et al., after completing their study with anxious and normal subjects, recruited 16 patients with a primary diagnosis
of depression and tested them on the same paradigm. These subjects did not shift their attention towards threat words any more than normal subjects had done. Of course, MacLeod et al.'s study involved threat-related semantic stimuli. It seems unjustified to assume that a noted lack of significant differences between depressed and normal subjects, in the above study, would necessarily carry over to the present situation where subjects must decode facial expressions which represent both threat-related (e.g. anger) and non-threat-related (e.g. interest) emotions.

Physiologically, anxiety may be regarded as a subset of a more global arousal state. With this in mind, the findings from two studies by Clark, Milberg and Erber (1984) suggest that the effect of anxiety on perception of emotional stimuli may result from this status. Their first study, conducted at a tennis court in a city park, involved 37 adult tennis players (23 men, 14 women) rating five emotional phrases. Seventeen subjects performed this task before playing (non-aroused) and 20 subjects performed in a post-play condition. Ratings were made on the basis of arousal continua such that positive phrases were rated according to a scale anchored by the term serenity (1 point) at the low arousal end and by joy (7 points) at the high arousal end. The anchors on the continuum for rating negative phrases were the terms depression (1 point) and anger (7 points), with depression seen as a low-arousal negatively-valenced state and anger as a high-arousal negatively-valenced state. As
hypothesized, for both positive and negative phrases, post-play subjects rated the statements as indicating a significantly higher state of arousal (e.g., joy rather than serenity) than did pre-play subjects.

Despite obtaining results which supported their hypothesis, Clark et al. were concerned that there may have been a plausible alternative explanation to their arousal hypothesis. Specifically, although they did not ascertain numbers, they concluded that subjects' post-game moods may have been affected by whether they had won or lost the tennis game. Thus, the joy of winners may have biased their perceptions towards joy and, in turn, losers may have been biased towards anger. To examine this alternative explanation, they eliminated half of the data from both the high arousal, positive states, and the high arousal, negative states condition. Specifically, they eliminated the highest ratings of both joy and anger, which were the ratings most favourable to their hypothesis. For positive statements, the differences between post- and pre-play subjects remained significant. However, the differences for negative states were no longer significant, although in the hypothesized direction.

The second study, conducted with college students (21 men and 17 women), utilized visual (photographs of facial expressions) rather than semantic stimuli. Arousal was manipulated by having half of the subjects step up and down on a cinder block for 7 minutes and the other half relax in an armchair for the same period. As with the findings with the
re-analysis of semantic stimuli data, the high arousal group rated the positive photographs as displaying significantly higher levels of arousal than did the low-arousal group, but no significant differences existed between the groups in their arousal ratings of negative photographs. The experimenters put forward three possible explanations for the lack of significance between the low and high arousal groups in rating these negative stimuli. Firstly, the level of arousal necessary to induce joy may very well be less than that necessary for anger. Related to this first explanation, it may be that the pattern of physiological responses produced by moderate exercise matches that produced by joy rather than anger. The final possibility, posited by the experimenters, is that whereas serenity and joy differ primarily in amount of arousal, sadness and anger differ in more complex ways. In this connection, Clark et al. raised a point which is relevant to the present study. They suggested that arousal might very well bias judgments of negative stimuli when subjects are assessing the arousal level within one emotion category as opposed to the similarity of two different emotions each pre-rated for their respective arousal levels. Such a possibility is explored in the present study by requiring quantitative assessment of arousal after qualitative identification of emotions.

Considerations regarding whether a state of positive or negative arousal had been instilled should not arise in the present study. Anxiety, by definition, involves high levels of
negatively valenced arousal. Although, the data of Clark et al. do not allow one to assess the viability of the above explanations, their data do suggest that arousal, in general, influences or biases the perception of emotional material and others' emotional displays. Thus, findings of emotion recognition deficits in depressed patients would seem essentially uninterpretable unless one also has knowledge of the patient's anxiety levels and the performance of non-depressed, anxious subjects on similar tasks.

One way of attempting to tap emotion recognition deficits which are depression mediated, without the necessity of controlling for concomitant anxiety, would seem to be by using an affect-induction procedure. However, it is unlikely (and even undesirable) that experimentally induced sad affect could ever adequately mimic clinical depression. Additionally, it would be naive to assume equal levels of anxiety and depression in subjects prior to affect induction. Nevertheless, if experimental findings do suggest differences in emotion processing between normal controls and those subjects with whom a sadness induction procedure has been used, such findings would be suggestive, at least, of differences in emotion processing between normals and depressives. With this consideration in mind, this review will conclude with a short survey of emotion processing studies in which affect induction has been applied with normal subjects.
Studies Utilizing Affect-Induction Procedures

There is good evidence to suggest that experimentally induced "depression" will cause subjects to recall more self-rated unpleasant memories than pleasant ones (Teasdale & Fogarty, 1979; Teasdale & Taylor, 1981), but only a few studies have addressed the effects of induced emotion states on the recognition of emotion in others. Schiffenbauer (1974) found that adult subjects who had previously listened to a "disgust" tape gave more negative labels for photographs of emotional expressions than did subjects who had listened to a comedy tape. However, in a study with 4- to 5-year-old children assessing emotion from facial photographs of 4- to 5-year-old black and white encoders, Carlson, Felleman, and Masters (1983) found that children, in whom a sad state had been induced, actually gave less sad responses to the stimuli photographs than did children in happy, angry and neutral conditions. These researchers could not explain this finding other than to cite a possible reluctance of sad children to recognize sadness in others, or a possible developmental-stage related inability to distinguish one negative emotion from another. Thus, the results from studies of emotion recognition in which affect has been induced are no more consistent than those from studies which have taken advantage of naturally occurring affective states.
Research Conclusions and Remaining Questions

Several conclusions may be drawn from the foregoing review of research. The face would appear to be the most important indicator of emotional information for adults and for children over the age of 7 years. Research has consistently shown that schizophrenics of all ages exhibit emotion recognition deficits above and beyond the level of previously noted perceptual disturbances with non-affective stimuli. Among the proposed explanations for these deficits have been emotion recognition problems peculiar to the psychobiology of schizophrenia, biological vulnerability factors shared with depressives (e.g., possible abnormalities in the metabolism of biogenic amines), and a more general "social withdrawal" factor which should also characterize, to some extent, other hospitalized psychiatric populations.

In contrast to this noted consistency of findings with schizophrenic populations, individual results obtained from emotion recognition studies with depressed persons have been contradictory (both where the depression occurs naturally and where sad mood has been induced). Studies with these populations have suggested a negative bias, a positive bias and no significant differences from normals in tasks requiring qualitative judgements of emotional expressions. However, the depressed populations typically employed have been heterogeneous in terms of inclusion of schizoaffective and pure depressive
subjects. Depressives do, indeed, appear to show reliable differences from normal controls in their processing of emotion information, but most findings suggest that these differences exist at the level of information recall where depressed subjects appear to have access to a greater number of unpleasant memories than do normal subjects. Whereas depressed subjects have not been shown consistently to differ from normals in their qualitative categorization of facial expressions of emotion, anxious subjects do appear to display differences from normals in the way that they perceive emotional material or others' emotional displays.

Some important questions are suggested by the above conclusions. Firstly, with a more homogeneous group of depressed subjects, will the depressed group show consistent differences from normals in qualitative identification of emotion from facial expressions? Alternatively, do depressives recognize the same qualitative emotion as normals but rate the valence of these emotional expressions as being less pleasant than do normals? While depressed subjects may rate facial expressions differently from normals subjects along a pleasantness dimension, there would seem to be no basis for positing that depressive rather than anxious symptoms would lead persons to perceive erroneously high levels of arousal in others' facial expressions. Accordingly, did those studies which found differences between normals and depressives actually tap attentional biases mediated by anxiety rather than depression?
Finally, although a social withdrawal hypothesis cannot be directly addressed within the available parameters, do persons who see themselves as socially introverted have more trouble than others in accurately identifying others' emotions?

Rationale and Hypotheses of Present Study

It has already been stated that the failure accurately to read nonverbal emotion cues may contribute to inappropriate social responses and decreases in feelings of social efficacy. The importance the present study has is twofold. Firstly, it separates the effects of anxiety and depression in a way that past emotion recognition studies have failed to do. Secondly, the findings should indicate whether any differences between anxious and depressed groups and normals actually entail qualitative errors on the part of clinical populations or, alternatively, differences in the quantitative assessment of pleasantness or intensity of emotion.

In light of these considerations, using clients of a hospital Employee Assistance Program clinic who cite significant levels of depressed and anxious symptomatology, and normal subjects recruited from their work colleagues, the present study is designed to determine whether self-reported depressives do, in fact, show emotion perception deficits or biases. Henceforth, references to present subjects as anxious or depressed should be understood to reflect their own self-reports rather than
recorded diagnoses. Although the self-report instrument used in this study has been shown to correlate highly with psychiatric diagnoses, as is frequently the case with clients in such therapy and counselling clinics, formal diagnoses were not made. In any case the present study was concerned more with subject state than historical diagnosis.

An attempt will be made to distinguish between two competing explanations for any such deficits. Firstly, do any deficits or biases relate to a perceiver's depressed affect as suggested by Walker (1981), Zuroff and Colussy (1986), and Mandal (1986)? Alternatively, are any noted biases mediated by anxious arousal as findings from several studies have suggested (Parkinson & Rachman, 1981; Burgess et al., 1981; Mathews & MacLeod, 1985; Ray, 1979; MacLeod et al., 1986)? By using quantitative measures of encoder arousal and affective tone (a Likert-type scale rated from 1-7 for least aroused to most aroused and least pleasant to most pleasant respectively), it should be possible to assess whether depressed and/or anxious populations are different from normals in the degrees of pleasantness and arousal they perceive, even when the emotion has been identified by each of the groups as qualitatively the same. The reason for using this model in the present study is that it allows for quantitative differentiations between different subjects' perceptions of a facial expression after the expression has been identified as one of the basic emotions included in the stimulus photographs to be used here (Izard, 1971). For example, happiness is a
single qualitative category within Izard's cross-cultural test of emotion recognition. Yet, qualitative identification of "happiness", agreed upon globally by different persons, may nevertheless differ in the quantitative range of degrees of both pleasantness and arousal and this should have implications for expectations of both the encoder's future behaviour and the decoder's behaviour towards the encoder.

The specific quantitative measures to be used in this study derive from a long tradition of research, illustrated by Schlosberg's (1952) proposal that emotion concepts are organized in a circular arrangement which can be dimensionalized along two bipolar axes. More recently, Russell (1980) has presented a spatial model in which affective concepts fall in a circle based upon their ratings along two orthogonal axes: pleasure-displeasure and degree of arousal. There is some evidence for a third dimension but, as yet, the two dimensional model is considered most useful. Supportive evidence was obtained from non-clinical samples in which subjects scaled 28 emotion-denoting adjectives in four different ways: multidimensional scaling based on perceived similarity among terms, Ross's (1938) direct circular scaling technique, unidimensional scaling with dimensions of pleasure-displeasure and degree of arousal, and a principal components analysis of 343 subjects' self-reports of current affective states. Despite differences in the measurement approaches, consistent spatial representations were obtained. For example, the emotion term
"content" was always at the high end of the pleasantness axis but neutral on the arousal axis; "astonishment" was always at the high end of the arousal axis but near neutral on the pleasantness axis.

Unlike Russell's study which employed 28 emotion-denoting adjectives, the present study employed 4 photographs of the facial expression of each of 9 "fundamental" emotions. To remove the possibility of encoder sex being used as the basis of similarity judgments, the 17 male photographs were removed, and then one female exemplar was randomly selected for each emotion. To assess whether Russell's spatial model of affect holds for the present clinical population, subjects used a 9-point numerical scale to rate the similarity of each of the 9 depicted facial expressions to each of the other facial expressions. These similarity ratings were then reflected yielding dissimilarity ratings and multidimensional scaling was applied to the resulting dissimilarity ratings. This procedure allowed subjective dissimilarities between facial expressions of different emotions to be represented spatially as mathematical distances between those same emotions.

The theoretical underpinnings for the above research derive from Rosch's theory of categories (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). That is, an emotion is considered to comprise a prototypical or "best example" expression and a distance dimension which is defined by decreasing similarity of other instances to the prototype. Using such a scheme, people
may see different levels of arousal and pleasantness in a face but still recognize each expression as being an exemplar of the same emotion category. The thesis of this study is that the discrepancies between past studies of emotion recognition in normal and depressed populations have been caused by an emphasis on qualitative rather than more subtle quantitative differences between the emotion recognition of these two populations.

Recognizing the availability of measures both for qualitatively identifying (Izard, 1971) and for quantitatively rating emotions (Russell, 1980), the hypotheses are as follows. (1) Anxious-depressed and anxious but non-depressed subjects are expected to rate facial expressions of emotions as showing a higher level of arousal than are non-anxious subjects. This hypothesis is based on published findings from two areas. Firstly, many studies (Parkinson & Rachman, 1981; Burgess et al., 1981; MacLeod et al., 1986; Mathews & MacLeod, 1985; Ray, 1979) suggest that anxious subjects lack a protective perceptual bias which would shift their attention away from minor threatening (negatively arousing) stimuli. The second source of this hypothesis is the findings of Clark, Milberg and Erber (1984) that study participants who had been subjected to physical arousal were more likely to rate positive and negative statements as indicating higher levels of arousal than were normal subjects, and were also more likely to see facial photographs as representing the high arousal emotion of joy rather than the low-arousal serenity, seen by non-aroused
subjects. These findings are relevant for anxious subjects in that anxiety involves high levels of negative arousal (i.e., motor tension, autonomic hyperactivity, apprehension, hypervigilance). In support of such a hypothesis, a large body of research appears to support the theory, posited by MacLeod et al. (1986), that anxiety is characterized by attentional biases which operate at perceptual intake rather than at a retrieval level to facilitate the pick-up of emotionally threatening, mood-congruent information.

(2) Depressed subjects, although hypothesized to be as accurate as normal subjects in qualitative categorizations of emotion, are more likely than non-depressed subjects to rate all photographs as showing a lower level of pleasantness. Such a finding would be supported by the work of Mandal (1986), in which a homogeneous group of depressed patients appeared particularly sensitive to the pleasantness dimension of affect. In addition, Beck's (1967) theory of depression, which includes negative perceptions of the world, along with negative self evaluation and negative expectations of the future as core symptoms and causes of depression, would predict a tendency among depressed persons to perceive facial expressions as more negative than they actually are.

(3) It is expected that there will be no differences among normal, depressed and anxious subjects in their accuracy in qualitative identification of photographs of facial expressions representing nine different standard emotion categories (happiness, sadness, anger, surprise, disgust, shame, fear,
interest, and contempt). This hypothesized finding coincides with the "null" hypothesis which is, thus, not expected to be rejected in the present case. The basis for this "no difference" expectation is as follows. Accurate perception of facial expressions is acquired at a young age (Izard, 1971; Ekman & Oster, 1979) and only major perceptual-cognitive disturbances lead to inaccuracies accurately to recognize the facial expressions of the basic emotions portrayed in stimuli such as those to be used in this study (Izard's Cross-Cultural Test of Emotion Recognition, 1971). None of the subjects in this study will belong to the schizophrenic group, who are the only psychiatric patients who have been shown to exhibit perceptual disturbances such as the inability to complete a percept from an incomplete silhouette (Cohen, Senf, & Huston, 1956). In addition, Izard's present stimuli comprise photographs of nine, common discrete emotions which all of the subjects will have had many years of experience in perceiving.

