Judgment and recognition of emotion in the hypothetically psychosis-prone

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JUDGMENT AND RECOGNITION OF EMOTION IN THE HYPOTHETICALLY
PSYCHOSIS-PRONE

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Hypothetically psychosis-prone college students were identified using the Chapman scales of Physical Anhedonia, Perceptual Aberration and Magical Ideation. These scales assess schizotypal symptoms. Males and females scoring high on either or both of the Perceptual Aberration and Magical Ideation scales and males and females scoring high on the Physical Anhedonia scale were compared with control subjects in their responses to photographs displaying various emotions through facial expressions. The study investigates one aspect of social competence: the ability to perceive and experience emotion in others. Deficits in this area have been documented with schizophrenic subjects, but not with a psychosis-prone sample. Investigating these skills in this latter population aids in the understanding of the development of these deficits in the schizophrenic population, and may suggest the benefits of earlier and additional methods of intervention. Subjects were assessed in their reactions to photographs in three ways. The first task consisted of judging the mutual similarities among six different facial affects depicted in photographs. The second task consisted of rating these six emotions along two dimensions. The third task measured the subjects' ability to decode facial expressions and match them to category and sub-category labels. In the first task, it was hypothesized that psychosis-prone subjects would display less differentiation (a more restricted range) than controls among the emotions. On the second task, it was hypothesized that psychosis-prone subjects would rate emotions in photographs less favorably than normals. On the third task, it was hypothesized that psychosis-prone subjects would be less accurate than normals at matching facial expressions to pre-selected category labels, and that their accuracy would decrease even more when judging the more subtle subcategories of emotions. For this third task, it was also hypothesized that females would be more accurate than males. Results did not support these hypotheses. This suggests that these deficits occur later in the schizophrenic process. Points for discussion include methodological limitations of this study and other studies using similar tasks with schizophrenic subjects, theoretical implications of these negative findings for the development of these deficits in schizophrenia, and suggestions for future research.
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INTRODUCTION

This study investigates the judgment and experience of emotion derived from viewing facial expression in a population with schizotypal symptoms. Subjects are college students who score high on the scale of Physical Anhedonia or who score high on either or both scales of Perceptual Aberration and Magical Ideation (Per-Mags). High scorers on these scales have been identified as having psychotic-like experiences and being less socially involved. Therefore, the groups are hypothesized as being high risk groups for developing psychosis. This paper will begin by reviewing the literature on the nature of this population and the alleged relationship of schizotypy to schizophrenia.

This study examines these subjects' ability to receive and decode emotional expression, which represents one component of social competence. The general area of social competence as well as the specific component of ability to judge emotional expression in others will be reviewed as it pertains to this population. Identifying the specific deficits of these subjects in the area of social competence has both theoretical and practical implications. Deficits in this area have been found in the schizophrenic population. This study examines a population with schizotypal symptoms. Results can contribute to theory
about the development of these social deficits in the schizophrenic process. One facet of subjects' social functioning is examined and compared to the performance of normals. Experimental subjects' performances are then compared to performances of psychotic patients discussed in the literature. Finally, practical implications are discussed.

History and Development of the Concept of "Schizotypal" Psychopathology

The population examined in this study is best described in the current classification system for mental disorders as showing symptoms of schizotypal personality disorder (American Psychiatric Association, 1987). This disorder is grouped together with paranoid and schizoid personality disorders in the DSM III-R because of subjects' common characteristic of appearing odd and eccentric. While all personality disorders involve maladaptive, enduring patterns of perceiving, relating to, and thinking about the environment and oneself (American Psychiatric Association, 1987), schizotypal personality disorder is considered to be one of the more disabling disorders in the group. DSM-III-R defines the disorder as characterized by oddities of thought, perception, speech and behavior which are not severe enough to warrant a diagnosis of schizophrenia. No
one feature is necessarily present in all cases. In particular, the disorders of behavior often include social isolation and constriction of affect that interferes with interpersonal interactions. Schizotypal personality disorder is conceptualized as being related to schizophrenia in a number of ways. Its symptoms parallel those of schizophrenia, but are present to a less severe and less pervasive degree.

There is some controversy regarding the nature of the personality disorders in general, but there is particular controversy over the label "schizotypal". The controversy centers around its proposed relationship to schizophrenia as well as its differentiation both from schizoid personality disorder (Millon, 1981) and borderline personality disorder (Gunderson and Singer, 1975). Both of these disorders have also been viewed historically as being related to schizophrenia (Millon, 1981; Gunderson and Singer, 1975). In order to understand this controversy, it is important to explore the history and development of these concepts.

The origins of the particular term "schizotypal" are difficult to trace in the literature: however, in the literature on schizophrenia, there are many references to a less severe form of this disorder. Over the course of time, this less severe form was labelled in various ways.

What is now classified as schizophrenia was originally
called "dementia praecox" by Kraepelin (1896) in his psychiatric texts. In his discussion of the disorder, he did not refer to a less severe form, and in fact defined the disorder in terms of inevitable deterioration (dementia). However, later theorists such as Bleuler (1911) and Meyer (1906) did recognize cases of dementia praecox that did not deteriorate into the most severe form.

Bleuler emphasized that there were several schizophrenic disorders and used the phrase "the group of schizophrenias", reserving the term dementia praecox for those cases advancing through the whole course of the disorder. Bleuler referred to the primary symptoms of schizophrenia as involving: disturbance in thought association, ambivalence, autism, and a break between affect and intellect (the four A's). He considered the disorder to be a disease resulting from a neurological ailment or defect.

Meyer viewed the disorder from a psychological viewpoint. He called the disorder "paragesia" and believed it could exist in less severe forms. Langfeldt (1937) classified schizophrenia into two subtypes, process and reactive. The process types had an insidious premorbid personality process which led to eventual deterioration. He called this premorbid personality "schizoid", a precursor of modern terminology. The reactive types he called
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schizophreniform; their psychoses followed a disturbing precipitant.

Zilboorg (1941) built further on the concept of a less severe or nonpsychotic form of schizophrenia. He called the less severe forms of the disorder "ambulatory schizophrenias". These patients could lead relatively stable lives, yet still possessed, to some degree, symptoms linked with schizophrenia, such as social withdrawal or autistic thinking.