(4) Finally, subjects who score high versus low on the social introversion scale of the MMPI-168 are likely to be less accurate in their qualitative identifications of emotional facial expressions of emotion than are low scorers. This hypothesis, based on past findings suggesting that increasing social withdrawal among psychiatric patients may lead to emotion recognition deficits (Walker, Marwit, & Emory, 1980; Walker, 1981), provides an alternative basis of explanation to diagnosis-based deficits (eg. deficits related to the psychobiology of schizophrenia). If this finding is robust, it
may also appear on (albeit imperfect) self-report analogues such as the social introversion scale.
PART B

THE PRESENT STUDY
Subjects

Anxious and depressed subjects were state hospital employees who were receiving therapy for self-reported depressed and anxious mood states under the terms of the Employee Assistance Program (EAP) in effect at their hospital. The use of these non-inpatient subjects allowed for comparisons between self-reported depression and self-reported anxiety without the confounding effect of comparing inpatient depressed subjects with subjects who carry primary, anxious diagnoses and thus are unlikely to be found in inpatient populations.

Given the recruitment methods of this study, none of the subjects were expected to be schizophrenic or bipolar. However, all subjects were asked whether they had ever received psychiatric diagnoses, and if they were now, or in the past on Lithium or neuroleptic medication. Two of the anxious and depressed subjects were receiving therapy from non-hospital sources and were also on anti-depressant medication. No other subjects were on psychotropic medication. Considerations relating to matching controls with anxious and depressed subjects were handled by obtaining controls from the same hospital employee population. Thus, all subjects were drawn from a pool of people who experience the high level of work stress.
accompanying daily caregiving for a large population of both psychotic and developmentally disabled patients. Anxious and depressed subjects were obtained by personal request for volunteers among EAP patients. Normal controls were solicited by circulating requests in the hospital's weekly news-sheet. All subjects were paid $5 for participating and, despite an assurance that their participation was purely voluntary, no EAP client refused a request to participate.

The original intention was to assign clinical subjects to one of 3 groups: (1) anxious, non-depressed \((n=20)\), (2) anxious, depressed \((n=20)\), (3) non-anxious, depressed \((n=20)\) with a (4) non-anxious, non-depressed control group \((n=20)\) being obtained from persons working in similar positions to the clinical subjects, at the same hospital. Given pilot findings with this population, it was expected that some volunteers would actually be "pre-therapy" persons who were experiencing significant levels of anxiety and dysphoric mood, and would therefore fit the conditions for one of the clinical groups rather than the control group.

In actuality, for reasons to be explained later, a non-anxious, depressed group was not obtained so the group composition was as shown in Table 1:
Table 1

Mean and standard deviation of subject age, and status by group

<table>
<thead>
<tr>
<th>N</th>
<th>Males</th>
<th>Females</th>
<th>Mean Age(S.D.)</th>
<th>In Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Males</td>
</tr>
<tr>
<td>NA,ND</td>
<td>6</td>
<td>17</td>
<td>36.78(12.55)</td>
<td>0</td>
</tr>
<tr>
<td>A,ND</td>
<td>9</td>
<td>14</td>
<td>40.17(11.10)</td>
<td>6</td>
</tr>
<tr>
<td>A, D</td>
<td>6</td>
<td>14</td>
<td>35.70(9.63)</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>45</td>
<td>35.70(9.63)</td>
<td>11</td>
</tr>
</tbody>
</table>

NA,ND - Non-anxious, Non-depressed  
A,ND - Anxious, Non-depressed  
A, D - Anxious, Depressed

The ratio of male to female subjects shown in Table 1 reflects a similar ratio in referrals to the Employee Assistance Program and also a large female/male ratio in the employee populations of "non-physician" clinical staff. As previously noted, past research in this area has not produced significant main effects for sex. Additionally, correlations of sex with other variables in the present study failed to produce any significant results.

Materials

Leeds Scales

The assignment of subjects to diagnostic groups was based upon their scores on the anxiety and depression subscales of the Leeds Scale (Snaith, Bridge, & Hamilton, 1976). To be included in a significantly anxious or significantly depressed group, each subject in the present study had to score at least 7 (out
of a possible 18) on the relevant subscale. Mean Leeds Scale scores for each group are presented in Table 2:

Table 2

Mean and standard deviation of subject scores on the Leeds Scale by group

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Anxiety</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA,ND</td>
<td>23</td>
<td>3.78(1.72)</td>
<td>2.48(1.35)</td>
</tr>
<tr>
<td>A,ND</td>
<td>23</td>
<td>8.78(1.38)</td>
<td>3.74(1.29)</td>
</tr>
<tr>
<td>A, D</td>
<td>20</td>
<td>10.55(2.58)</td>
<td>8.00(1.63)</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NA,ND - Non-anxious, Non-depressed  
A,ND - Anxious, Non-depressed       
A, D - Anxious, Depressed

Several of the studies reported have assigned subjects to groups on the basis of diagnosis without assessing levels of depression or anxiety at the time of testing (Mandal, 1986; Walker, 1981). Most others have assigned subjects to depressed groups on the basis of responses to the Beck Depression Inventory (MacLeod et al., 1986; Zuroff & Colussy, 1986; Tabachnik et al., 1983; Bradley & Matthews, 1983; Powell & Hemsley, 1984; Fogarty & Hemsley, 1983; Mathews & MacLeod, 1985), and to anxious groups on the basis of the State Trait Anxiety Inventory (MacLeod et al., 1986; Mathews & MacLeod, 1985).

Although the Beck has been the standard assessment instrument for assigning subjects to depressed groups (Vredenburg, Krames, & Flett, 1985), it was not used in this study for several reasons. Beck’s original intention was that
his instrument be used for quantifying intensity of depression, not for differential diagnostic purposes (Carroll, Fielding, & Blashki, 1973), and definitely not for identifying mild levels of depression (Tanaka-Matsumi & Kameoka, 1986). Many depressed patients find the Beck difficult to complete and researchers complain that it is expensive in terms of research time (Kearns, Cruickshank, McGuigan, Riley, Shaw, & Snaith, 1982). Perhaps neither of the above criticisms is surprising given the fact that researchers almost always require subjects to read items and self-report, whereas the original intention of Beck was that his scale would be interviewer administered (Vredenburg et al., 1985). Amongst other criticisms of the Beck are: a lack of discriminant validity with the State Trait Anxiety Inventory (Nezu, Nezu, & Nezu, 1986); a higher correlation with the Taylor Manifest Anxiety Scale than that of the Zung Self-Rating Depression Scale (Meites, Lovallo, & Pishkin, 1980); and a lack of item analysis in its original and widely used form. On the basis of all the shortcomings in the Beck, Kearns et al. (1982) stated that it should not be used for research purposes. Although these authors did not recommend a replacement, they stated a preference for the Leeds Depression Scale over the Beck because it outperforms the Beck in the ability to identify depressed persons and distinguish between severity levels, and is less difficult for patients to complete.

Turning to measures of anxiety, the present requirement is for an instrument which will address the acute arousal
components of anxiety rather than the personality trait which may not be in evidence at the time of testing. Findings from several studies (Ramaiah, Franzen, & Schill, 1984; Tenenbaum, Furst, & Weingarten, 1985) suggest that the State Trait Anxiety Inventory is not accurate enough to distinguish between more permanent trait, and more changeable state components of anxiety. Thus, it might be difficult to support a contention that the high scores on the State scale at the time of testing actually reflected a present arousal state.

With the above considerations in mind, a search was made for two scales which: respectively correlated well with clinicians' ratings of anxiety or depression; were intended to assess levels of depression and anxiety in undiagnosed persons; were self-report rather than interviewer-administered; and the completion of which was not overly burdensome to depressed and anxious subjects. A literature review suggested that the Leeds scales might be unique in this regard.

The development of the Leeds scales can be traced back to the original Zung Self-Rating Depression Scale (Zung, 1965). Validation studies have reported that the Zung correlates highly with physicians' ratings of depression and with scores for Hamilton Rating Scales (Hamilton, 1959), and can differentiate between four levels of severity of depression at the .05 level (Biggs, Wylie, Ziegler, 1978). Other studies have shown the Zung to perform better than the Beck and the MMPI Depression scale, in strength of positive correlations with clinicians' ratings of
depression levels in 101 psychiatric inpatients and 99 patients on an inpatient chemical dependency unit (Schaefer, Brown, Watson, Plemel, DeMotts, Howard, Petrik, Balleweg, & Anderson, 1985).

As with the Beck, Zung's scales lacked statements dealing with symptoms of anxiety. Additionally, some items were not useful in assessing depression. Accordingly, Snaith, Ahmed, Mehta, and Hamilton (1971) took the 10 Zung items endorsed most often by depressed patients (Zinkin & Birtchnell, 1968) and added 2 "anxiety" items. The resulting Wakefield Self-Assessment Depression Inventory was found to accurately classify 97 of 100 diagnosed depressed patients and 185 of 200 normal controls.

Though useful, Snaith et al. thought the Wakefield merited further development. The resulting Leeds scales, evolved from a research project which, through item analysis based on diagnoses and comparisons with other measures, sought to:

"a) determine whether individual items correlate significantly with age and sex and should therefore be excluded from scales designed to detect or measure illness in either sex at any age.
b) determine whether the same, or different groups of items are most appropriate as i) measures of the severity of clinically diagnosed primary depressive illnesses and anxiety states and, ii) measures of the severity of depression and anxiety throughout a range of psychiatric disorders.
c) determine whether the scores based upon these sub-scales confirm clinical diagnoses and so might be justified as a diagnostic instrument.
d) determine whether the scales so constructed are sufficiently sensitive and specific for their use to be justified in screening work (Snaith et al., 1976).
To carry out the research, Snaith et al. took the Wakefield items and added 10 other items which, together with the original 12, more nearly covered the range of common symptoms of depressive illness and anxiety states, as set out in the ICD-9. Two psychiatrists made Hamilton scale ratings on 100 patients with a mixture of depressive and anxious diagnoses. Interrater correlations for 20 jointly undertaken ratings, were .94 for the Hamilton Depression Rating Scale (Hamilton, 1960) and .90 for the Hamilton Anxiety Rating Scale (Hamilton, 1959). Diagnoses were based on the psychiatrists' previous knowledge of the patient or a preliminary interview.

As mentioned, in an attempt to produce the best instrument in terms of diagnostic utility, all scale items were subjected to item analysis. In the present study, the subjects are undiagnosed. One of the purposes of Snaith et al.'s research project was to determine whether the same items are appropriate to measure severity of depression and anxiety in those with primary depressive and anxious diagnoses, and in those who have not been diagnosed with either kind of disorder. In this case the General Depression and General Anxiety subscales are relevant. For an item to be placed on one or other of these sub-scales, it had to have a correlation of higher than .52 with the appropriate observer rating of depression or anxiety, and also have a contribution to the variance which differed by at least .05 in the correlation of the item with the two observer ratings. For example, "suicidal thoughts" correlated .62 with
observer ratings of depression and .48 with observer ratings of anxiety. The difference in variance accounted for by these correlations was .15. This item was included in the General depression sub-scale. On the other hand, "lack of energy" correlated .61 with observer ratings of depression and .59 with observer ratings of anxiety. Difference in variance accounted for by these correlations was .02. Accordingly, this item did not discriminate well between groups and was not included in either of the Leeds General sub-scales.

For an item to be placed on the Specific Depression or Specific Anxiety subscale (to be used with diagnosed depressed and anxious subjects), it had to correlate higher than .58 with severity of illness as determined by psychiatrist's global rating, and also had to achieve a higher mean score in patients of the appropriate diagnostic group prior to treatment. Those items which "passed" the above item analysis became part of the final Leeds scale. Correlations of all final Leeds items with sex and age were insignificant.

As assigned to the subjects in the present study, the instrument was a 15 item self-report measure with two subscales, anxiety and depression (Appendix B). The two General sub-scales each comprised 6 self-rated statements. These statements reflected diagnostic criteria described for the respective disorders in major diagnostic systems (DSM-III-R, ICD-9). For depression, the statements related to sadness, loss of enjoyment, apathy, delayed insomnia, loss of appetite, and
suicidal thoughts (e.g., "I have lost interest in things"). The anxiety subscale included items which assess panic, restlessness, agoraphobia, irritability, palpitations, and fearful mood (e.g., "I get very frightened or panic feelings for apparently no reason at all"). For each item, response was on a 4 point scale: "Yes definitely" (3); "Yes sometimes" (2); "No not much" (1); and "No not at all" (0). Scale items 5, 7, 11 and 13 were reversed (i.e., "Yes definitely" scores 0) to reduce the possibility of response bias. In a cross-validation study, Leeds General sub-scales scores were correlated with observer ratings for all patients throughout the range of diagnostic groups used in the research study. Leeds General depression sub-scale scores correlated .85, p<.01 with observer ratings of depression. Leeds General anxiety scale scores correlated .83, p<.01 with observer ratings of anxiety.

When subscales were derived by item analysis, it was found that the Specific depression sub-scale differed from the General depression sub-scale in only one item, specifically it included "lack of energy" but not "loss of appetite". The Specific anxiety sub-scale differed from the General anxiety sub-scale in only 2 of 6 items. Specific items not in the General scale related to "dizziness" and "psychic tension". General items not in the Specific sub-scale related to "restlessness" and "irritability". Given the high number of shared items between General and Specific sub-scales, the cross-validation data for the Specific sub-scales are also relevant in support of the use
of the Leeds in the present study. Cross-validation of the Specific depression sub-scale, with 32 patients suffering from psychiatrist-diagnosed endogenous depression yielded a correlation of .87 between the depression sub-scale and an independent global rating of endogenous depression (5 point ratings of severity made independently by 6 psychiatrists on the basis of their clinical expertise). A similar cross-validation of the anxiety sub-scale with 20 patients suffering from psychiatrist-diagnosed anxiety neurosis yielded a correlation of .72 between the anxiety sub-scale and a global rating of anxiety neurosis (5 point ratings of severity made independently by 6 psychiatrists).

For the General scales, comparisons between healthy subjects and those rated by two psychiatrists as "moderately ill" revealed that a cut-off between scores of 6 and 7 out of 18 (6 items x a maximum score of 3) provided an optimal division. This cut-off appropriately classified 94% of normals and 97% of the "moderately ill" for both anxiety and depression subscales.

Experimental support for using the Leeds scales in preference to the Beck and the Zung comes from studies with patients diagnosed with "major depressive disorder" (Kearns, Cruickshank, McGuigan, Riley, Shaw, and Snaith, 1982), "mentally distressed" young mothers attending a general practice (Berg, Butler, Houston, & McGuire, 1984), and with 34 mothers who had recently lost a baby (Forrest & Berg, 1982).
MMPI-168 Social Introversion Scale

As noted in the introduction, a social withdrawal hypothesis of impaired emotion recognition is not addressed directly in the present study. In its place, subjects were given an analogue measure of social introversion in the belief that a finding of poor emotion decoding among high scorers (introverts) would indicate that this hypothesis deserved further attention. Accordingly, immediately subsequent to completing the Leeds scale, each subject also completed the 16 item self-report social introversion scale from the MMPI-168 (Overall & Gomez-Mont, 1974). The MMPI-168 is one of the most popular short forms of the MMPI and comprises the first 168 items from the full inventory. To establish a rationale for the use of this scale, two issues must be addressed as relevant to the present study. These are the suitability of the 70 item SI scale of the MMPI as a predictor of the level of social participation and, secondly, the adequacy of the 16 item MMPI-168 SI scale as a substitute for the more cumbersome, time consuming full-item SI scale.

The SI scale was empirically derived by selecting items which discriminated between university students who either scored above the 65th percentile or below the 35th percentile on the social introversion-extroversion scale of the Minnesota T-S-E inventory (Evans & McConnell, 1941). High scorers on this scale were expected to be socially introverted people who would avoid or withdraw from interpersonal interactions when possible.
Potential distortion effects from an individual's perception of his/her own performance cannot be ruled out with this instrument. Nevertheless, the SI scale should be less subject to such problems than any necessarily facially valid ad hoc instrument, constructed specifically for this study. With the latter, there would be a lack of empirically derived items known to discriminate socially avoidant from gregarious persons. More seriously, to construct the instrument, one also would be faced with the probably inappropriate task of making non-empirically based executive decisions regarding the essential characteristics of social isolation.

Additionally, past research suggests that the SI scale is an excellent predictor of clinician ratings regarding social interactions of community mental health centre outpatients (Merluzzi, Burgio, & Glass, 1984). Although similar evidence was not found for the efficacy of other measures of social interaction, a literature review suggested that there were few available instruments for directly measuring a person's level of interaction with his/her social environment. In those existing, questions tapping social interactions appear to be widely interspersed with a great number of questions relating to such issues as leisure activity, parental roles, physical health, marital satisfaction, etc. (Weissman, Sholomskas, & John, 1981). Additionally, the great majority of such instruments are lengthy (60-120 minutes) interviewer-administered scales which would have been burdensome for subjects and may have introduced
unwanted fatigue effects into their performances on the experimental tasks.

The second issue to be addressed is the validity of substituting the 16 item MMPI-168 SI scale for the 70 item full scale. In terms of convenience and subject stress, the advantages are obvious. However, the decision to use this instrument could not be supported on the basis of such pragmatic issues. Much has been written about the clinical utility of the MMPI-168, and it appears that a rather consistent picture has emerged (Helmes & McLaughlin, 1983; Hart, McNeill, Lutz, & Adkins, 1986). Like other MMPI short forms, the MMPI-168 is not very good at predicting full scale clinical code profiles. However, short to standard form subscale correlations are excellent and in the case of the SI scale range from .80 to .90 with several large samples of male and female psychiatric patients (Helmes & McLaughlin, 1983; Hart et al., 1986). Accordingly, in the present study, there appears to be justification for believing that the MMPI-168 SI scale would pick up a profile of social introversion scores similar to that which would be obtained with the full SI scale. Thus, a finding of a significant correlation between scores on this scale and accuracy of perception of emotions should suggest that a social isolation hypothesis is worth investigating in future research.
Izard's Cross-Cultural Test of Emotion Recognition

The present study entailed one qualitative and two quantitative rating tasks, administered to all subjects. Stimuli varied depending upon the task performed. The emotion photographs of the present version of Izard's (1971) cross-cultural test of emotion recognition constituted the stimuli for the qualitative task (Appendix D). These stimuli comprise 4 photographs of facial expressions of each of 9 standard emotions. Each photograph is a 5" by 7" black and white print of an adult male or adult female expressing one of: happiness(joy), anger, surprise, disgust, shame, fear, distress(sadness), contempt, and interest. Izard's stimuli were used because they have been validated with a number of different populations, including adult schizophrenics, and they have been used with sufficient frequency to allow for comparison of present results with past findings.

The stimulus set for Izard's test was produced by having 3 judges rate about 1,000 photographs. If 2 of 3 judges agreed on the emotion portrayed, a photograph was then rated by 30 new judges. Then, if more than 70% of these 30 judges placed the photograph in a given category, it was accepted as representative of that category. This procedure resulted in 16 photographs being accepted. These 16 were then used as guides by a group of 15 American actors who tried to pose Izard's 9 emotions. Every time one of the resultant photographs was placed in a given category by 70% of 10 or more American college
student judges, it was accepted for research. In this way, the requisite 4 photographs of each of 9 emotions were obtained. In cross-cultural validation studies with American (n=89), English (n=62), German (n=158), Swedish (n=41), French (n=67), and Swiss (n=36) judges, the mean accuracy of judgements, for each sample, was between 78% and 83% for all emotion categories. The lowest mean was for shame; however, at 71% agreement, this was still within an acceptable range. Each subject was also presented with a list of the 9 emotions to be used in labelling photographs. To reduce the possibility of order effects, the order of emotion words was randomized for each subject.

Quantitative Rating Scales

For the quantitative portion of the task, experimental materials comprised Izard's 36 photographs and two numerical Likert-type scales with values ranging from 1 to 7 (Appendix C). In line with Russell's circumplex model of affect (1980), subjects used the Likert scales to rate quantitatively emotions on the two orthogonal dimensions of arousal and pleasantness, each of the 36 photographs being rated separately on each dimension. The purpose of this task was to assess whether groups differed in the amount of arousal and pleasantness which they ascribed to photographs. For pleasantness ratings, subjects were told that a photograph rated "1" was an expression which represented the most unpleasant feeling in the encoder with "2", "3", "4", "5", and "6" representing increasing levels of pleasantness up to a rating of "7" which was an expression
representing as pleasant a feeling as possible. For arousal ratings, subjects were told that "1" represented the lowest possible level of arousal with "2", "3", "4", "5", and "6" representing increasing levels of arousal up to "7" which meant the photographed person was "as aroused as s/he could be". Because the term arousal may not have been understood uniformly by all subjects, the following explanation was given to all, "By level of arousal, I mean how excited the person is in either a positive or negative sense. So drowsy is usually seen as being very low arousal, panic would be a state of very high negative arousal and ecstasy would be a state of very high positive arousal." In addition to the rating numbers, the arousal scale included the words "most aroused" over the 7, "least aroused" over the 1 and "arousal increases -->" over the numbers 3 through 5. The pleasantness scale was identical except for the "arousal" terms being replaced by "pleasantness" terms.

_Benton Facial Recognition Test_

As a control task to ensure that any noted differences in emotion recognition were not due to prosopagnosia or other general perceptual difficulties relating to the face, part of the Benton Facial Recognition Test (Benton & Van Allen, 1968) was administered to each subject. The stimuli comprised pairs of photographs of same sex adults. For each pair of photographs, hair and eye colour, clothing and hair style were invariant. Subjects were required to indicate whether the pairs of photographs depicted the same or different persons.
Finally, each subject was presented with 36 stimulus sheets for the multidimensional scaling task. Each sheet consisted of photographs of two different female facial expressions extracted from Izard's photographs, and these 36 stimuli comprised all possible pairings of one photograph from each of the nine depicted emotion categories. These photographs of female facial expressions were selected randomly for each emotion, after removing the smaller number of male photographs. Only female faces were used, for this task, to avoid the possibility of subjects rating similarity on the basis of gender. In the original selection procedure for Izard's photographs, the four best exemplars of one emotion (distress) all involved female faces. Accordingly, in the present study, only by using female faces could stimuli be produced to cover all possible combinations of different emotions. Subjects were instructed to rate how similar each facial expression was to the other facial expression depicted on the same stimulus sheet. To facilitate statistical analysis, a 9 point scale was used (Appendix C), with 9 being as similar as possible, 8 down through 2 representing decreasing degrees of similarity, and 1 being as dissimilar as possible. In addition to numbers, this scale consisted of the words "most similar" placed over the number 9, "least similar" over the number 1, and "similarity increases --" over the numbers 4 through 6.
Procedure

All subjects were informed that they were participating in an experiment that examined how people rate facial expressions. After being assured of the confidentiality of their results, subjects were informed of the procedures of the study and gave written consent for their participation. Several subjects were interested in how they rated themselves on the Leeds scales. All subjects who asked were shown their scores on the scales. Any subject who requested therapy would have been accommodated within the Employee Assistance Program. Only two anxious, depressed subjects were not in therapy. One was seeking a private therapist and the other believed that she was actually improving after a recent marital break-up.

The procedure required each subject to perform both a qualitative recognition task and quantitative ratings. The order of presenting the quantitative tasks was counterbalanced among subjects in order to equalize carry over effects on these tasks. The qualitative task required subjects to label each of 36 photographs with the name of one of Izard's 9 standard emotions, from the list placed in front of them. Thus, the experimenter said to each subject, "I am going to show you a series of photographs in which people are showing different facial expressions. I would like you to tell me which of the emotion names on the list I have given you best describes each photograph". To ensure that any noted differences were not due
to non-emotion related facial recognition problems, before performing the emotion recognition tasks, subjects also performed the first three facial matching tasks on the Benton Facial Recognition Test. Any subject who could not correctly identify a stimulus person within a display of similar looking persons would have been eliminated from further testing. However, all subjects performed adequately on this screening task.

For the quantitative rating task, subjects were first told how to use the 7 point scale for both the arousal and the pleasantness dimension. For both dimensions, it was ascertained that subjects understood the use of the scale by asking how they would rate such arousal anchor words as "terrified" and such pleasantness anchor words as "delighted". No subject was noted to have an unusual perception of the arousal or pleasantness levels of these anchor terms, as assessed by their numerical ratings.

For each stimulus photograph, the experimenter said to a subject, "Show me on this scale how aroused the person in the photograph is feeling with 1 being not very aroused at all up to 7 being as aroused as he/she could be". The procedure was then repeated, but this time the experimenter said to subjects, "Show me on this scale how pleasant the person's expression suggests they are feeling with "1" being as unpleasant as possible and each number showing increasing pleasantness right up to "7" which is as pleasant as possible."
The final task was to assess the relative similarities of the 36 pairs of photographs representing every possible pairing of one photograph from each of 9 emotion categories. The stimulus sheets were presented to subjects in randomized order, and the experimenter said to subjects, "I am going to show you 36 sheets of paper. Each one contains copies of two photographs of facial expressions. Using this 9 point scale in which 9 represents a pair of photographs which are as similar to each other as they could possibly be, and decreasing down to 1, which is two very dissimilar photographs, I want you to give me a numerical rating for the similarity of each pair. The numerical scale was placed in front of subjects throughout this task.
CHAPTER II

RESULTS

One of the first findings of this investigation was that it proved impossible to obtain subjects who were depressed but not anxious, according to their own self-report on the Leeds scales. Hence, the originally intended 2 X 2 complete factorial design could not be used. Possible reasons for the unavailability of this group, together with precedents from past research, will be presented in the Discussion section.

As earlier noted in the Introduction, sex differences in perception of facial expressions have not been found with the present populations. Nevertheless, to ensure that there were no such differences in the present sample, both intra-group and overall correlations were performed. In no case were there significant correlations between sex and any of arousal, pleasantness, accuracy, or social introversion scores. The highest correlation between sex and a dependent variable was in the anxious, depressed group where the correlation between accuracy and feminine gender was 0.2762, p>.2.

However, within the anxious, depressed group, males did score as being more depressed than females. This would appear to reflect the EAP referral pattern in that male patients were more often referred by their unit supervisors when their emotional problems appeared to interfere with their ability to carry out their duties, and were becoming obvious to co-workers. Female
patients were more likely to self-refer before their problems became disruptive to unit functioning. Notably, there were also no significant correlations between age, marital status, or educational level and any of the dependent variables.

In light of the above, the following results pertain to comparisons between three mixed-gender groups of subjects, namely those classified as non-anxious, non-depressed; anxious, non-depressed; and anxious, depressed. For each subject group, mean accuracy of categorical identification of facial expressions, mean judgments of arousal and pleasantness in facial expressions, and social introversion scores on the MMPI-168 SI scale are listed in Table 3.

Table 3

Mean and (standard deviation) of arousal (AR), pleasantness (PL), accuracy (AC), and social introversion (SI) scores for each group

<table>
<thead>
<tr>
<th></th>
<th>NA, ND</th>
<th>A, ND</th>
<th>A, D</th>
<th>F(2,63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>28.13(2.68)</td>
<td>27.57(3.40)</td>
<td>27.10(2.59)</td>
<td>.70</td>
</tr>
<tr>
<td>AR</td>
<td>164.35(16.82)</td>
<td>182.91(16.95)</td>
<td>182.45(24.23)</td>
<td>6.71**</td>
</tr>
<tr>
<td>PL</td>
<td>116.09(14.22)</td>
<td>117.48(19.34)</td>
<td>109.35(22.98)</td>
<td>1.10</td>
</tr>
<tr>
<td>SI</td>
<td>4.83(2.44)</td>
<td>6.00(1.83)</td>
<td>7.00(3.26)</td>
<td>3.94*</td>
</tr>
</tbody>
</table>

** - significant at the .001 level
* - significant at the .05 level
NA,ND - Non-anxious, non-depressed
A,ND - Anxious, non-depressed
A, D - Anxious, depressed

Maximum scores- AC=36, AR=252, PL=252, SI=16

Analyses of scores on each dependent variable will be individually addressed in the following sections. However, as displayed above, significant intergroup differences were noted on the overall analyses of variance of arousal and social
introversion scores. Differences were not significant for accuracy or pleasantness scores.

**Influence of Anxious Arousal on Quantitative Ratings of Perceived Emotion**

Initial results relate to assessment of the levels of arousal shown in facial expressions of emotion. It was hypothesized that both anxious, depressed and anxious, non-depressed subjects would rate facial expressions of emotion as showing a higher level of arousal than would non-anxious subjects. This hypothesis was based on past findings that anxious subjects tend to shift their attention towards negatively arousing stimuli, and on findings that aroused people see higher levels of arousal in others' facial expressions, than do non-aroused persons. With anxious, depressed and anxious, non-depressed groups combined to form one anxious group, and a non-anxious control group, a one-way analysis of variance was performed on arousal scores. Hypothesis 1 was supported, with anxious subjects reporting higher levels of perceived arousal in photographs ($M=182.70, SD=20.34$) than non-anxious subjects ($M=164.35, SD=16.82$). As illustrated in Table 4, a highly significant effect for anxiety was obtained, $F(1,64)=13.62$, $p<.001$. Therefore, the anxious arousal component, and not depression per se, seems best to account for differences in perceived arousal.
Table 4

One Way Analysis of Variance for Arousal Scores

<table>
<thead>
<tr>
<th>Source</th>
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<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
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<td>5045.61</td>
<td>5045.61</td>
<td>13.62</td>
<td>.0005</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>23704.23</td>
<td>370.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To assess whether all, or a subset of emotion categories accounted for this difference in perceived arousal, one-way analyses of variance were performed on arousal scores for individual emotions. Bonferroni's inequality procedure was employed to control for the probability that the chances of a Type I error would be greater than .05 with this family of nine comparisons. This resulted in assessing significance of intergroup differences on the basis of a per comparison error rate of .0056. Employing this error rate, anxious versus non-anxious subjects perceived higher levels of arousal for interest, \( F(1,64)=8.174, p=.0056 \) (anxious group \( M=15.35, SD=4.22 \); non-anxious group \( M=12.35, SD=3.56 \)); and for shame, \( F(1,64)=13.090, p=.0006 \) (anxious group \( M=14.56, SD=4.74 \); non-anxious group \( M=10.39, SD=3.66 \)). There was a tendency towards anxious subjects perceiving higher levels of arousal for sadness, \( F(1,64)=5.055, p=.0280 \) (anxious group \( M=20.51, SD=2.93 \); non-anxious group \( M=18.00, SD=3.33 \)); joy, \( F(1,64)=4.823, p=.0317 \) (anxious group \( M=22.70, SD=4.27 \); non-anxious group \( M=20.17, SD=4.57 \)); and contempt, \( F(1,64)=6.462, p=.0135 \) (anxious group \( M=15.00, SD=4.19 \); non-anxious group \( M=12.48, SD=2.87 \)). Thus, it was particularly for lower arousal emotions that attributed
arousal differences tended to be seen. This pattern will be discussed later.