At this point in history, the word "schizotypal" still had not yet appeared, although the term "schizoid" had been used by Langfeldt. The term schizoid has a longer history than the term schizotypal. This is true of the term borderline as well, this term first being used by Stern in the 1930's (Gunderson and Singer, 1975). This is relevant to the current controversy over the differentiation of these disorders. As more attention was drawn to this group of patients with less severe forms of the schizophrenia-like disorder, theoreticians began to see distinctions among these forms of the disorder.

Rapaport et al (1945-46, 1968) and Schafer (1948) described two subtypes within this category of less severe forms of schizophrenia-like disorders. Rapaport called the whole group "preschizophrenics". One subtype he called "inhibited" or "coarctated"; these patients were
characterized by withdrawal, anxiety, and inhibition of affect. This group bears resemblance to the Anhedonic group in the present study. The second group, called "overideational", included patients more characterized by a preoccupation with bodies, ideas and fantasy life and bears resemblance to "Per-Mags", the second psychosis-prone group examined in this study. Schafer relabelled these types. The former he called "schizoid". He viewed the constellation of symptoms in this group as suggestive of an approaching psychotic break. The latter group he relabelled "schizophrenic character". In this group, the primary symptoms existed, but were integrated into a relatively stable personality make-up. Schafer's concept of schizophrenic character is quite close to today's schizotypal personality.

In the late 1940's and early 50's, other theoreticians wrote about the existence of preschizophrenic groups. The groups were labelled "latent schizophrenia", "latent psychosis", and "pseudoneurotic schizophrenia" by Federn (1947), Bychowski (1953), and Hoch (1949) respectively. By the 1950's, various theoreticians had studied this group of disorders and agreed on their existence. However, disagreement still remained as to the terminology and more specific manifestations of the disorder.

Rado first used the term "schizotypal" in a 1950 paper
at the New York Academy of Medicine. He continued to develop his conceptualization over the next six years. The term he used was derived from the longer term "schizophrenic phenotype", a term revealing Rado's conceptualization that the disorder consisted of an overt manifestation of some hereditary predisposition or genotype (Rado, 1956). Rado believed the genotype resulted in two defects. The first he referred to as 1) "integrative pleasure deficiency". The second he referred to as 2) "proprioceptive diathesis". He saw the hypothesized pleasure deficiency as resulting in an impaired self, because it slows down the individual's psychodynamic integration. The individual then tries to compensate for this impaired process of integration by "schizoadaptation". Thus, Rado viewed the schizotypal personality from an adaptive, developmental viewpoint. The entire course of the personality disorder could proceed through four stages: compensation, decompensation, disintegration (psychosis), and deterioration. In summary, Rado saw the schizotypal personality as a stable form of schizophrenia which could potentially develop into instability.

Rado's concept of "integrative pleasure deficiency" corresponds to the symptom of anhedonia. One of the populations examined in this study is characterized primarily by this symptom. Rado's developmental viewpoint
is related to one of the current study's hypotheses regarding why this population may have social skills deficits.

Paul Meehl (1962) developed Rado's concept. He also writes about a neural deficit, as both Bleuler and Rado did. He postulates an integrative neural deficit called "schizotaxia", which is a necessary, but not sufficient, cause of schizophrenia. Depending on the social learning history of the individual with schizotaxia, a schizotypal personality may evolve. Add even more pathogenic environmental influences, particularly "the schizophrenogenic mother", and the person is likely to become schizophrenic. Meehl described the four main traits of schizotypy as: cognitive slippage, interpersonal aversiveness, anhedonia, and ambivalence. The trait of interpersonal aversiveness is also a recognition of the difficulties which the schizophrenic person has in general interpersonal relations and more specifically, in social skills.

As mentioned earlier, today's classification of personality disorders in DSM-III-R includes schizotypal personality disorder and schizoid personality disorder. When the term schizoid appeared earlier, it first referred to the whole group of preschizophrenics, before distinctions were made within that group. This whole group also included
the borderline personality. This history was reflected in DSM-II (American Psychiatric Association, 1968) where the term "schizoid" referred both to people with impaired ability to form social relationships and to people with oddities of thought and behavior. The latter group was shown by research to have a higher family incidence of schizophrenia. Currently, the term "schizoid" refers most particularly to the inability to form social relationships, while "schizotypal" refers to those who have odd thoughts and behaviors as well as interpersonal difficulties. The borderline personality has since become more specifically characterized by its intense affective difficulties and by its highly charged interpersonal relationships (Gunderson and Singer, 1975; American Psychiatric Association, 1987).

Scales Measuring Psychosis Proneness

Chapman and his colleagues (Chapman, Chapman, Raulin, and Edell, 1978) have continued the study of the schizotypal subject. In their studies, their refer to this population of subjects as "psychosis-prone". These subjects display schizotypal symptoms, but they generally do not warrant the clinical diagnosis of schizotypal personality disorder. Chapman, Edell, and Chapman (1980) report the reasoning for the approach of their research. It is based on the assumption that schizophrenia is probably more than one
disorder. In order to further the study of the different disorders within schizophrenia, these researchers attempt to measure proneness to different varieties of psychoses. They state that the discovery of different psychoses within a clinical population is impeded by hospital effects, drug effects, and the disruptive nature of the psychosis itself. The goal of identifying different varieties of psychoses is more easily attainable in a group measured to be at risk for psychosis because these confounding factors have not yet become influential.

This research has identified at least two subtypes within psychosis-prone subjects. One subtype displays a preponderance of odd thoughts and behaviors and the other is characterized by affective disturbance and interpersonal difficulties. The latter subgroup is characterized by the trait of Physical Anhedonia, involving an abnormally low degree of pleasure derived from physical sensations. As mentioned earlier, this trait corresponds to Rado’s concept of a pleasure deficiency. Examples of questions on the Physical Anhedonia scale are included in Appendix A. A scale for Social Anhedonia has also been constructed, but this characterizes those who are more likely influenced by social pressure and the scale itself is more influenced by social desirability than is the scale for Physical Anhedonia. The two Anhedonia scales are highly
intercorrelated (Chapman, Chapman, and Raulin, 1976). The traits measured by the Physical Anhedonia scale are more consistent with Meehl's theoretical proposition of a biological deficit. This deficit relates to loss of pleasure which in turn influences social adjustment. This symptom of anhedonia also seems to reflect Meehl's trait of interpersonal aversiveness. Physical Anhedonia is significantly associated with poor premorbid adjustment in male schizophrenics (Chapman et al., 1976); therefore, this scale in itself, without the addition of the Social Anhedonia scale, seems appropriate as a measure of a general pleasure deficit including social interactions as well as physical sensations. Subjects identified by the Physical Anhedonia scale tend to differ from controls on a composite score of schizotypal features, but are also more likely to be socially withdrawn and have fewer heterosexual interests and activities (Chapman, Edell, Chapman, 1980).