With the same two groups as used above, one-way analysis of variance was performed on pleasantness scores. As expected, there was no effect of subjects' anxiety on their ratings of pleasantness of facial expression, \( F(1,64)=.237, p>.5 \) (anxious group \( M=113.70, SD=21.03 \); non-anxious group \( M=116.09, SD=14.22 \)). Thus, there was no evidence to suggest that the experience of anxious arousal will lead to negatively biased perceptions of the valence of others' expressions of emotion.

**Influence of Self-Reported Depression on Quantitative Ratings of Perceived Emotion**

Hypothesis 2 stated that depressed subjects would be more likely than non-depressed subjects to rate all photographs as showing a lower level of pleasantness. This hypothesis is based on a finding (Mandal, 1986) that depressed subjects appeared particularly sensitive to a pleasantness dimension of emotion, and on Beck's (1967) theory of depression which includes negative perceptions of the world as core symptoms. Accordingly, with non-anxious, non-depressed and anxious, non-depressed groups combined to form separate depressed and non-depressed groups, a one-way analysis of variance was performed on pleasantness scores. Although, as expected, the mean perceived pleasantness score for the depressed subjects
was lower than the combined means of the two non-depressed groups (M=116.78, SD=16.78), Table 5 illustrates that this difference did not reach statistical significance, \( F(1,64)=2.17, p>.10. \)

Table 5

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
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<tbody>
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<td>Group</td>
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<td>770.05</td>
<td>770.05</td>
<td>2.17</td>
<td>.1459</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>22740.31</td>
<td>355.32</td>
<td></td>
<td></td>
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</tbody>
</table>

Therefore, the hypothesized difference in pleasantness ratings, between non-depressed subjects and those who rated themselves as depressed, was not supported. Tukey HSD post-hoc comparisons of means were also performed on pleasantness scores of all three individual groups to establish whether there were any significant differences between individual group means. No inter-group differences exceeded 13.96, the "honestly significant difference" at the .05 level, for the pleasantness scores of these three groups. Accordingly, there was no support for a hypothesis that anxious, depressed subjects would see generally lower levels of pleasantness in facial expressions than would anxious, non-depressed or non-anxious, non-depressed subjects.

Despite the overall lack of significant differences in perceived pleasantness of emotions, it is possible that groups differed in their perception of individual emotions. Accordingly, one-way analyses of variance were performed for individual emotions, once again using the Bonferroni inequality
procedure. There was a tendency towards depressed subjects rating facial expressions of interest, $F(1,64)=4.156$, $p=.0467$ (depressed group $M=16.45$, $SD=5.28$; non-depressed group $M=18.74$, $SD=3.54$); and shame, $F(1,64)=6.019$, $P=.0169$ (depressed group $M=10.30$, $SD=3.55$; non-depressed group $M=12.52$, $SD=3.23$) as less pleasant than they were rated by non-depressed subjects. Possible reasons for this tendency on 2 of the 9 emotions will be discussed later.

A one-way analysis of variance was also performed on arousal scores with non-anxious, non-depressed and anxious, non-depressed groups combined to form one depressed and one non-depressed group. As expected, there was no significant effect for depression on the ratings of level of arousal in facial expressions, $F(1,64)=2.5083$, $p>.10$ (depressed group $M=182.45$, $SD=24.23$; non-depressed group $M=173.63$, $SD=16.89$). Therefore, the depressive symptomatology of the anxious, depressed subjects does not appear to bias their perception of arousal states in a manner different to that exhibited by those who are also anxious, but not depressed.

**Intergroup Differences in Qualitative Assessment of Facial Expressions of Emotion**

A major purpose of this study was to investigate hypothesized differences between anxious/depressed subjects and a normal control group, in the perception of facial expressions
of emotion, that may occur independently of any differences between the groups in qualitative recognition of the subject emotions. This section presents results of the investigation of possible qualitative differences between the groups in perception of facial expressions. The summary of an analysis of variance of accuracy scores presented in Table 6 illustrates that, as anticipated in Hypothesis 3, there was no support for differences among the groups in the accuracy of their recognition of facial expressions of emotion, $F(2,63) = .67$, $p > .5$.

Table 6

<table>
<thead>
<tr>
<th>Source</th>
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<th>$p$</th>
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<tr>
<td>Group</td>
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<td>11.47</td>
<td>5.73</td>
<td>.67</td>
<td>.5158</td>
</tr>
<tr>
<td>Error</td>
<td>63</td>
<td>540.06</td>
<td>8.57</td>
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</table>

As there was a possibility of differences in accuracy on individual emotions, individual one-way (group) analyses of variance were performed for all emotions. Once again the Bonferroni procedure was employed with significance being assessed on the basis of a per comparison error rate of .0056. There were no significant differences between groups for any of the individual emotion categories. Thus, there appeared to be no differential patterns of accuracy between groups in their categorical processing of facial expressions of emotion.

It is impossible to draw conclusions from negative findings in the way one can with hypothesized positive findings. However, one way to assess the ability of the present test to detect
inter-group differences when they do exist is to set up a reasonable scenario for inter-group differences and assess the power of the test to detect these differences. Accordingly, if the anxious, non-depressed and anxious, depressed subjects were alike in accuracy and separated from normal controls by one standard deviation (2.91 points), the present sample size would lead to a power of .92. Thus, only 8 times out of 100 would a Type II error be expected to occur.

Effects of Self-Reported Social Introversion on Qualitative Assessment of Facial Expressions of Emotion

It was hypothesized that subjects who score high versus low on the social introversion scale of the MMPI-168 would be less accurate in their qualitative identification of facial expressions of emotion. This hypothesis, based on past findings suggesting that social withdrawal may lead to emotion recognition deficits (Walker, Marwit, & Emory, 1980), was not supported. Although social introversion and accuracy scores were negatively correlated (−.0610), this correlation was trivial and non-significant. Thus, socially introverted persons did not appear inferior to others in terms of the accuracy with which they judged facial expressions of emotion.

Within group correlations between social introversion and accuracy scores were also performed to assess whether there might be some support for the above hypothesis within more
homogeneous groups (i.e., normal controls, anxious, and anxious-depressed). The highest of these correlations was for
anxious, non-depressed subjects for whom the correlation was
-.3212. Although this correlation was in the expected direction,
it was not significant. The correlation for anxious, depressed
subjects was trivial and not in the expected direction (.0373).
For the normal controls, though larger, it was in the wrong
direction, and still not significant (.2184).

A one-way analysis of variance conducted on social
introversion scores did actually reveal an overall significant
effect for group membership, $F(2,63)=3.9406$, $p<.025$. Comparisons
of group means revealed that, as a group, anxious-depressed
subjects saw themselves as more socially introverted than did
controls, $t(63)=2.796$, $p<.01$. No other significant differences
in group means were found. These findings suggest that depressed
subjects may be more socially isolated than normal persons but
that their social introversion does not influence the accuracy
of their assessment of facial expressions of emotion.

Multidimensional Scaling

Multidimensional scaling of similarity data was carried out
using the Multiscale II program (Ramsay, 1986). The purpose of
the multidimensional scaling procedure was to produce a spatial
representation of the perceived dissimilarities of facial
expressions of emotion used in this study. By so doing, it is
possible to assess the validity of the present view that people have a "mental map" of emotions based on the two orthogonal dimensions of level of pleasantness and level of arousal. Additionally, by comparing the "mental maps" produced by each group, this procedure allows for statements to be made about similarities and dissimilarities in the emotion processing of different subject groups.

Using a maximum likelihood estimation technique, which assumes a log normal distribution for the dissimilarities, the multidimensional scaling procedure generated a set of mathematical distances which closely approximated the subjective dissimilarities generated by the subjects. As expected, and in accord with Schlosberg's (1952) model, the most useful representation was a two dimensional spatial plot in which the dimensions were pleasantness and arousal, and the locations of emotion terms were consistent with those obtained by Russell (1980).

Initial operations on the dissimilarity data revealed that both anxious groups showed great inter-group and intra-group similarity in their judgments. Non-anxious, non-depressed subjects (Group 1), on the other hand, displayed significant inter-subject differences in their similarity judgments. Multiscale II provides the option for differential weighting of dimensions from subject to subject. Because of the homogeneous judgments of anxious, non-depressed (Group 2) and anxious, depressed subjects (Group 3), these two groups were combined and
weights for each dimension were constant between subjects. However, given the individual differences within the non-anxious, non-depressed group (Group 1), the most suitable model was that in which the weighting of dimensions was allowed to vary from subject to subject. For the purpose of presenting multidimensional scaling results, the combined clinical group is referred to as Group A and the non-anxious, non-depressed group is Group B.

Table 7 presents a summary of multiscale analyses undertaken before arriving at final solutions for the two groups. Table 8, by showing the improvement in fit for additional dimensions, justifies the choice of a two dimensional model, and Table 9 supports the use of an unweighted model for the combined clinical group, and a weighted model for the control group.

Other results are presented separately for the combined anxious Group A, and for the non-anxious, non-depressed Group B. Tables 10 and 12 present summaries of final results after successful convergence of main iterations had been achieved, for Groups A and B respectively. Tables 11 and 14 present the interpoint (inter-emotion) differences produced in the multiscaling procedure. Given that an individual weighting model was employed with Group B, Table 13 presents the individual weights obtained for each subject in Group B.

Line (Figures 1 & 3) and spatial (Figures 2 & 4) plots illustrate that 3 emotions were placed differently by the two
groups. Relative to their own mental maps, the combined anxious, depressed/anxious, non-depressed group saw interest as more pleasant, joy as more aroused, and disgust as less pleasant and less aroused, than did the normal control group. These findings will be discussed later.
Table 7

Summary of Multiscale Analyses

<table>
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<tr>
<th>Analysis</th>
<th>2logL</th>
<th>AIC</th>
<th>BIC</th>
<th>Global df</th>
<th>Std. Error</th>
<th>Iterations to Convergence</th>
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<td>(1,2,3)U1</td>
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<td>(1,2,3)U2</td>
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<td>2308</td>
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<td>2304</td>
<td>1.06</td>
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<td>723</td>
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<td>1808</td>
<td>2304</td>
<td>1.06</td>
<td></td>
<td>723</td>
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<tr>
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</table>

Key to Analyses for Tables 7-9:

(1),(2),(3)-group number
U and W -unweighted and weighted dimensions
1,2,3,4 -number of dimensions
Table 8

Effect of increasing the number of dimensions on fit for all groups combined

<table>
<thead>
<tr>
<th>Analysis</th>
<th>df</th>
<th>Chi squared</th>
<th>AIC decrease</th>
<th>BIC decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1,2,3)U0*</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
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<td>569</td>
<td>293</td>
<td>-504</td>
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<tr>
<td>(1,2,3)U2</td>
<td>145</td>
<td>985</td>
<td>695</td>
<td>-142</td>
</tr>
<tr>
<td>(1,2,3)U3</td>
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<tr>
<td>(1,2,3)U4</td>
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<td>800</td>
<td>-101</td>
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</table>

*-baseline model

Table 9

Relative fit of various MULTISCALE models

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<th>Analysis</th>
<th>df</th>
<th>Chi squared</th>
<th>AIC decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1,2,3)U2*</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1+(2,3)U2</td>
<td>13</td>
<td>24</td>
<td>-2</td>
</tr>
<tr>
<td>1+2+3 U2</td>
<td>26</td>
<td>77</td>
<td>29</td>
</tr>
<tr>
<td>1W2+(2,3)U2</td>
<td>36</td>
<td>183</td>
<td>111</td>
</tr>
<tr>
<td>1W2+(2,3)W2</td>
<td>79</td>
<td>256</td>
<td>98</td>
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<tr>
<td>1+2+3 W2</td>
<td>92</td>
<td>354</td>
<td>170</td>
</tr>
</tbody>
</table>

*-baseline model
Table 10

Results for anxious, non-depressed and anxious, depressed subjects (Group A)

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<th>Value</th>
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<tr>
<td>2 x log likelihood</td>
<td>-3629.805</td>
</tr>
<tr>
<td>AIC Statistic</td>
<td>3913.805</td>
</tr>
<tr>
<td>BIC Statistic</td>
<td>4672.755</td>
</tr>
<tr>
<td>Unbiased standard error</td>
<td>1.862</td>
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<tr>
<td>Number of parameters</td>
<td>142</td>
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<td>Number of degrees of freedom for error</td>
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<td>Maximum likelihood standard error estimate</td>
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</table>

Convergence was achieved after 67 iterations.

Table 11

Interpoint distances (Group A)

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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
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<td>Joy</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Interest</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Surprise</td>
<td>54</td>
<td>56</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>59</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
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<td>60</td>
<td>7</td>
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<td>40</td>
<td>44</td>
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<td></td>
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</tr>
<tr>
<td>Disgust</td>
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<td>33</td>
<td>36</td>
<td>33</td>
<td>49</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shame</td>
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<td>43</td>
<td>59</td>
<td>23</td>
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<td>60</td>
<td>28</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Contempt</td>
<td>67</td>
<td>43</td>
<td>65</td>
<td>27</td>
<td>64</td>
<td>66</td>
<td>33</td>
<td>7</td>
<td>0</td>
</tr>
</tbody>
</table>
Figure 1

Line plot for each dimension (Group A)
1(PLEASANTNESS) 2(AROUSAL)

46  ANGER
44
42
40
38
36
34
32
30
28
26
24  DISTRESS(SADNESS)
22
20
18
16  FEAR
14
12
10  SURPRISE
  8
  6
  4
  2
  0
-2  DISGUST
-4  CONTEMPT
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36  INTEREST
-38
-40
-42
-44  JOY
-46
Figure 2
Plots of the configuration (Group A)

(AR) - Arousal
(PL) - Pleasantness

Plotting Emotion Symbol

A Joy
B Interest
C Surprise
D Distress (Sadness)
E Fear
F Anger
G Disgust
H Shame
I Contempt
Table 12

Results for control subjects (Group B)

<p>| | |</p>
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<td>BIC Statistic</td>
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Convergence was achieved after 41 iterations.

Table 13

Individual weights (Group B)

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<th>8</th>
<th>9</th>
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<td>15</td>
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Table 14

Interpoint distances (Group B)

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<td>14</td>
<td>20</td>
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<td>0</td>
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<td>40</td>
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<td>29</td>
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</tr>
<tr>
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</table>
Figure 3

Line plot for each dimension (Group B)
1 (PLEASANTNESS) 2 (AROUSAL)

ANGER

CONTEMPT
SHAME, DISTRESS (SADNESS)

FEAR, DISTRESS (SADNESS)

SURPRISE

INTEREST

JOY

SHAME

CONTEMPT

INTEREST

DISGUST, ANGER

DISGUST

FEAR, SURPRISE

JOY
Figure 4

Plots of the configuration (Group B)

(A) - Arousal
(PL) - Pleasantness

Plotting Symbol

<table>
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<th>Symbol</th>
<th>Emotion</th>
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</thead>
<tbody>
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<td>A</td>
<td>Joy</td>
</tr>
<tr>
<td>B</td>
<td>Interest</td>
</tr>
<tr>
<td>C</td>
<td>Surprise</td>
</tr>
<tr>
<td>D</td>
<td>Distress(Sadness)</td>
</tr>
<tr>
<td>E</td>
<td>Fear</td>
</tr>
<tr>
<td>F</td>
<td>Anger</td>
</tr>
<tr>
<td>G</td>
<td>Disgust</td>
</tr>
<tr>
<td>H</td>
<td>Shame</td>
</tr>
<tr>
<td>I</td>
<td>Contempt</td>
</tr>
</tbody>
</table>
CHAPTER III
DISCUSSION

This section will examine and discuss both the expected and the more surprising findings from this study. In order to review present findings in light of other relevant research, a topic of fundamental importance for depression studies must be addressed first. Specifically, attention should be directed to problems encountered in recruiting a group of subjects who cite high levels of depressive symptomatology but non-clinical levels of anxiety. Without such a group, it was not possible to construct a balanced 2 x 2 factorial design for investigating the present hypotheses. The following sections will discuss the absence of a depressed, non-anxious group, with emphasis on the most likely causes: generally high levels of anxiety in depressed persons; and possible lack of discriminant validity in depression and anxiety scales.

Absence of a Non-Anxious, Depressed Group

It is unfortunate for purposes of a logical balance in an a priori experimental design, but perhaps not surprising in terms of knowledge of the symptomatology of affective disorders, that it proved impossible to obtain non-anxious, depressed subjects for the present study. From one viewpoint, the absence of this group may be a drawback of categorizing subjects on the basis of self-reported symptoms. When categorization has been done on the
basis of diagnostic entity, it has been possible to select "diagnostically discrete" groups with either depressive or anxious diagnoses. From another viewpoint, this finding may be a virtue of the present study in that the use of diagnostic entities fosters a false sense of security for researchers regarding the purity of symptomatology within different diagnostic categories. In fact, past research findings suggest that categorization by diagnosis conceals frequent significant levels of anxious symptomatology within people diagnosed as suffering from a depressive disorder (Steer, Beck, Riskind, & Brown, 1986).

There are certainly precedents in previous research for the present failure to obtain non-anxious, depressed subjects. Miller, Seligman and Kurlander (1975) had similar problems in obtaining a group of college students who endorsed a high number of items on the Beck Depression Inventory (Beck et al., 1961) but did not score in the clinical range on the IPAT Anxiety Scale (Scheier & Cattell, 1967). These researchers noted that their inability to find non-anxious, depressed subjects underlines the need for future studies to include a matched anxious, non-depressed group before concluding that any results are specific to depression. Such a group was included in the present study.

In another relevant study, Craighead, Hickey and DeMonbreun (1979) wanted to construct subject groups of college students in order to investigate whether self-reported depressed subjects
would be more likely than non-depressed subjects to distort their perception and recall of neutral feedback. Assignment to groups was based on the Beck Depression Inventory and a modified version of the Endler-Okada S-R Inventory of General Trait Anxiousness (Endler & Okada, 1975). Once again, a dearth of subjects reported high levels of traditional depressive symptoms concomitant with low levels of anxious symptoms. Accordingly, they constructed the same three groups as used in the present study, noting:

"Since depression and anxiety are highly correlated in the sample and with the assessment instruments being employed, and since it is essential to have a psychopathology control group in order to argue that obtained group differences may be clearly attributable to depression, it was decided that the following groups should be included in the study: depressed, anxious; non depressed, anxious; non-depressed, non-anxious."

Obviously, an important question to be addressed is, "Why are non-anxious, depressed persons not emerging in these studies?" Given findings from the above two studies, it is tempting to conjecture that inability to obtain subjects who endorse a high number of depressive self-statements, but a non-clinical level of anxious self-statements, is a function of using undiagnosed college students rather than psychiatric patients. However, in addition to results from the present sample, such conjecture is invalid given the evidence from numerous studies that, in psychiatric patients also, symptoms regarded as depressive in nature coexist with symptoms regarded as reflecting anxiety (Derogatis, Klerman, & Lipman, 1985; Akiskal, 1985; Mathew, Swihart, & Weinman, 1982; Van Valkenburg,
Akiskal, Puzantian, & Rosenthal, 1984; Izard & Blumberg, 1985). Steer, Beck, Riskind and Brown (1986) have actually posited that depressive and anxious symptoms co-occur so often that frequently it is difficult to identify which symptoms are truly indicative of which disorder. What then is the relationship between anxiety and depression? This question will be addressed further in the following section.

**Relationship of Anxiety to Depression within Subjects**

High levels of anxiety may consistently constitute a significant portion of the symptomatology of depressive states. Alternatively, the opinion that self-reports of anxiety are common only in certain types of depression was expressed by Gray (1985) who, using the now archaic neurotic vs. psychotic dichotomy, noted that neurotic depression includes many symptoms, such as self-reported anxiety, which are identical to anxiety states; whereas psychotic depression, with its accompanying loss of ability for reality testing, is qualitatively different. By not employing inpatients, by excluding anybody taking neuroleptic medication, and by administering a portion of Benton's Facial Recognition Test, the present study hopefully excluded the "psychotically" depressed. Psychosis has already been shown to result in anomalies in emotion perception which appear unrelated to depressive affect. Thus, what was left in the present study was a group of "neurotically" depressed subjects. Accordingly, Gray would have
predicted the presence of anxiety among the depressed subjects in this study. Given the lack of information on the anxiety levels of depressed groups in past studies, what was not predictable was the severity and pervasiveness of the anxiety in this group. Specifically, would they all exhibit clinical levels of anxiety, as assessed by the Leeds scales? In the absence of strong "a priori" evidence of anxiety levels, it was felt that there was insufficient justification for not trying to obtain a "depressed, non-anxious" group for the present study.

Constructing a neurotic-psychotic dichotomy is not the only useful method for discriminating between types of depressive symptomatology. Dimensionalization according to mania and depression (bipolar) versus depression only (unipolar) is also relevant in that Donnelly, Murphy and Goodwin (1978) found that unipolar depressed subjects cited significantly higher levels of anxiety than did bipolar subjects, on the IPAT Anxiety Scale. They believed that the "manic personality dimension and associated use of denial" by bipolar depressed patients enables them to cope with anxiety in a way that unipolar patients cannot. Accordingly, they suggested that test-taking defensiveness, in general, and denial in particular, might account for findings suggesting lower levels of reported anxiety in bipolar patients. Given the requirement for self-report of depressive affect and anxiety in the present study, the absence of subjects with a diagnosis of bipolar affective disorder should reduce the possibility of spuriously low scores on both
anxiety and depression scales.

Anxiety as a Possible Precursor to Depression

Other researchers have also stated strong cases for the belief that where there are depressive symptoms, anxiety is likely to be present. Watts (1966) noted that the eventual course of the illness suggests that middle-aged patients who present in a primary care setting with symptoms of a severe anxiety state, and who lack a history of premorbid neuroticism are, in fact, suffering from a primary depressive illness. This suggests that anxiety may be the first stage of affective disorder in a model posited by Gersh and Fowles (1979). These researchers saw anxiety and depression as two symptomatic stages of one affective disorder with the ratio of anxious and depressive symptoms varying over time such that the diagnosis depends upon the stage of the illness at which a patient is evaluated.

In the same vein, Roth, Gurney, Garside, and Kerr (1972) believed that anxiety serves as a precursor to depression such that, with the passage of time, longstanding anxiety states tend to acquire characteristics which are predominantly depressive in nature. Mandler (1980) was perhaps supporting this view when he described the "hopelessness" of depression as being a generalization of the "helplessness" of anxiety.
In empirical studies supporting the above view, using the Anxiety Disorders Interview Schedule (DiNardo, O'Brien, Barlow, Waddell, & Blanchard, 1983), Barlow et al. (1986) found that persons with a major depression diagnosis scored very high on "apprehensive expectation", a symptom which Barlow calls the "cardinal feature" of Generalized Anxiety Disorder. With subjects who fulfilled Research Diagnostic Criteria for either a major/minor depressive disorder or some kind of anxiety diagnosis, Blackburn, Jones and Lewin (1986) found that their depressed group scored higher on the State Trait Anxiety Inventory (Spielberger, Gorsuch & Lushene, 1970) than did their anxious group. A similar finding obtained in the present study with the anxious, non-depressed group having a mean anxiety score of 8.82 and the anxious, depressed group having a mean anxiety score of 10.70. However, unlike many previous studies, this latter group was explicitly referred to as anxious, depressed rather than just depressed. The foregoing does suggest that an anxious presentation, without significant depressive symptomatology, may be found in subjects who will later develop a depressive disorder. There is also the possibility that the finding of Blackburn et al. speaks more to the validity of self report measures of anxiety than to the co-morbidity of the two states. This issue, together with its relevance for the use of the Leeds scales, will be considered in a later section.

At this point, it can be stated that, despite frequent usage of the terms, considerable confusion exists as to the true
nature and interrelation of anxiety and depression states. Lesse (1982) addressed this confusion when posing a question which had probably been on the lips of many, namely, "Is anxiety the primary response to stress in all instances or can depression be a primary response to stress?" It would appear that Lesse believes, from long years of studying the topic, that anxiety is indeed the primary response. He reported on 18 years of observing the motor, affective, autonomic, and verbal components of anxiety in nearly 700 "severely anxious" patients. Whereas, from an investigative point of view, his study may have lacked appropriate experimental rigor, it is interesting to note his finding that anxiety constituted the primary response to socio-environmental stressors in over 80% of patients studied. Additionally, at the time of presenting his findings, Lesse noted that of the 60 patients who had been ill for a year or less:

"it was usually only after weeks or months of mounting anxiety with progressive dominance of secondary hypochondriasis or somatic symptoms that evidences of a developing depressive core could be documented."

One of the leading researchers on the nature of depressive and anxious states has been Sir Martin Roth. In a final consideration of this continuing confusion, few researchers would disagree with the succinct description that comes from his work with his colleague Mountjoy (Mountjoy & Roth, 1982). In considering the relationship between anxiety disorders and depressive states, they have stated:
"The relationship between depressive states and anxiety neuroses constitutes a problem of central importance in the classification of disorders of affect. The blend of anxiety and depressive features is perhaps the commonest syndrome of emotional disorder seen in psychiatric outpatient departments and in general practice. A blend of the emotional symptoms culminates in the clinical picture both of depressive neuroses and anxiety states and no rule exists whereby precedence can be given in diagnosis to one or other of the components of the clinical picture."

The foregoing would appear to present a strong case for asserting that the person who complains of depressive symptoms but does not also endorse a significant number of anxiety symptoms is indeed "a rare bird." However, in the same study, these researchers note that an increasing amount of evidence, based on multivariate statistical analysis, shows that it is possible to separate depressive states from anxiety neuroses. Additionally, above findings, and those from the present study, do support the existence of a group of anxious persons who do not display significant depressive symptoms. Given the above-noted tendency for depressed subjects to have significant levels of anxiety, together with positive findings of this study regarding perceived arousal, and negative findings regarding perceived pleasantness, one should not be surprised to encounter similar quantitative assessments of emotion from both anxious and depressed populations. Specifically, present data suggests that both groups would interpret all facial expressions as showing anomalously high arousal levels. However, for 7 of 9 emotions studied, there was no indication that either group differed significantly from normals in their overall assessment of the amount of pleasantness portrayed in different facial
expressions. The tendency towards perceived pleasantness differences with "interest" and "shame" will be addressed later.

Today, few clinical researchers would deny the high frequency with which the diagnostic criteria for a depressive disorder coexist with the diagnostic criteria for anxiety disorder within the same person. However, as noted above, past research and present findings do indicate that there are a large number of persons who display symptoms of anxiety without displaying a significant number of specific depressive symptoms. Present findings suggest that the inclusion of this anxious, non-depressed group is vital for any study in which researchers attempt to investigate differences between depressed and normal persons in processing emotional information. Without such inclusion, it would not be possible to argue that obtained group differences may be clearly attributable to depression.

Although clinical evidence is strong for the existence of anxious, non-depressed subjects, there is a psychometric issue to be addressed which must take into account differences between persons assigned discrete depressive and anxiety diagnoses and undiagnosed persons, who by their own self-report, suffer from a significant number of symptoms described as either anxiety or depression. There has been a tendency in past studies for researchers to assign subjects to clinical groups on the basis of historical diagnoses without attempting to assess arousal and affective state at time of testing. This method of subject assignment is a "luxury" not available to researchers working
with undiagnosed counselling and therapy clients. However, the
need to assess levels of depression and anxiety is really an
advantage in that it allows the researcher to assess anxious and
depressive symptoms at the most relevant time for their
research, the time of testing. Such assessment is particularly
important in the present study because of the need to relate
present subject state to present processing. Assessment of
present state can be carried out by using an observer rating
scale, or by having a subject self-report their own levels of
anxious and depressive symptomatology. Problems inherent in
using both types of scale will now be considered.

Reasons for Using Self-Report Instruments and Concerns Regarding
their Validity

A major issue concerns the validity of using either
self-report instruments or observer rating scales to assign
persons to either depressive or anxious diagnostic groups for
experimental purposes. It is particularly relevant in the
present study (and in other studies with similar outpatient
populations) because these subjects characteristically have not
received a depressive or anxiety disorder diagnosis. Rather,
they represent that majority of persons who seek the help of
both professional and lay therapists because of depressed affect
or feelings of anxiety, but who may never receive a DSM-III-R
diagnosis. Although undiagnosed, such persons typically do cite
levels of depressive and anxious symptomatology which, while
sometimes transient, have often reached clinical levels at the time they seek counselling.

Additionally, and with reference to the present study, use of this group made it possible to recruit controls from among their work colleagues, and it seems reasonable to assume that the clinical and control groups were well matched in terms of work environment, responsibility level, amount of patient contact, and the general daily stresses of caring for patients in a very large psychiatric facility. Hopefully, this relative homogeneity of subjects helped to ensure that noted differences in depression and anxiety levels did not just reflect such demographic variables as socioeconomic status or education. A lack of significant correlation between anxiety/depression scores and various demographic variables (including education) suggested that Leeds Scale scores did not simply reflect education and job levels.

Before specifically addressing problems in validity, it is important to reiterate that, because the present study entailed an examination of the influence of a person's present affect on the visual perception of others' affective states, it necessitated a "snapshot" view of how the subject felt at a particular moment in time. This fact appears to have been ignored by many researchers, but its importance cannot be overstated. Sacco (1981) stated it well by noting:

"the lesson to be learned is clear. Subjects should be tested for level of depression immediately prior to the experiment... this suggestion is particularly pertinent
to research using college students, who are likely to experience transiently depressed states, though it is also methodologically sound to apply the 'test on the day of experiment rule' to clinical populations as well. Otherwise, the results of depression experiments are likely to be invalid and misleading."

Historical diagnoses, while useful in terms of prognosis and the formulation of appropriate treatments, may not correspond well with the subject's affect at the time of testing. Specifically, in a world where socio-environmental stressors are temporally unpredictable (especially in facilities for psychotic patients), a person in good general mental health may, at any particular time, be experiencing stronger negative emotions than a person with a diagnosed affective disorder. The Leeds scales, used in the present study, specifically request that respondents endorse items with respect to the present moment and the very recent past (last day or two).