The other traits identified by this research are Perceptual Aberration and Magical Ideation. Perceptual Ideation at the core consists of distortions in body image. This trait is similar to the characteristics of those of Rapaport's "overrideational" preschizophrenic subjects who were preoccupied with bodies, ideas, and fantasies. Sample items for questions on the scale for Perceptual Aberration are included in Appendix A. Subjects scoring deviantly high
on this scale exceed controls on the following characteristics: psychotic-like experiences, depression, hypomania, social withdrawal, problems of concentration, deviances in communication and speech, and a composite score of schizotypal features. Another scale devised by Eckblad and Chapman (1983) attempts to identify individuals exhibiting Magical Ideation. This trait is also related to the concept of the "overideational" preschizophrenic. Sample questions are in Appendix A. Meehl believed that the trait of Magical Ideation was an important precursor to schizophrenia. Chapman and Chapman (1985) reported that high scorers on this scale displayed similar symptoms to those scoring high on the Perceptual Aberration scale, and these scales have been found to be correlated ($r = .70$). Because of these facts, these scales are used jointly in their research and in the present study. Another characteristic these authors have studied is Impulsive Nonconformity, measured by a scale of the same name (Chapman and Chapman, 1985; Chapman et al., 1984). Sample items are included in Appendix A. The traits measured by this scale include a lack of respect for conventional mores, hostility, lack of empathy, and a reckless pursuit of self gratification. Only a subset of these individuals may be at risk for developing psychosis, and these individuals may be identifiable by scores on the previously mentioned scales.
Subjects who scored high on both the Impulsive Nonconformity scale and the Perceptual Aberration-Magical Ideation scale are more aberrant on measures of cognitive slippage than subjects scoring high on only one of these scales. Therefore, this scale may help in the selection of a high risk group, although it is not used in the present research.

Social Competence

The study of psychosis-prone groups may elucidate issues of concern in the study of a psychotic, schizophrenic group. Psychosis-prone subjects have been found to be similar to schizophrenic subjects on many kinds of tasks. Issues of importance regarding this group are not limited to the discovery of different psychoses. This section of the paper discusses a particular group of deficits in the area of social competence which are hypothesized to be important in both psychosis-prone and psychotic subjects. First, social competence is defined. Studies investigating social competence in normals will aid in clarifying its important components. Then, the role of social competence in the development of psychopathology is discussed, as well as the nature of deficits in clinical and sub-clinical groups. Controversies and practical implications are outlined, and a specific component of social competence investigated in the current study is discussed.
Social isolation and/or deficits in interpersonal interaction have been identified by many to be important traits in the schizotypal, or psychosis-prone population. It is well known that the schizophrenic population is characterized by severe social skills deficits (Morrison and Bellack, 1987). The term that this paper will use for this area of social skills deficits is "social competence". The term "social skills" seems to focus on the acquisition of skills and behaviors. "Social competence", on the other hand, is a social psychological variable that refers to the adequacy of behavior in interpersonal interactions and which is part of a larger variable, "adjustment" (Burns and Farina, 1984).

Different definitions of social skills include aspects of internal states, "topography of behaviors" (response repertoires), and outcomes of interactions (Morrison and Bellack, 1981). A consideration of all of these factors would most closely approximate what is meant by the term "social competence". However, both of the most recent and hopeful therapies which aim at improving social skills (the token economy and assertiveness/social skills training) focus primarily on only the factor of "topography of behavior", teaching the person a more adequate repertoire of responses. While these therapies have been successful at changing behaviors, the generalization of these learned
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skills has been less than adequate (Morrison and Bellack, 1981). Many times subjects will not know when it is appropriate to enact a behavior that was learned. Such intervention programs have ignored internal factors; these may inhibit a person from knowing how to assess a situation appropriately in order then to decide what behavior to enact. In addition, these programs ignore outcomes of interactions and how various outcomes can influence and change an interpersonal situation.

One internal factor is the focus of this study, the ability to judge accurately emotions in others. The more accurately a person can judge emotional factors in others, the more accurate will be his or her assessment of an interpersonal situation. In particular, this study focusses on the ability to pick up emotional cues from non-verbal channels.

Social Competence in Normal Subjects

Burns and Farina (1984) pursued an investigation of social competence in psychiatric patients. As a component of this, they wanted to investigate how level of social competence influences interpersonal interactions in normal subjects. They discovered it to be a crucial factor in both normal and clinical populations. A scale was devised by Jain and Greengrass (1975) to assess social competence in
normal subjects in an efficient manner. These authors found that highly competent female college students varied their tone of voice more when interviewing a stranger than did lower socially competent subjects. In addition, they also discovered that these highly competent female subjects asked more open ended questions, spoke more, nodded their heads more, and made more eye contact.

In considering such behavioral differences, it seems important to remember how social skills influence the outcomes of interactions. If an individual speaks and nods more and makes better eye contact, these behaviors impact the observer and may affect the observer’s response, thereby influencing the course of the interaction. Jain and Greengrass (1975) found observers of highly competent subjects to judge the subjects as more comfortable and likeable than less competent subjects. Kelso (1978) observed that greater liking of competent subjects operated over time as well, when people had actually had the chance of getting to know subjects of interest. The ability to form a good impression seems to influence the outcome of interpersonal interactions in a positive way.

Other components of social competence are internal states and "topography of behavior". An example of an internal state is cognition. The notions of impression formation, judgment of personality and cognition of emotion
are all aspects of cognition. Once information is perceived by the senses, different individuals are likely to bring differing interpretations to the same material. This depends on the individual's characteristics and his/her learning history.

Expectation represents one type of cognition. Eisler et al. (1978) found that highly assertive subjects expected better consequences of their behavior in an interaction than did low assertive subjects. In selecting response alternatives to an interaction, low assertive subjects chose more passive and less assertive responses than highly assertive subjects. When the responses selected were compared to actual behavior, there was a greater discrepancy observed in low assertive subjects. Thus, this study is an example of how cognitive deficits may play a primary role in the social competence of normal subjects.

Christensen et al. (1980) tested the hypothesis that sensitivity to non-verbal cues is an important component of social competence in female college students. Subjects interviewed confederates and were instructed to switch topics if the interviewee showed signs of discomfort. Both high and low socially competent subjects reported observing nonverbal cues at the same time, but the low competent subjects failed to respond as instructed. Therefore, the deficit in competence in these normal subjects seemed most
manifest in the area of behavioral response ("topography of behavior"), rather than in the actual level of sensitivity to the non-verbal cues. Whether or not this is the case in clinical and sub-clinical populations is an important question that will be addressed after a review of social competence as it develops in these populations.

**Social Competence and the Development of Psychopathology**

Zigler and Phillips (1961) take a developmental approach to psychopathology and see social competence as playing a central role. They hypothesized and found evidence for a positive relationship between premorbid social competence and prognosis; in fact, premorbid social competence seemed more significantly related to outcome than did type of treatment received. Mental disorder in individuals with good premorbid social competence tends to be precipitated by a specific traumatic event. This is not the case in individuals with poor premorbid adjustment. These individuals' long term maladjusted social history seems to be more influential in the etiology of their disorder. Thus, according to Zigler and Phillip's viewpoint, the prognosis for any individual with a mental disorder depends more on the development of the disorder than on the particular disorder or type of treatment received. The distinction in premorbid adjustment is
related to the process-reactive distinction in schizophrenia. Process schizophrenic subjects show a poor premorbid adjustment, while reactive schizophrenia occurs more in response to a traumatic stressor. Reactive schizophrenic subjects exhibit a higher overall premorbid adjustment. Zigler and Phillips suggest that this distinction is not unique to schizophrenia, but applies to other disorders as well.

Westermeyer and Harrow (1986) studied the predictive utility of the Zigler-Phillips Social Competence scale. Their results do not support the developmental approach; rather, they support a disease specific model. These authors found that schizophrenic subjects had significantly poorer outcomes than nonschizophrenic subjects; they showed less prehospital social competence than the nonschizophrenic subjects. Originally, Zigler and Phillips (1961) suggested that social competence factors predicted outcome equally well for various diagnostic groups. Westermeyer and Harrow found that the scale had a greater predictive utility for schizophrenic subjects than for subjects in other diagnostic groups. Within the group of schizophrenic subjects, the predictive utility was similar for both sexes. This result suggests that the prognosis for posthospital adjustment in schizophrenic subjects is affected by both the specific symptoms of schizophrenia and previous development of social
competence.

Investigating the various facets of social competence has important theoretical and practical implications. The possible usefulness of social skills training of schizophrenic persons is an important practical consideration, particularly in light of the trend of deinstitutionalization. Due to the wide use of psychopharmacological treatment of schizophrenia, one of the main interactions between psychologists and psychotic patients is in the arena of social skills training. The development of a social skills training program that has greater generalizability than current programs would be a significant contribution to this field.

Morrison and Bellack (1981) discuss the emphasis on improving response repertoires in skills training with schizophrenic subjects. They advise that, for skills training to be more generalizable, it will be necessary to differentiate between perceptual and response deficits. In other words, one aspect of being socially competent involves improving response repertoires, while another involves the subject's ability adequately to recognize and assess situations in order to enact the most appropriate response. This aspect of social competence can be called social perception (Morrison and Bellack, 1981, 1987). Thus, the investigation of components of social competence has
beneficial practical implications, both for treatment and assessment. It is important for us to understand which factors are primary, which are secondary, and how they interact, in order most effectively to treat the deficits. Attempting to study these factors in clinical subjects whose condition has deteriorated considerably is a difficult task.

One major controversy is centered around the question of which type of deficits (social skills or psychotic breakdown) comes first. Rado proposes an inherited pleasure deficiency (anhedonia) as primary. If this is the case, then these individuals are seen as deriving less pleasure from social interaction and having less intrinsic motivation to be socially involved. Therefore, social withdrawal is the end result. The opposite viewpoint is that social withdrawal occurs first and that pleasure deficits follow, along with deficits in interpersonal functioning such as an inability accurately to perceive emotions in others (from lack of practice and lack of skill).

The present study examines the skill of facial affect recognition, one way of perceiving emotions in others. Morrison, Bellack, and Mueser (1988) recently reviewed the literature on deficits of these skills in schizophrenia. They propose four hypotheses to account for these deficits. They review literature that suggests the skill of facial affect recognition is mediated by the right hemisphere and
hypothesize that these deficits in schizophrenia are due to right hemisphere lesions. A second hypothesis is that these deficits are a result of poor social learning. A third hypothesis is that these deficits may be secondary to a more general deficit involving limited attentional abilities in schizophrenic persons. A fourth hypothesis is that schizophrenic persons may exhibit deficits in the perception of certain emotions, such as negative ones.

One explanation for the hypothesis of poor social learning is that social interactions may either be too arousing or aversive for these subjects. Mednick (1958) observed that schizophrenic subjects are autonomically more aroused than normals. Pilowsky and Bassett (1980) found that over-arousal in schizophrenic subjects increased during free responses to photographs depicting fear and anger. Rado proposes that a biological deficit is primary, whereas Mednick says that social withdrawal occurs first because of the over-arousing nature of these interactions and then, through learning, other deficits such as the pleasure deficiency follow.

The third hypothesis of the primacy of limited attention deficits gains some support from studies of perceptual deficits in schizophrenia. Steronko and Woods (1978) found that the critical stimulus interval in a backward masking visual task was significantly longer in a
psychosis-prone group than in controls. The members of the psychosis-prone group were those identified by an MMPI profile of 2-7-8, but who did not display thought disorder. These elevated scores on the depression, psychasthenia, and schizophrenia scales have been documented as measuring disposition towards psychosis (Chapman, Edell, Chapman, 1980). The longer critical stimulus interval may reflect deficits in early stages of visual information processing; 2-7-8 subjects may have taken longer to encode icons, resulting in different icons being confounded in perception. It is a clear possibility that the perceptual deficits may be the primary deficit in this group.