It was stated earlier that the Leeds scales comprise statements which reflect the diagnostic criteria for depressive and anxious disorders within the DSM-III-R and the ICD-9. This symptom correspondence with major diagnostic systems does not, of course, carry over to temporal requirements for the above diagnoses. However, this aspect of the Leeds scales would not appear problematical for the present study in that it was essential to assess subjects' present affective state rather than their diagnostic status. The reason for this is that, for example, a person who was diagnosed as depressed 6 months ago may well be significantly less depressed now than a person who
has not yet been diagnosed.

The questions addressed, and the present processing focus of this study made it imperative to assess anxious and depressive symptoms just prior to testing. With these considerations in mind, it must be stated that some researchers have questioned the psychometric adequacy of commonly used self-report depression and anxiety scales. Dobson (1985) illustrated this concern when reporting that the average correlation between anxiety and depression scales is close to the average correlations within a group of depression scales and within a group of anxiety scales. Accordingly, he concluded that one is left to question whether the two states, as measured by self-report instruments, are actually separate constructs.

What appears likely, given earlier noted opinions of researchers in the area (Gray, 1985), is that symptoms of anxious arousal are included in diagnostic criteria for depressive disorders. However, it does not appear that anxious diagnoses are similarly dependent upon traditional depressive symptoms. The present ability to obtain both self-reported anxious, depressed and anxious, non-depressed groups seems to support this view.

However, Dobson's concerns will not be dismissed summarily as they are important. His findings appear both robust and general in that correlations between self-reported anxiety and depression scales of .40 to .70 have been reported for college
students (Gotlib, 1984; Nezu, Nezu, & Nezu, 1986; Tanaka-Matsumi & Kameoka, 1986); children (Blumberg & Izard, 1986); non-patient adult populations (Orme, Reis, & Herz, 1986); and various patient populations (Bouman & Luteijn, 1986; Mendels, Weinstein & Cochrane, 1972; Zurawski & Smith, 1987). In fact, while eminent researchers such as Akiskal (1985) and Foa and Foa (1982) still indicate that it is valid to maintain an anxiety-depression distinction, some investigators believe that a common underlying construct which may be called negative affectivity, neuroticism, or general psychological distress is what is tapped by all of the presently available anxiety and depression measures (Tanaka Matsumi & Kameoka, 1986; Gotlib, 1984).

The foregoing is of concern to researchers considering whether to use self-report measures to assign affectively disordered subjects to experimental comparison groups. However, in considering alternatives, the drawbacks inherent in group assignment on the basis of historical diagnosis have already been addressed, and observer rating scales also have numerous problems not the least of which is their use of the same symptoms as self-report inventories. For instance, the Leeds and the Hamilton observer rating scales (probably the most popular observer rating scales) are based on similar discriminating items. Other serious drawbacks which make use of observer rating scales undesirable or impossible in many research situations are tainting of obtained scores through such instances of
"experimenter bias" as: 1) "a priori" expectations of how sick subjects with different diagnoses should be; 2) whether the observer's past experience has been mostly with mild or severe psychopathology; and 3) great discrepancies in the competence, training and experience of different observers.

Notwithstanding the noted drawbacks, the requirement at this stage is for an assessment of how viable and defensible it was to use a self-report scale, such as the Leeds, in the present study. This issue will now be addressed.

Rationale for Present Use of the Leeds Scales

Without a pragmatic approach to subject assignment, researchers figuratively will have to "throw up their hands" and declare themselves incapable of investigating the influence of negative affect upon people's daily functioning, thereby leaving unchallenged past, probably erroneous experimental findings, based on assignment by diagnosis. For example, in the present study, assignment by diagnosis would probably have produced the finding that depression and anxiety are independent causes of subjects seeing higher levels of arousal in others' faces.

Obviously, the need to know the impact of depression, anxiety and stress, in general, on people's lives makes the abandonment of such an important area of research unacceptable. In assessing alternatives to such abandonment, defence of self-report instruments comes from Watson, Clark and Carey
(1988) who, in line with the above criticisms of observer ratings, note that it would be folly to conclude that the differential diagnostic problems are purely a reflection of limitations imposed by self-report scales. They cite well researched findings that ratings of anxiety and depression made by clinicians are also highly correlated, that anxiety and depression symptoms do co-occur in many patients (as already noted in this discussion) and that, in fact, co-morbidity of the full clinical syndromes occurs in approximately half of all patients who carry either an anxiety or depression diagnosis. Further, they note that the given correlations, between self-report anxiety and depression scales, of from .40 to .70 still leave a large amount of variance to be accounted for, that one-half of all anxious patients show a relatively pure syndrome, and that there are most certainly distinctive subgroups of patients within each classification, and subjective and physiological correlates unique to each type of disorder.

Dobson's position was that, because studies have shown self rating depression and anxiety scales to correlate between .40 and .70, one should exercise caution in employing them for subject assignment. In the present study, the position would be relevant to separating an anxious, depressed group from an anxious, non-depressed group. There is general agreement from the above studies (Watson et al., 1988) that these scales do tap some form of psychological distress. Therefore, using the Leeds scales to assign the non-anxious, non-depressed control group on
the basis of their low scores would not be problematic.

Despite Dobson's concerns, several factors suggest that the Leeds scales also produced a valid separation of "clinical" subjects into those who reported clinical levels of anxious and depressed symptomatology, and those who were anxious but cited levels of depressive symptoms which were no higher than those cited by normal controls. Firstly, there is a definitional aspect to the present situation. The major diagnostic systems, DSM-III-R and ICD-9 enumerate what symptoms define a clinical anxiety state and what symptoms define a clinical depression state. The Leeds General sub-scales, already noted to correlate very highly with observer ratings and psychiatrist global ratings of the respective disorders, cover most specific, core symptoms of each type of disorder, without apparent overlap with the other disorder. Supporting this assertion, Mountjoy and Roth (1982) performed a principal components analysis of 41 items which occurred with a frequency of more than 10% in a group of 108 patients diagnosed with anxious, depressive or phobic neurosis. Although, diagnostic groups overlapped in the two component plot, none of the items used in the Leeds General Depression sub-scale overlapped with General Anxiety sub-scale items. This suggests that the Leeds items are, in some way, discretely depression-related and discretely anxiety-related, respectively.

In general terms, it would seem that the most important consideration is whether maintaining a dichotomy between anxiety
states and depressive states has predictive and descriptive utility, not just for the researcher but also for the sufferer's general practitioner, friends and family members whose care and attention are often the only line of defence against development of the full syndromes of mood and anxiety disorders. Some estimates place an individual's lifetime risk for a depressive disorder at as high as 30%. Kedward and Cooper (1966) suggest that 27% of people who present in general practice with psychiatric symptoms have anxiety states. Obviously, patients displaying depressive symptoms or anxious symptoms (or both) make up a very significant portion of all patients with psychiatric disorders. Therefore, mental health professionals need to know whether the anxious/depressive distinction is a useful one.

Findings from Roth and Mountjoy (1982) would appear strongly to validate the separation of anxiety states from depressive states on the basis of presently employed diagnostic criteria. These researchers present supporting evidence for the following conclusions: (1) the anxious cluster tends to be characterized by a more sudden, less insidious onset, (2) features predicting outcome are different for the two complaints, (3) recovery from depressed mood is more likely to occur, (4) there is much stronger evidence for a hereditary disposition to anxiety than exists for neurotic depression, and (5) the two types of complaint differentially respond to psychotropic medication. Additionally, from the perspective of initial presentation,
within the present study there was certainly a group of subjects who endorsed a high number of the "anxiety" symptoms, but considered themselves to have no more depressed symptoms than the normal control subjects. It is difficult to believe that diagnostically grouping these "anxious" persons with the generally more sad and apathetic anxious, depressed group would not deleteriously influence intervention decisions and prognostic forecasts for both groups.

There is no reason to believe that, at least for the foreseeable future, the mental health profession will abandon distinct anxiety and depression classifications within the major diagnostic systems. The Leeds scales, by including questions on sad mood, anhedonia, apathy, delayed insomnia, poor appetite and suicidal thoughts for the depression subscale; and panic, restlessness, agoraphobia, irritability, palpitations, and fearful mood for the anxiety subscale, is clustering those symptoms which, while an anxiety-depression dichotomy is maintained, reflect DSM-III-R diagnostic criteria and, by so doing, capture the nature of identifiable states which diagnosticians refer to as anxiety or depression.

Eventually, we might join the anxiety and depression categories and say that those people who endorse a high number of "negative arousal" self-statements see the world differently from others. However, these self-statements do comprise markers for an anxiety disorder within the accepted diagnostic systems. While significant groups of persons do not reveal clinical
levels of "depressive" symptoms, anxiety disorder is a term which suggests to clinicians a behavioural profile and indicates appropriate and specific pharmacotherapy (eg. anti-anxiety versus anti-depressant medication) in a manner that affective disorder or negative affectivity does not.

Much effort has been devoted to establishing a rationale for using self-report group assignment and proceeding with three rather than four groups. However, in the present study, hypotheses were straightforward and findings relatively clear. Establishing a rationale for using present tools was of paramount importance. Earlier researchers in this area failed to address problematic issues of subject assignment and differential diagnosis. Without such an effort, less import could be attached to what appear to be some compelling experimental findings. These findings will now be addressed.

**Multidimensional Scaling of Similarity Judgments**

The initial findings to be discussed are those which arose from a multidimensional scaling of judgments made about the similarities of different emotions. The reason for considering these findings first is that they quite clearly illustrate the nature of subjects' "mental map" of emotions and, perhaps more importantly, lend strong support to the strategy of investigating perceived pleasantness and perceived arousal scores, independent of any assessment of accuracy of qualitative
In performing the multidimensional scaling procedure, no predetermined constraints were placed on the number of orthogonal dimensions to be used in representing relations among different facial expressions. Accordingly, solutions were obtained for one to four dimensions. Despite the lack of constraint placed on the number of dimensions, goodness of fit criteria suggested that two dimensions were most useful for representing the present data. As expected, the spatial and line configurations of facial expressions indicated that Axis 1 constituted a pleasantness dimension and Axis 2 constituted an arousal dimension. Thus, the orthogonal dimensions obtained were consistent with those posited by Russell (1980) and in line with the model of Schlosberg (1952).

Additionally, the spatial locations of facial expressions of individual emotions in the present study corresponded to the locations of adjectives denoting the same emotions, in Russell's (1980) study. Therefore, support was obtained for the proposal that people characteristically estimate the similarities of different emotions on the basis of the two orthogonal dimensions of pleasantness and arousal. Accordingly, the present investigation of arousal and pleasantness levels introduced a method of comparing the emotion processing of different subject groups which taps the two basic dimensions which people naturally use in their assessment of emotion.
An interesting finding from the multidimensional scaling procedure was that anxious, depressed and anxious, non-depressed subjects were very similar in terms of their "mental maps" of facial expressions of emotion. However, within the non-anxious, non-depressed group, there was a great deal of individual difference between subjects. Although firm conclusions cannot be drawn from these patterns of results, a plausible explanation is that anxiety exerts a powerful influence on emotion processing which tends to attenuate any individual differences found in non-anxious persons. These findings also strengthen a belief that, for the purposes of this study, the instruments used for assigning subjects to groups, provided a meaningful separation of "clinical" and "non-clinical" subjects.

The spatial and line plots provided by the Multiscale II program allow some comments to be made about the findings of earlier studies. Zuroff and Colussy (1986) claimed that depressed subjects actually interpreted negative emotions as positive. Because the multidimensional scaling suggested that anxious, depressed and anxious, non-depressed subjects were alike in this aspect of processing facial expressions, the present clinical group cite an admixture of depressive and anxious symptoms. However, Zuroff and Colussy did not control for anxiety level, so it is probable that their depressed subjects also had high levels of anxious symptomatology. In the present study, the spatial plots suggested that the clinical group may have seen one negative emotion (disgust) differently.
than did normal control subjects. However, compared to normal controls, they saw this emotion as less pleasant relative to other emotions, not more pleasant. Thus, Zuroff and Colussky's findings were not supported by present results. Walker's (1981) anxious-depressed children mislabelled positive and neutral emotions as negative. No support was obtained for these findings with an adult sample. Disgust, shame and contempt were actually labelled as somewhat more positive than expected. However, this pattern was produced by both clinical and control groups and probably speaks more to the difficulty of producing veridical facial exemplars of these emotions (e.g., shame may look like shyness) than it does to internal processes within any specific subject group.

Mandal's (1986) subjects carried DSM-III-R major depression diagnoses. He also did not control for anxiety and, accordingly, his depressed subjects almost certainly displayed significant anxiety. Mandal noted a certain unidimensionality about the emotion judgments of depressed subjects in that they appeared to rate the similarity of different emotions along a pleasantness dimension, whereas normal controls took into account both pleasantness and arousal dimensions. His findings also are not supported by present results, as spatial plots suggest that the non-anxious, non-depressed subjects and the combined group of anxious, depressed and anxious, non-depressed subjects were similar in their sensitivity to pleasantness and arousal dimensions.
Thus, the present inclusion of a multidimensional scaling task has been extremely useful in addressing questions of bias in the processing of facial expressions of emotion. Present findings do not suggest a unidimensionality of emotion judgments in depressed persons (Mandal, 1986); nor do they suggest that anxious/depressed subjects mislabel the valences of different emotions (Zuroff & Colussy, 1986; Walker, 1981).

It is impossible to rule out the possibility that differences in the nature of depressed subjects account for present differences from past findings (e.g., Zuroff and Colussy's depressed subjects scored higher on the MMPI schizophrenia scale than did their schizophrenic subjects). However, the above discussion suggests that, at least in the way that they perceive interrelations of different categories of emotions, persons who cite high levels of anxious and depressed symptoms are very similar to normal controls.

Main Effect of Anxiety on Arousal Level

Turning to a consideration of the composition and nature of individual emotions, rather than the nature of their interrelations, the remarkable lack of inter-group variance in accuracy of responses to photographed facial expressions validates the universal language of facial expressions. However, despite apparent assumptions to the contrary in past studies (Walker, 1981; Zuroff & Colussy, 1986), such categorical or
qualitative identification is not the only, and probably not the most important, element in the visual assessment of others' feeling states.

If the present study had provided only for a nominal categorization of encoded emotions, the results would have reflected unwarranted homogeneity across groups. However, the finding that those persons who endorse a high number of traditional anxiety symptoms also tend to see more arousal in other persons' expressions, represented in photographs, certainly illustrates the danger of assuming that placement of facial expressions within the same emotion categories implies identical perceptions of the underlying affective states.

The inclusion of these quantitative arousal ratings allowed us to see that there are visual perceptual differences between normal and anxious persons (the anxious, non-depressed and anxious, depressed subjects in the present study), which may very well have behavioural concomitants in the real world. Persons who see themselves as anxious appear to see a more highly charged interpersonal world in which others are less calm than they appear to the non-anxious observer. Interestingly, and in line with expectations, analysis of individual emotions suggest that the present findings are not the result of a tendency for anxious persons to see only a couple of very specific emotions as more aroused. The pattern of perceived arousal levels indicate that anxious persons saw more arousal in general than did normal controls. This was evident in their
appraisals both of two of the objectively lower arousal emotions (judged significantly higher in arousal), and two other objectively lower arousal emotions (judged marginally higher in arousal).