In a more recent study, Balogh and Merrit (1985) comment that the Steronko and Woods study failed to differentiate performance between schizotypic and psychiatric control subjects. Balogh and Merrit claim to have done this in a 1984 study where two schizotypic groups were identified by either the 2-7-8 or an 8-9 MMPI profile, and a psychiatric control group was identified by other MMPI scale elevations. They found the 2-7-8 group to have higher critical stimulus duration values in a no-mask condition than either the normal controls or the 8-9 group. They also found both schizotypic groups to have fewer correct identifications of target stimuli than either control group. They suggest that these groups might be vulnerable to
specific subtypes of schizophrenia. In their 1985 study, they investigated similar tasks in psychosis-prone groups identified by the same Wisconsin scales (Chapman and colleagues) used in the present study. While they found no group differences in critical stimulus duration (CSD), psychosis-prone groups were less efficient in correctly identifying target stimuli in a backward masking task. They discuss this as a marker of vulnerability, and state that this finding provides indirect support for the construct validity of the Wisconsin scales. Balogh and Merritt (1985) employed the Type A masking paradigm traditionally used by schizophrenia researchers. In this paradigm, CSD is regarded as a measure of icon quality and backward masking functions are thought to reflect speed of information transfer from icon to short term memory. MacMillan and Ireland (1982) also use the Perceptual Aberration and Anhedonia Wisconsin scales and identify reaction time crossover in these subjects, another attentional marker.

Rosenbaum, Shore, and Chapin (1988) explore this latter attention deficit in relation to social competence. They examined a schizotypic group identified by the MMPI and also evaluated by the Lanyon Social Competence scale. Schizophrenic and schizotypic subjects both displayed earlier reaction time crossover, while only schizophrenic subjects displayed longer mean reaction time. Schizotypic
subjects also were rated significantly less socially competent on the Lanyon scale. Although these findings show that both lower social competence and attentional deficits are occurring in the schizotypic subjects at the same time, this does not tell us which area of deficits may be the primary or causal factors.

The Assessment and Study of Social Competence in the Schizophrenic Spectrum.

The discussion thus far has led up to the issue that there is more to studying social competence than merely assessing what social behaviors people have in their repertoire. The social competence of a person varies depending upon features of situations. Some studies have found schizophrenic and psychosis-prone subjects to differ in aspects of social competence involving behavioral skills in general, as well as the quality of behavior and its impact on others. One study also assessed the internal factor of sensitivity (Christensen et al., 1980).

Unlike the Christensen et al. (1980) study with normal subjects that found no differences in level of sensitivity between high and low socially competence subjects, Rosenthal (1973) found that better adjusted female schizophrenic patients were more sensitive to the perceived role of an interviewee. While both high and low adjusted
groups behaved differently in response to different roles of
the interviewer, the better adjusted group showed a greater
difference in its behavior between conditions. Individuals
with higher social competence have more sensitivity to
different kinds of interactions and more often know what is
appropriate, and alter their responses more. Kelley et al.
(1971) found that both high and low socially competent
psychiatric patients changed their behavior in an interview
according to instructional set; however, the more highly
adjusted group displayed more extreme behavior for each
instruction, and these subjects were better able to perform
the behavior as instructed. Thus, the factors of
sensitivity and responsiveness to instructions imply that
social competence may reflect flexibility in choosing
behaviors, with more competent individuals exhibiting
greater cross-situational variability in behavior.

Social competence has also been investigated within a
psychosis-prone population. Haberman, Chapman, Numbers, and
McFall (1979) used the Goldsmith and McFall Interpersonal
Behavior Role Playing Test to measure social competence of
behavior in schizotypal college students. This test entails
having subjects listen to tape-recorded descriptions of a
difficult social interaction and then respond verbally as if
they were in the situation. These responses were themselves
taped and scored for social competence. Male Anhedonic
subjects were significantly less socially competent than controls, while female Anhedonic subjects and Perceptual Aberration subjects did not display a significant difference. In a study by Beckfield (1985) which included only male Anhedonic college students, Anhedonic subjects responded to a role play task in a significantly less confident and more terse manner than controls. Zborowski and Garske (1987) videotaped interviews with Per-Mag male subjects. These subjects were rated more odd and avoidant than controls and negatively impacted the interviewers, who became more anxious, angry, and disinterested.

A study by Numbers and Chapman (1982) included only female college students who also performed a role play task, this time based specifically on social problems of college women. The authors found no significant differences in subjects' overall skill level; however, they found three types of inappropriate quality in the subjects' interactions: avoidance, oddness, and hostility. Anhedonic subjects were significantly more often avoidant and odd; perceptual aberration subjects were significantly more often odd and hostile than controls. Haberman et al. (1979) did not show significant differences in social competence between Perceptual Aberration subjects and controls. However, the Numbers and Chapman, and Beckfield, and the Zborowski and Garske studies all suggest that people deviant
on the psychosis-proneness scales do have deficits in social competence, manifested in inappropriate interacting. Numbers and Chapman see the psychosis-prone subjects as having a general knowledge about the right way to act; when they do not know how to act, however, they respond inappropriately. The authors conclude, in concurrence with other findings, that the psychosis-prone subjects display a lowered competence when under stress or when the situation is more emotional.

Facial Expression

This study examines an internal factor not yet studied in the psychosis-prone population. The general factor of concern here is the ability to infer others' emotions by using numerous verbal and nonverbal cues. This study will focus on one nonverbal channel, that of facial expression. Christensen et al. (1980) examined sensitivity to nonverbal cues as a component of the larger variable, social competence. Normal subjects showed the same level of sensitivity to these cues, but behaved differently. While different subjects may notice a nonverbal cue to an equal degree, they may experience or judge it differently. Rosenthal (1973) suggests that level of sensitivity to the role of others differs in schizophrenic subjects who are high or low in social competence. The specific nonverbal
cue of facial expression was chosen for further study in the psychosis-prone group because of the primary role the face plays in communicating emotion. First, research on the facial expression of emotion is discussed, followed by a review of the literature on schizophrenic subjects' experience of emotion derived from facial expression.

History of research on the facial expression of emotion

According to Harper et al. (1978), "In many respects the face may be the single most important body area and 'channel' of nonverbal communication." (Harper et al., p. 77) Emotional cues emanating from the face are considered partially innate, universal and specific. The face has the ability to convey emotion in a very short period of time (Harper, 1978). Some consider the face to be the primary source of emotion (Tomkins, 1962; Tomkins and McCarter, 1964).

The interest in facial expression can be dated to the 1920's. A significant proportion of the earlier literature is concerned with a person's ability to enact emotion and the subsequent categorization of those facial expressions of emotion. Allport first proposed categories of facial expression in 1924, and this proposal was first tested by Woodworth in 1938 (Harper, 1978). Since that time, a considerable amount of research in this area has revealed
generally consistent findings. Ekman, Friesen, and Ellsworth (1972) review the literature, citing the various categories found by different authors. The results are generally consistent; most researchers identified close to eight categories of facial emotion, regardless of research design and type of subjects. However, Ekman and Friesen (1975) talk about only six categories as being firmly established. In their review, they found that every investigator in the previous thirty years found the six emotions of happiness, sadness, surprise, fear, anger, and disgust.

Another approach to studying facial expression is the dimension approach. This approach was initially pursued in order to find fewer dimensions along which several categories of facial expression might fall. Shlosberg (1954) was the first to conceptualize this approach. He viewed emotional behavior on a continuum that included all behavior. Therefore, he identified dimensions of facial expression that also represented dimensions of behavior in general: 1) pleasant-unpleasant, 2) attention-rejection, and 3) sleep-tension. In the following years, research resulted in generally consistent support for the first dimension as applied to facial emotion. There was more disagreement about the applicability of the latter two dimensions to facial emotion; some viewed these two as
overlapping. Ekman and Friesen (1972) settled on the following three dimensions: 1) pleasant-unpleasant, 2) attentional-activity, and 3) intensity-control. The inconsistency of findings and the fact that some authors (Fridja, 1968, 1969) discovered as many dimensions as there were discrete categories in earlier studies, dampened the enthusiasm for this approach and diminished its initial appeal. Nevertheless, this remains an alternative to the category approach.

As was stated previously, the majority of research on facial expression has concerned the enacting of facial expression. One reason for this lack of emphasis in the research on emotion recognition was a finding in the early twenties that observers could not identify facial expressions with an accuracy any better than that expected by chance. Ekman and Friesen renewed interest in the area by citing methodological problems in that research, in addition to pursuing the area themselves. Some general findings of their research are as follows: 1) females are judged more accurately than males (they tend to be better expressers), 2) blacks are judged less accurately overall than whites, and 3) unpleasant emotions are less accurately judged than pleasant emotions. A brief review of some of the findings in the area of emotion identification that are pertinent to this study follows.
In an early study by Gates (1925), significant correlations were found between emotion labelling and indices of mental age and social adjustment. The link between the skill of emotion labelling and social adjustment is relevant to the current study.

An interesting debate in this area has concerned whether judgment of an isolated face is synonymous with judgment of a face presented in some kind of context. Although Frois-Wittmann (1930) demonstrated that rather specific facial expressions could be reliably identified by a significant proportion of observers, Turhan (1960) found that judgments of emotions differed when the stimuli was a face alone or a face as part of a movie scene where behavior and situational cues defined a context. Thayer and Schiff (1969) found facial expressions to be a more significant determinant of judgment than the interpersonal interaction or body movement.

Other studies pertinent to the practical treatment implications of the present study are those studies examining the effect of training on emotion recognition. Allport (1924) and Guilford (1929) found that after training, subjects' average gain in recognition ability was 5.9% and 51% respectively. Despite these large differences, both researchers found a significant negative correlation between initially superior judging and improvement in
ability. Both explained that initially superior judges were less analytical and were therefore more sidetracked by training which emphasized analysis.

Other relevant findings concern gender differences. Drag and Shaw (1967) found females to be significantly better than males at identifying the emotions of happiness, fear, love, and anger. This is consistent with the work of Hall (1979) who reviewed seventy-five studies where groups of subjects served as judges of nonverbal expressive stimuli that involved face, body, or vocal cues alone or in combinations. Hall concluded that there is a gender difference in "assessing how that person feels" or in general ability to decode nonverbal cues.

**Facial affect recognition in schizophrenic subjects**

This section of the paper reviews the literature examining schizophrenic subjects' ability to recognize emotion from facial expression. The review will include a discussion of ten studies and one theoretical paper in this area. General findings point to a number of deficits in this area in this population. There is more disagreement about the specific nature of the deficits, whether or not they are specific to schizophrenic subjects as opposed to subjects with other mental disorders, and whether or not these deficits are part of the premorbid personality.
Andorfer (1984) discusses the clinical manifestations of schizophrenia as being grouped into those pertaining to cognitive functioning and those pertaining to affect and social competence. Affective deficits seem to include the deficit in recognizing and interpreting emotion. Andorfer conceptualizes this deficit as resulting from affective pattern recognition. The larger concept of pattern recognition "refers to the process whereby a stimulus configuration is perceived, analyzed into its component features, and compared to one or more cognitive schemata" (Andorfer, 1984, p. 404). Andorfer proposes that affective pattern recognition consists of three levels. The primary or cue level is first, and entails the precision or discrimination of nonverbal cues. The secondary or configurational level involves the various schemata for emotional displays. The third or stochastic level involves further cognitions, such as beliefs or values. These levels will be helpful to keep in mind during the following literature review. Andorfer proposes that schizophrenia arises from defects in the first and/or second levels. With this conceptualization in mind, he also proposes that the affective and social manifestations of schizophrenia may precede the cognitive manifestations.

The social competence deficits in schizophrenia are related to premorbid functioning. Dougherty, Bartlett and
Izard (1974) found that female process schizophrenic subjects performed more poorly at recognizing emotions from photographs of facial expressions than did normal subjects, but that their accuracy increased when responding to the emotion of happiness. Muzekari and Bates (1977) found different results using male and female chronic schizophrenic subjects. Schizophrenic subjects of both sexes performed more poorly than normals on tasks of judging emotions from both still photographs and videotaped scenes. Their accuracy did not increase while judging happy emotions. Within each task, subjects' responses were either open-ended or multiple-choice. For both normal and schizophrenic subjects, accuracy increased in the multiple-choice option. While both studies found impairment in schizophrenic subjects, there was some disagreement about the range of impairment.

As discussed previously in this paper, process and reactive schizophrenia can be distinguished by the former's lower levels of premorbid social competence (Zigler and Phillips, 1961). Zigler and Phillips also discuss level of social competence as being influential in all mental disorders. Some research in the area of emotion recognition deficits have compared schizophrenic subjects to subjects with other psychiatric disorders in order to establish if these are differential deficits, and some researchers have
found differences which will be discussed. In addition, comparing process and reactive schizophrenic subjects' level of skills would be beneficial. Although this comparison has not yet been done directly, Cutting (1981) makes an attempt to investigate this issue by examining acute, remitted, and chronic schizophrenic subjects in one study.