There was an absence of significant differences between groups for objectively high arousal emotions such as fear and anger. These are the emotions for which one might expect less discrepancy for two reasons. Firstly, normal controls are likely to ascribe high levels of arousal to facial expressions of high arousal emotions. Secondly, these are the emotions for which present measuring scales produce ceiling effects attenuating group differences. Importantly, results of this study suggest that this "distortion" or "biasing" in visual perception is unaffected by the presence of sad affect and other traditionally depressive symptoms, at least in a non-psychotic outpatient group.

Of course, the question to be addressed is why anxious people appear to ascribe similarly high levels of arousal to the facial expressions of other people in their environment. Several possible explanations can be raised. An unlikely possibility that they may actually be more accurate in their perceptions would require one of two experimental paradigms. Firstly, both encoders and decoders of facial expressions could give an assessment of the encoders' arousal levels. Alternatively, some mechanical measure of encoder arousal (e.g., heart rate) could be employed. In the absence of such paradigms, it seems unlikely
that anxious subjects would exhibit the present tendency to perceive higher levels of arousal in all low arousal emotions, if indeed they were more accurate.

Assuming that the anxious, non-depressed and anxious, depressed subjects in this study may actually exhibit distorted perceptions, possible explanations would include a need to see some consistency between one's own affective experience and that of others in one's environment; an increased accessibility of "arousal" information to aroused persons; and a "blocking" process which actually prevents perception of low arousal in others. It would not be pleasant for these people to feel that their own affective states are "out of step" with those of their peers. Perhaps a need to see others' emotions as being consistent with one's own leads the anxious person to perceive greater levels of arousal than might actually exist. In support of such an hypothesis, several researchers have provided evidence suggesting that specific emotions experienced at the time of testing influence perceivers' judgments about the emotional states of others (Feshbach & Feshbach, 1963; Hornberger, 1960; Schiffenbauer, 1974). In a related vein, there is evidence to suggest that people base their decisions on the information which is presently most accessible to them (Tversky & Kahnemann, 1974). High arousal is particularly accessible to anxious persons.

Taking the process a step further, Clark, Milberg and Erber (1984) suggested that a perceiver's high level of arousal may
effectively block out perception of lower levels of arousal in other people. This blocking theory may well be supported by the present findings regarding overall arousal rating differences across all but the two highest arousal emotions (fear, anger). In addition, present findings more specifically indicate that anxious subjects make accurate qualitative judgments of both positive and negative emotions, but then assign anomalously high levels of arousal to supposedly low-arousal emotions. For example, anger has been shown to be associated with much higher levels of physiological arousal (blood pressure, heart rate) than has sadness (Schwartz, Weinberger, & Singer, 1981). However, in the present study, anxious subjects often assigned similar arousal levels to both sad and angry facial expressions and also, on the positive side, to interest and joy facial expressions. Thus, it can be suggested that anxious subjects may intensify the arousal of all objectively low-arousal emotions. That high-arousal emotions, such as anger, do not also get raised, suggests a possible ceiling effect.

One conclusion from the present study, in particular, is that assigning a qualitative label to a facial expression is less influential in guiding subsequent perceived arousal than in guiding a subsequent rating of the pleasantness of the facial expression. That is, assessment of arousal may be a more independent process. For example, past findings (Russell, 1980; Clark, Milberg & Erber, 1984) have indicated that sadness is a low arousal, low pleasantness emotion state. Although arousal
and pleasantness are both vital elements of the emotion, it appears that we are more consciously aware of the pleasantness component.

The thesis put forward here is that placement of facial expressions along an arousal dimension is less determined by prior categorization than is the placement of those same facial expressions along a dimension of pleasantness (positivity-negativity). A paucity of studies integrating qualitative and quantitative aspects of emotion recognition greatly limits the amount of empirical evidence available to support such a thesis. However, in a literature review for their study on emotion recognition deficits in schizophrenic patients, Walker, Marwit and Emory (1980) did note that, while differences in accuracy of categorizing specific emotions had been shown by these patients, no differences had been noted when college students, "mental retardates", and psychiatric patients (including schizophrenics) had been asked to rank facial expressions along a positive-negative continuum. The possible "canalization" of pleasantness-unpleasantness judgments will be addressed further in the following section.

Lack of Overall Main Effect for Pleasantness

Overall levels of perceived pleasantness did not differ between groups. However, relative to normal controls, there was a tendency towards depressed subjects seeing lower levels of
pleasantness in facial expressions of interest and shame. In the case of interest, this is in contrast to findings from the multidimensional scaling, which suggest that, relative to their own mental plots, they see interest as relatively more pleasant than do normal controls (these findings are not contradictory given the intergroup vs. intragroup difference in focus of the two procedures). Given that the facial expression of interest is arguably the closest to neutral of any of the emotions, the present finding is not surprising. With fewer valence cues in the facial expression, one would expect less canalization of perceived pleasantness and would also expect the observer's internal processes to be more influential in perceptual judgments. A similar argument can be applied to shame. Personal observation, group mean errors, and findings from Izard's (1971) original cross-cultural study indicated that this was a facial expression which caused subjects a great deal of difficulty in terms of qualitative identification. Accordingly, as with interest, when valence cues are relatively ambiguous, internal processes are more influential.

With regard to the lack of overall differences in levels of perceived pleasantness, it is understood that, whereas the absence of directional results may reflect a real absence of differences between different subject populations, they can also result from any number of procedural problems. Accordingly, we will consider possible reasons for a lack of a main effect of either subjects' depression or anxiety on their ratings of
pleasantness of emotions seen in photographs.

Of course, with respect to the non-depressed, anxious subjects, no prior evidence suggests that they should see others as less pleasant than they actually are. The subjects who might have been expected to do so are those who saw themselves as more depressed than the average psychiatric health employee.

There are cases where clinical subjects' perceptions of pleasantness may vary from those of controls. While anxiety is seldom a reason for hospitalization, there is definitely a group of depressed patients who require hospitalization because of the severity of their symptoms. In the present study, two depressed patients subsequently experienced short hospital stays (in private short-term psychiatric facilities rather than state psychiatric hospitals). However, the subject pool essentially comprised persons who would have been diagnosed neurotically depressed under older diagnostic systems. Perhaps, a group of hospitalized, psychotically depressed subjects would exhibit the expected anomalous perception of pleasantness in facial expression. However, although one of the subsequently hospitalized patients scored at the lower end of the perceived pleasantness scale, his overall perceived pleasantness score was higher than that of several other subjects who reported lower or non-clinical levels of depressive symptomatology. Additionally, with psychotic patients, there is a pervasive loss of ability for testing reality. Accordingly, one would have to question whether perceptual deficits were arising from thought disturbed
processes, similar to those seen in other psychotic subjects, rather than from some peculiarly "depressive" process.

With the present non-psychotic, self-reported (but in therapy) depressive group who exhibited normal reality testing, a few possible explanations come to mind. Campos's (Campos & Barrett, 1984) functional theory of emotions is relevant in this situation. Campos saw emotions as "crucial regulators of social and interpersonal behavior, primarily through their multiple expressive channels." It seems that in the present case, personal safety considerations may render the arousal level in a person's facial expression a more crucial regulator of others' behavioural responses than is the pleasantness level. Whereas a smile or a frown may be intimately related to a person's evaluation of themselves or of others, arousal seems intimately related to action and more informative to the observer in terms of assessing present intent and danger. When presented with an unpleasant low-arousal expression such as boredom, one may prefer to avoid the producer in the future even though nothing in the encoder's face suggests immediate danger to the observer. However, if other aspects of the facial presentation suggest high levels of hostile arousal, such as in an expression of rage, personal safety considerations would lead one to leave that person's presence immediately.

Alternatively, and as stated previously, it seems likely that a prior qualitative identification of an emotion indicates the degree of pleasantness in the facial expression of that
emotion. For example, in the process of socializing young children, parents and teachers point out to the children the effect that their actions have had on other people. When doing this, it would seem that they tend to use such terms as happy and sad to indicate how bad or good the other person feels (valence) rather than the level of arousal that the child's behaviour has precipitated in the other person. This being the case, an assessment of arousal in facial expressions would appear to be less intimately linked to an identification of the specific emotion involved. Accordingly, when observing a sad expression, observers are more likely to perceive the encoder as feeling bad than as feeling a low level of arousal.

In Mandal's (1986) study, in which different diagnostic groups were reported differentially sensitive to the arousal and pleasantness factors, he apparently did not ask for the categorical judgments, required in the present study. Rather, he had patients assess the similarity of exemplars to standards on whatever base seemed most relevant to them. Given that it is probably impossible to avoid identifying emotions on some level, Mandal's methods probably did not totally eliminate any subsequent canalizing effects of naming the emotions. However, such a presentation may have reduced the level of these biases.

Mandal's findings did suggest a strong influence of the pleasantness dimension in that depressed subjects appeared to classify emotions on the basis of their pleasantness rather than their arousal level. However, in the present study, it was
decided explicitly to investigate both qualitative and quantitative assessments. The act of naming an emotion may well be enough to trigger some overlearned and stereotyped conceptions about the pleasantness levels associated with each of the different emotions and, at least with the intact reality testing of a non-psychotic group, thereby negate any increased sensitivity to the pleasantness dimension. Indeed, taking the example of the negative valence, low arousal emotion of sadness, while the image of teachers and parents educating children regarding how their naughty behaviour can make other people sad is a very common one, rarely does one imagine a child being told how their behaviour has produced a state of low arousal in their victim. Accordingly, normal socialization may lead to a somewhat automatic assessment of emotional valence based on well-established concepts of the meaning of different facial expressions, whereas a request to assess arousal is more likely to engender some "perceptual effort" on the part of the observer.

Whatever the reason for a lack of main effect on pleasantness scores, its absence does lend substance to the assertion of Macleod et al. (1986) that anxiety is characterized by attentional biases which facilitate pick-up of mood-congruent threatening information and depression is characterized by memorial biases which lead to recall of mood-congruent, emotionally negative material. In the present study, anxiety did appear to bias emotional processing at an attentional level.
Consistent with the suggestion of MacLeod et al. that depression may bias memory more than present attention, there was no evidence that significant levels of self-rated depression significantly influenced subjects' perceptions of arousal or pleasantness in facial expressions. Apart from the two noted instances of "interest" and "shame", there was no evidence that depression influenced the overall perception of level of pleasantness in facial expression. Having stated this, the discussion will now turn to that aspect of the perceptual task which may be the dominant influence on judgments of pleasantness, namely identification of emotion categories.

Lack of Significant Differences in Perceptual Accuracy

The present measure used for assessing accuracy of decoding facial expressions of emotion was the total number of photographs to which a subject gave the emotion label assigned to the photograph by Izard's (1971) original judges. As expected, there was no notable difference between groups in accuracy of qualitative judgments of emotion. Of course, a null finding can be due to any number of factors and one cannot assign the same power to this finding as to a finding of hypothesized significance. Theoretically, however, it is worth attention because it has been in this very area of categorical identification of different emotions that past studies have claimed differences between normal and depressed persons (Walker, 1981; Zuroff & Colussy, 1986). For example, Zuroff and
Colussy stated that depressed subjects mislabel negative emotions as positive. Walker claimed the opposite, noting that her anxious-depressed subjects saw positive and neutral emotions as negative.

My own view, based on empirical evidence, is that depressive or anxious states do not, of themselves, disrupt a person's ability to understand the universal language of facial expression. Nevertheless, some of the more likely competing hypotheses for present null findings will be considered.

Firstly, all groups in this experiment were functioning at least adequately in the community and were thus receiving ongoing practice in the production and perception of facial expression as part of their daily interpersonal interactions. With socially withdrawn, depressed patients whose daily interactions have fallen to a minimal level, problems in assessing others' emotions may begin to be apparent. However, reported within group correlations between accuracy and social introversion scores suggested that these two factors were not related within the relatively socially introverted anxious, depressed group. Although social introversion is not a direct measure of social withdrawal, socially introverted people tend to avoid social situations.

Alternatively, characteristics of the testing situation may have reduced the range of accuracies obtained in the present study. Izard's photographs were posed by actors. Their
expressions, initially posed for investigating cross-cultural emotion perception, may be too blatantly stereotypical of the emotion to cause any perceptual identification problems for perceivers across different mood or arousal states. Perhaps clinical groups are less accurate in assessing non-prototypical exemplars of different emotions. However, past studies noting accuracy deficits in schizophrenic subjects (Dougherty, Bartlett, & Izard, 1974; Muzekari & Bates, 1977; Walker, Marwit & Emory, 1980), and in both schizophrenic and depressed subjects (Walker, 1981; Zuroff & Colussy, 1986), also used Izard's photographs. Accordingly, the present stimuli would not seem to account for the present lack of significant differences between the emotion categorization of depressed and normal subjects.

Time constraints and a requirement for uniformity within emotional categories, necessitated the use of a restricted list of available emotion names (one for each emotion) from which subjects selected labels for the photographs in front of them. Perhaps, in a free response mode with no restriction of available labels, differences would emerge. Although the free response mode has not been used in the previous emotion recognition studies with depressed patients, two studies with schizophrenic subjects employed both free response and "restricted list" tasks (Dougherty, Bartlett, & Izard, 1974; Muzekari & Bates, 1977). Both studies found an advantage for normal control subjects over schizophrenics on free and fixed response tasks. However, Dougherty et al. found less of an
advantage for normals on the free response task whereas Muzekari and Bates found more advantage for normals on this task.

One of the major problems with the free response mode, which may have caused the above inconsistent findings, is that the method requires some system for establishing what emotion labels would constitute accurate perceptions of the photographed facial expressions. This is clearly a problem in that it would seem to require an arbitrary decision about the interchangeability of different emotion terms. Additionally, education effects are surely more relevant given that in the free response mode it is the subject who must supply the vocabulary. Whether the use of such terms as "ennui" and "sadness" constitute differences in perception or merely differences in people's lexicons would be a matter for concern. More importantly, the switch to a task in which subjects supply their own emotional terms would appear to change the nature of the task. Specifically, asking a person to access their own memory store might differentially affect depressed patients if, indeed, there is a tendency among depressed people to access mood-congruent memories (Bower, 1981). Supposedly, such a process could lead to inaccurate interpretation of positive expressions as being negative. The discussion will continue with the question of whether, irrespective of diagnostic category, those persons who have low levels of social interaction exhibit deficits in their ability to read others' emotions.
Lack of Main Effect for Social Introversion

The intent of using the social introversion scale of the MMPI-168 was to obtain a group of subjects who, by their high scores, would reveal a tendency to be less gregarious than most other persons and thus would constitute an outpatient analogue for the socially withdrawn hospitalized patient. As a group, the anxious, depressed group rated themselves as significantly more socially introverted than did the other subjects. Given that the tendency of socially introverted people is to avoid and escape social interaction, there was good reason to investigate a social withdrawal hypothesis relative to processing of emotion information.

One concern in using the MMPI-168 social introversion scores was that the range might be too restricted to pick-up a significant correlation. However, the scores of the anxious, depressed group (M=7.00, SD=3.26) suggest that a greater range was obtained with the present group than was reported for 70 psychiatric male inpatients (M=5.71, SD=.77) and also for 70 psychiatric female inpatients (M=6.98, SD=.87) in a study by Newmark, Newmark, & Cook (1975). Keeping in mind the possibility that, despite the relatively high mean score and large standard deviation for these anxious, depressed subjects, restriction of range may have attenuated the correlation, there was not a significant negative correlation between social introversion scores and accuracy of perception. These findings suggest that
social withdrawal may not exert a significant effect on the accuracy of perception of facial expressions of emotion. Alternatively, it may be that such a hypothesis can be adequately addressed only by obtaining subjects whose social isolation has been previously assessed on the basis of behavioural scales of social interaction.