Cutting (1981) examined acute versus chronic schizophrenic subjects, as well as a psychiatric control group and a depressed group. The task involved judging facial emotions, rather than just recognizing emotions. Subjects were asked to judge the friendliness of photographs. Cutting included a control task involving a perceptual judgment of color. Acute schizophrenic subjects judged the faces as less friendly than the other three groups, but performed similarly on the control task. Therefore, this result could not be attributed to attentional factors in the perceptual tasks. A second experiment included a task of judging meanness and friendliness and a control task of judging ages from faces. Remitted psychotic subjects were used instead of chronic schizophrenic subjects in this experiment. Again, the acute schizophrenic subjects performed similarly to other groups on the control task, but were more deviant on the experimental task. Cutting claims that the results show that the facial judgment impairment does not result from a
premorbid process, due to the relatively high performance of the remitted psychotic subjects. Since the abnormal judgment was not seen in this group, Cutting suggests that the abnormal judgment is not a premorbid or necessary feature.

In a study similar to Cutting's, Colussy and Zuroff (1985) showed videotapes to subjects and asked them to rate how accepting and loving the actress in the tape was. The videotapes varied in their verbal versus nonverbal displays; in some, the two channels were congruent, while, in other tapes, they were incongruent. These researchers compared schizophrenic, depressed, and normal subjects. Both of the experimental groups were less influenced by the nonverbal displays than were normals. Depressed subjects tended to perceive less loving in the actress. In another study by Zuroff and Colussy (1986), schizophrenic and depressed patients performed a task involving still photographs and the labelling of eight emotions. Schizophrenic and depressed subjects performed similarly; both groups showed higher than normal error rates. For both groups, the errors occurred most often in the rating of positive emotions. This is in disagreement with the findings of Dougherty, Bartlett, and Izard, (1974). These studies seem to suggest that deficits in emotion recognition are not specific to schizophrenia. However, other findings dispute this.
Feinberg et al. (1980) studied emotion recognition in schizophrenic subjects and persons with affective disorders through the use of four tasks. The authors used still photographs, and the tasks were as follows: 1) facial identification, 2) facial matching, 3) emotional matching, and 4) emotional labelling. The schizophrenic subjects showed deficits on all four tasks, whereas the depressed subjects showed significant impairment on only the final task. Walker, McGuire, and Bettes (1984) broke down the tasks involved in facial recognition of emotion in a way similar to Feinberg et al.. They looked at facial discrimination, emotional discrimination, and two tasks of emotion identification (labelling and multiple-choice). Schizophrenic subjects had more errors than normals on the latter three tasks, but they differed from those with affective disorders only on the emotion discrimination task. These results suggest that the deficits displayed by schizophrenic subjects encompass a broader range of skills than deficits displayed by subjects with mood disorders.

It appears that there may be some differential deficits in the area of facial emotion recognition between schizophrenic subjects and subjects with other disorders. The manifestation of these deficits in process versus reactive schizophrenic subjects is a topic important to the present study, since this study examines psychosis-prone
Cutting's findings suggested that these deficits are not related to premorbid factors. If this is true, we would not expect to see these deficits in schizotypal subjects.

Two studies focusing on children have shown results that contradict Cutting's findings. Children represent a population where schizophrenic symptoms may be present, but usually have not developed through their entire range. In this way, children are similar to the subjects in a schizotypal population in that they may show early deficits without full-blown symptomatology. Thus, both groups are appropriate populations with which to explore the presence and nature of deficits associated with schizophrenia. Walker (1981) studied four groups of children between the ages of nine to thirteen. The groups were anxious-depressed, schizophrenic, and unsocialized-aggressive children. The task consisted of labelling facial expressions. The unsocialized-aggressive group performed as normals usually do. Schizophrenic subjects had the lowest scores, with depressed children falling in between these subjects and normal subjects. Depressive subjects' errors were characterized by a negative bias in that these subjects had a greater proportion of mislabelling positive or neutral emotions into negative categories. Walker, Marwit and Emory (1980) did a cross sectional study, subdividing groups of
normal and schizophrenic subjects into three subgroups: children, adolescents, and adults. The task was similar to Walker's (1981). It included a labelling task, but, in addition, also asked the subjects to identify the emotion in the photograph in their own words (free response mode). Normal children and adolescents scored higher than schizophrenic adults. Child and adolescent schizophrenic subjects showed deficits in identifying negative emotions, while the adults in this group showed deficits in identifying the range of positive to negative emotions. In summary, these results with children suggest that emotion recognition may not only be a deficit specific to adult schizophrenic subjects, but that it may also be present at an early age and may be an early marker of the processes resulting in deterioration.

**Methodological issues in studying facial recognition of emotion**

These various studies point to the complexity of the tasks and skills involved in emotion recognition. One component of the skill is the ability to identify or recognize the emotion, while other aspects require labelling or judging the emotion. Providing preselected labels for subjects to choose from as part of an experimental task has some complications. One is that the subjects' familiarity
with the verbal categories can confound their responses. The preselected category labels may also impose ideas on the subjects, affecting their responses. In some cases their responses may be improved by the presence of the preselected labels.

Mandal (1986) examined the judgment of facial affect among both depressive and schizophrenic subjects without the use of preselected labels. Mandal used still photographs, but had subjects judge the similarity among six facial affects. This method follows from Schlosberg's conceptualization of facial affects as lying along continuous dimensions. Abelson and Sermat (1962) reported a method for multidimensional scaling of facial expressions. If subjects are asked to respond to stimuli in terms of similarity, than estimates of distances between categories can be derived. Abelson and Sermat explained that this method allows for the emergence of dimensions which are operative for the subjects, a method superior to experimenters' trying to predict dimensions in advance. Mandal used this method with clinical subjects and discovered the dimensions of pleasant-unpleasant and arousal-non arousal. Mandal found that the most important dimension operating for depressive subjects was the dimension of pleasantness-unpleasantness, while for schizophrenic subjects, the important operative dimension
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was arousal-nonarousal. Schizophrenic subjects' range between positive and negative emotions was more restricted than other groups.

PURPOSE OF THE PRESENT STUDY

The present study is designed to investigate further emotion recognition in subjects with schizotypal symptoms. This section will summarize the relevance of the use of schizotypal subjects and will provide an introduction to the tasks and hypotheses of the study.