In the present case, it is tempting to suggest that more conclusive evidence on the effects of social withdrawal may have been obtainable with an inpatient population. However, while social withdrawal has traditionally been seen as most prevalent among psychiatric inpatients, modern facilities provide therapeutic milieux which often lead to inpatients experiencing a greater level of social interaction in hospital than they experienced prior to admission. Additionally, there were both theoretical and pragmatic reasons why the subjects employed were more suitable than inpatient subjects for addressing the primary questions of perceived arousal and pleasantness. Firstly, the deinstitutionalization movement, improved psychopharmacology, and the relative shortage of psychiatric beds has led to a situation where the "unipolar" depressed patient is not generally seen among the inpatient population of large psychiatric hospitals. Those inpatients who are depressed are likely to have schizophrenic features or to be suffering from a more severe bipolar disorder. Neither of these kinds of patients was suitable for the present study. Given schizoaffectives' disorders, it would be extremely difficult to defend a
conclusion that any perceptual biases did not relate to the schizophrenic symptomatology. With bipolar patients, it has already been noted that they appear to have a defensive style which leads to denial of anxiety. Therefore, they might be expected to attempt to present themselves in a favourable light (less anxious, less depressed, and more socially active) on the present self-report instruments. Additionally, the intent of this study was to produce results which were generalizable to the largest group of depressed persons. In studies looking at yearly incidence rates for non-bipolar depression among women, one study placed the figure as high as 7,800 per 100,000 people (Brown & Harris, 1978). Although this figure is very high compared to the findings of other studies, the lowest incidence noted for women in an epidemiological review was 247 per 100,000. The lowest figure given for men is lower at 82 per 100,000 but both are very much higher than the yearly incidence of bipolar disorder which is given as between 9 and 15.2 cases per 100,000 for men and between 7.4 and 32 cases per 100,000 for women (Boyd & Weissman, 1982).

Of course, the above arguments have only addressed issues regarding diagnosed and non-diagnosed, self-reported depressed patients. A further relevant problem with using inpatients in the present study would be that, unlike previous clinical comparison groups (schizophrenics), people with primary anxiety disorders are not normally inpatients of psychiatric facilities. Thus finding a pure anxiety inpatient group would be extremely
unlikely.

With the present subject population, despite the fact that their work efficiency was usually at a low ebb, almost all of the depressed subjects were at least functioning at a minimally adequate level in their work and home environment. A few depressed subjects were on medical leave from their jobs. However, even these persons had not totally withdrawn from society. Since the "clinical" subjects were still functioning at this level, it was relatively simple to obtain a control group which was well matched but for depression and anxiety.

Despite the fact that there were good theoretical reasons not to use inpatients, other factors unfortunately arose in the planning of the study which have more negative connotations for similar future psychological research. Specifically, non-professional patients' rights advocates on state human research boards have created a climate where it is extremely difficult to use outpatients and almost impossible to use inpatients unless some powerful and immediate therapeutic benefit can be shown to accrue to them as a result of participation in the research. Although protection of patients' rights must be of paramount importance, the average lay-person's lack of knowledge regarding the importance and efficacy of clinical psychological research has led to psychological studies being particularly hard hit. Accordingly, researchers may, as in the present case, be forced to develop an increasing number of analogue measures for assessing questions relating to the
inpatient experience. Incidentally, such requirements may have the desirable effect of causing researchers to re-examine the inpatient experience, and assess the many ways in which it has changed over the past years.

In the present situation, the finding of a significant correlation between accuracy of perception and social introversion score would have indicated the worth of further investigation into the effects of social withdrawal. As it stands, it may be that social withdrawal is not very influential in social perception, as presently measured. However, it may also be that the social introversion scale of the MMPI-168 is an inadequate analogue of the social isolation situation. This issue will be among those addressed in the next section.

This author's own feeling is that true social isolation may very well have a deleterious effect on a person's ability to read emotion in others' faces. However, I also believe that the degree of social isolation necessary to engender or exacerbate emotion recognition problems is likely to be far more extreme than that typically observed in depressed outpatients, or even in modern psychiatric inpatient facilities.

Future Directions for Research

When investigating perceptual and memorial processes in depressed populations, many researchers have assigned subjects to depressed groups on the basis of diagnostic categories or
subjects' endorsement of high numbers of depressive symptoms, without taking into account what other symptoms may be present. Probably the most important lesson to be garnered from the present study is the inadvisability of conducting comparison studies between depressed and normal subjects without including a comparison group of non-depressed, anxious subjects whose performance may indicate what influence anxious symptoms exert in determining the behavioural presentation of patients diagnosed as depressed. Although this is not the first study to include such a group, the previously noted research by Craighead, Hickey and DeMonbreun (1979) was one of the very few prior studies that appear to have considered the possibility of a significant level of anxiety influencing the emotion processing of both depressed and non-depressed subject groups.

In the present study, assignment of subjects to groups on the basis of depressive symptoms alone would have led to an anxious, depressed group and a non-depressed group in which some subjects were anxious and others were not. Obviously, such group composition compromises a researcher's ability to investigate the effects of both depressive and anxious symptomatology on daily functioning. Given the frequency of anxiety in depressed populations, such assignment may not have caused too great a loss of information about depressed persons. However, it appears that the effects of anxiety on the functioning of non-depressed, (or maybe pre-depressed) subjects would probably have been missed with such grouping criteria. Present findings of
perceptual differences between anxious and normal subjects suggest that this is a matter for concern in that many symptoms common in different anxious groups (e.g., social anxiety), may be partially the result of emotion perception biases and, if so, may be alleviated by remedial training.

With respect to the lack of significant differences in accuracy of perception, it would be interesting to compare the performances of depressed persons who show positive signs of cerebral compromise with those who do not. Prigatano and Pribram (1982) have shown that patients with right posterior lesions are impaired in their perception of facial expressions of emotion. However, persons with right hemisphere damage are likely to be quite insensitive emotionally and to be less prone to depression and catastrophic reaction to brain damage than are those persons with left hemisphere lesions. In Prigatano and Pribram's study, patients with left hemisphere lesions were more accurate than the "right hemisphere" subjects but were impaired relative to normals. Thus, those studies noting emotion perception deficits in depressed subjects may have been tapping not so much the effects of depression but the cause (left hemisphere lesions) of their depression. Notably, these studies used inpatients. Patients whose illnesses are severe enough to warrant hospitalization often manifest positive neuropsychological signs. Given the neuropsychological screening task (Benton), and the high accuracy of all groups in categorizing emotions, it is unlikely that present subjects had significant cerebral
impairment affecting their perception of facial expressions.

With regard to experimental design, the drawback of stereotyped, posed photographs in terms of veridicality of emotion expression has already been discussed. If a study with similar group composition and procedure were to employ short videotapes of people naturally portraying Izard's emotions, some idea could be obtained of the robustness of the present "arousal" effect within a more realistic context. If anxious subjects were still to attribute higher levels of arousal in such situations, one might be more confident that the present findings are not peculiar to situations in which the cues are relatively impoverished. Alternatively, use of less prototypical exemplars would have suggested whether the present findings also obtain with less stereotypical facial expressions.

However, neither of the above suggestions reduce the importance of present findings. The present photographs allow a more pure assessment of the impact of facial expression in a way that videotapes, with their attendant bodily (and perhaps vocal and verbal) cues do not. Persons are often called upon to judge others' arousal levels and affective valences in dangerous situations where required response time does not allow a delay of judgment. In these cases, the evidence is more in the form of an "emotion snapshot". Additionally, and in relation to using less stereotypical facial expressions, unless people are very guarded they are very likely to produce facial expressions which are close to stereotypical of the emotion which they are
experiencing.

In a slightly different direction, the present study relates to present feeling states. A profitable future extension, and one which addresses the motivating role of arousal, would be to assess how perceptual judgments affect the perceiver's future behaviour and mood and their forecast of the encoder's future behaviour. For example, on viewing a facial expression which normal controls view as mild arousal, would highly anxious persons attribute higher arousal to the encoder and leave the situation immediately to avoid personal danger? Additionally, would observers' mood be improved by interpreting the encoder's arousal level as similar to their own? Alternatively, are the universal, categorical meanings attached to certain facial expressions so entrenched within both normal and anxious persons as to overcome any influences of arousal on the perception of others' mood states?

With the above in mind, it is tempting to draw parallels between the effect of anxious arousal on emotion perception and future behaviour and the growing body of research concerning the relationship of empathy to subsequent behaviour. The relevance of the present findings relates to the fact that an empathic state must, by definition, arise from a perception of another's emotional state. Accordingly, Eisenberg and Strayer (1987) have noted that the concept of empathy comprises:

"an emotional response that stems from another's emotional state or condition, and that is congruent with the other's emotional state or situation."
Eisenberg and Miller (1987) suggested that low to moderate positive relationships exist between most measures of empathy and prosocial behaviour. Given present findings, it could be argued that anxious persons actually project aspects of their own arousal, thereby showing a distinct lack of empathy to the "facial expression" cues in a given situation.

An important question arising from this study relates to the lack of a significant relationship between social introversion and perceptual accuracy. Although groups were homogeneous in terms of accuracy scores, there was concern as to the most valid method of measuring social withdrawal. It is debatable whether any self-report instruments can perfectly predict the emotional and behavioural dynamics of a person's social environment. However, it seems important to try to develop acceptable self-report measures of social isolation for a couple of reasons.

Firstly, as noted earlier, many inpatients are less socially isolated in hospital than they were prior to admission. Additionally, and with reference to depressed persons, although depression is common among the inpatients of psychiatric hospitals, most of these patients carry schizophrenic, schizoaffective, and bipolar diagnoses. In such cases, processes independent of those under study significantly influence the perceptual process. Almost certainly, the majority of socially withdrawn depressed and anxious (e.g., agoraphobic) patients are confining themselves to their own homes, not to hospital wards.
Accordingly, researchers would find it necessary to conduct a comprehensive assessment of the home environment and interpersonal interaction measures of every subject if they wished to establish level of social withdrawal, without the use of the subject's own self-report.

Whether new instruments for assessing social involvement should comprise items which are theoretically or empirically derived is a matter for future study. General discussions of the relative merits of different kinds of instruments are numerous and will not be addressed here. However, in the present study, a pre-existing, empirically derived instrument was used because of its known validity and reliability. The social introversion scale was not constructed for the specific purpose of identifying social withdrawal in depressed and other psychiatric populations. However, for present purposes, a literature review failed to produce a measure which appeared superior to this empirically derived measure for these populations.

Given the above noted situation, future researchers should carefully consider whether they are willing to extrapolate from an avoidant personality style to a lifestyle of social isolation. It may be that a self-report instrument could be constructed which would adequately assess the number, nature and quality of a person's daily interactions. However, even in ostensibly identical social situations, different persons' own personalities will greatly influence the level of social interaction and their assessment of that social interaction.
Accordingly, a truly valid measure of social withdrawal may require extensive testing relative to definitions intended.

Finally, any assessment of function which suggests possible abnormalities in emotion processing should conclude with recommendations for study of intervention strategies. If the level of subjects' anxiety is exacerbated by their deviant perceptions of others' arousal, perhaps some rehabilitative process can ameliorate this problem. The most effective retraining strategy would have to be established empirically. However, Walker, McGuire and Bettes (1984) suggest that programs aimed at improving emotion perception in psychiatric populations should include plenty of practice with photographs and videotapes depicting facial expressions of different emotions, and participation of patients in modelled social interactions where emotion cues are salient.

Concluding Statements

Compared with earlier emotion recognition research, the present study is unusual in the range of questions addressed. Like the research of Walker (1981) and Zuroff and Colussy (1986), it included procedures to compare the accuracy of emotion recognition of depressed, anxious and normal control subjects; like Mandal's (1986) study, it included procedures to assess emotion perception of different groups along the two orthogonal axes of arousal and pleasantness; and, like Russell's
(1980) study, procedures were included to compare the "mental maps" which different groups use to order their own concepts of the interrelations of different emotions.

Findings did not support the existence of consistent differences between the groups in categorically identifying facial expressions of emotion. However, there was strong support for a hypothesis that self-rated anxious persons ascribe higher levels of arousal to others' facial expressions than do non-anxious controls. The most obvious implication of this finding is that there is a need to control for anxiety level in studies which seek to investigate differences in emotion processing between depressed and non-depressed subjects. In the area of "mental maps", all three groups appeared to have similar perceptions of the interrelations of different emotions. Additionally, the spatial placement of the facial expressions of these emotions support the placement of those same emotions when verbally presented, as in Russell's study (1980). This implies consistency among different adult groups in the verbal and pictorial recognition of basic emotions.
REFERENCES


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Clinical Psychology, 16, 328-331.


Ross, R.T. (1938). A statistic for circular scales. Journal of


INFORMED CONSENT BY SUBJECTS TO PARTICIPATE IN A RESEARCH STUDY

I __________, have been asked to participate as a subject in a research project named, "The Processing of Facialy Expressed Emotion as a Function of the Emotional State of the Subject." I understand that this project will help identify those processes which contribute to recognition of emotion in others' facial expressions. I will be given two short questionnaires to complete; a short test of emotion recognition; and a short test of facial recognition. This procedure will last about 40 minutes.

I understand that I will be one of about 80 subjects taking part in this project. While no direct benefit to me is expected, my participation may contribute to scientific knowledge and development of procedures to prevent social withdrawal in those persons who have problems in the area of emotion recognition. Additionally, I will receive $5 on completion of my participation. I understand all data will be coded to protect my identity and that my code number will be protected by being available only to the principal investigator of this study.

I understand that my permission to participate in this study is voluntary and that I may refuse to participate, at any time, without penalty. The principal investigator of this study will answer any of my questions about procedures to be used, at any time. His name is Jon Mayhew, M.A., and he may be reached through the Psychology Internship Program at Camarillo State Hospital (Telephone: 805-484-3661, Ext. 4844). If I have any further questions about this project, my legal rights or well being, I may contact John T. Olson, Ph.D., Camarillo State Hospital and Developmental Center, P.O.Box A, Camarillo, California, 93011. His phone number is 805-484-3661, Ext. 4149.

I have been given a signed and dated copy of this informed consent.
Subject: __________ Date: __________
Consent information and form supplied by ________ on ________
APPENDIX B

Leeds Scales

Answer sheets, manuals and stencils for the Leeds Scales may be obtained from:

The Test Agency Ltd.
Cournswood House
North Dean
High Wycombe
Bucks, England

The items comprising the Leeds Scales are also presented in the article by Snaith, Bridge and Hamilton (1976).
APPENDIX C

MEASUREMENT SCALES

Arousal:

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<th>LEAST AROUSED</th>
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<td>3</td>
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Pleasantness:

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<th>PLEASANTNESS INCREASES---&gt;</th>
<th>MOST PLEASANT</th>
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</thead>
<tbody>
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<td>3</td>
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</table>

Similarity:

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<th>SIMILARITY INCREASES---&gt;</th>
<th>MOST SIMILAR</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

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APPENDIX D

Izard's Cross Cultural Emotion Recognition Test

The stimuli for Izard's Cross Cultural Emotion Recognition Test are known as "Dr. Izard's I-M Series." They are available, under this title from:

Photo Services
University of Delaware
148 South College
Newark, Delaware 19716