Most of the schizophrenic subjects in the studies cited in the review on emotion recognition were taking some form of medication when they were studied. None of the studies controlled for this factor. There is some evidence that neuroleptic medication improves visual processing in both normal and schizophrenic subjects (Braff and Saccuzo, 1982). The present study will explore emotion recognition deficits in sub-clinical schizotypal subjects, a group that is hypothesized to be psychosis-prone and at risk for schizophrenia. One advantage of research with these subjects is that this population can be studied without the confounding effects of medication and hospitalization. In addition, this population also does not have the confounds of the debilitating impact of the development of the illness itself.
This study will explore two subgroups of schizotypal subjects, Perceptual Aberration-Magical Ideation subjects (Per-Mags) and Anhedonic subjects. The study will use Per-Mags in addition to Anhedonic subjects even though the findings of Haberman et al. (1979) found no significant difference in social competence between Perceptual Aberration subjects and controls. These subjects will be included here for two reasons. One is that the Haberman et al. finding is not conclusive. Numbers and McFall (1982) found Perceptual Aberration subjects to display more odd and hostile behavior than controls. This behavior may, in turn, affect their social interactions. The other, and perhaps more important reason for including these subjects is that deficits in the particular component of emotion recognition have been found in various groups of schizophrenic subjects, including acute, chronic and remitted schizophrenic subjects. Therefore, emotion recognition deficits are expected to be found in both subgroups of schizotypal subjects.

Most of the research cited in this review also showed no sex differences within schizophrenic subjects on emotion recognition tasks. However, findings of differences between sexes in the social competence literature are inconclusive, suggesting that females in general are more successful at decoding non-verbal cues (Hall, 1979); this may offset the
severity of other deficits in social competence in female schizophrenic subjects. Because this study aims to build the theoretical base in this area, gender will be included as a variable.

The present study includes four tasks. One task is the Shipley Institute of Living Scale. The three remaining tasks represent three ways of assessing deficits in emotion recognition. Responses to tasks are compared across groups. Three groups are included, two experimental groups of hypothetically psychosis-prone subjects and one group of normal controls. The tasks involve judging similarity of facial affect, rating facial affects along dimensions, and labelling facial affects.

The first hypothesis is that psychosis prone subjects will have a more restricted similarity range than controls; they will see opposite emotions as being more similar, less differentiated, than do normals. A second hypothesis is that psychosis-prone subjects, particularly Anhedonic subjects, will judge emotions to be generally less pleasant than normals judge them to be. The experimental subjects are also hypothesized to be less accurate on the category labelling task. It is unclear, from the literature, which of the three tasks should reveal the largest deficits.

The three tasks access potential deficits in facial affect recognition in three ways. The two traditional ways
of analyzing facial affect are the category approach and the dimensional approach. One of the pitfalls of the category approach is that it relies on the matching of an affect with a verbal label and, therefore, the responses of a subject may be influenced by his/her familiarity with the words and overall vocabulary knowledge. The present study employs the Shipley Institute of Living Scale (1967) and covaries out the effect of intelligence. The scale is included as Appendix B.

METHODS

Subjects: Subjects are male and female college students who completed the Wisconsin scales (Perceptual Aberration, Magical Ideation, Physical Anhedonia, Impulsive Nonconformity, and an Infrequency scale) as part of a general screening in the Introduction to Psychology course at the University of Montana. The study includes a total of twenty male and twenty female subjects identified by the Perceptual Aberration-Magical Ideation scales, twelve male and sixteen female subjects identified by the Physical Anhedonia scale, and twenty male and twenty female control subjects. Subjects who met the criteria for a group were contacted by phone.

Hypothetically psychosis-prone subjects were chosen using three scales. Experimental subjects were identified
by a criterion level of two standard deviations above the mean on the scales used to identify them. Per-Mag subjects scored at this criterion level on either or both of these scales. Subjects received scores of 0 (Per-Mags) or up to 2 (Anhedonics) on the Infrequency scale. Any subject scoring deviantly high on both the Physical Anhedonia scale and one or both of the other scales was not included in this group, because this type of subject is characterized by a mixture of symptoms not examined in this study. Subject age was limited to 35 or under, and subjects were also limited to English speaking Caucasians. Control subjects were chosen from those who scored less than .5 standard deviations above the mean on all three scales.

Materials: Four tasks were administered.

Task one: The first task was the similarity task. Its function was to measure subjects' similarity range for six facial affects. The six facial affects included were happiness, anger, surprise, fear, disgust, and sadness. Subjects' responses to this task revealed their range of differentiation among various affects. A paired comparison procedure was utilized. Subjects made judgments about fifteen possible distinct pair combinations of six facial affects. For each pair, subjects were asked to rate the level of similarity on a scale of one to seven, with one being "not similar at all" and seven being "exactly the
same". Photographs from the Facial Meaning Sensitivity Task (FMST; Leathers, 1986) were converted to overhead transparencies, and each pair of photographs was displayed on the overhead projector, one at a time. Emotions representing the six fundamental emotions were chosen from the first part of the FMST.

Task two: The second task was the dimensional task. Its function was to measure subjects' ratings of facial affect along the particular dimensions of pleasantness-unpleasantness and passivity-activity. The same six affects included in this task were those included in task one. Subjects were asked to rate each affect on two seven-point Likert scales, with one being "unpleasant" and seven being "pleasant" on the first scale and one being "passive" and seven being "active" on the second scale.

Task three - Intelligence measure: The Shipley Institute of Living Scale (Zachary, 1967) was administered to all subjects.

Task four: The fourth task was the Facial Meaning Sensitivity Task (Leathers, 1986). This is a categorical task and its function was to measure subjects' matching of photographs of expressions of facial affect to preselected category and subcategory labels. The task consists of three parts. The first part involves having the subjects match ten photographs to ten category labels. Included within
these ten labels are the six affects used in tasks one and two. The second part of the task involves having subjects view thirty photographs and pick three subtle emotions within each of the ten emotion categories. The third part of the task involves having subjects match those thirty photographs to subcategory labels.

**Design:** The formal design is a 3x2 between groups experimental design. Between group factors are the three groups of Per-Mag, Anhedonic, and control subjects, and the variable of gender. The dependent variables are the three emotion tasks administered to each group of subjects, resulting in a total of six measures. The measure of IQ serves as a covariate.

**Procedure:** The study proceeded through the following steps. First, identification of subjects was performed based on their scores on the scales filled out in the standard screening process. Subjects were contacted by phone and asked to participate in the study in return for either class credit or a small fee. The experimenter remained blind to group membership of subjects.

When subjects arrived at the place of testing, they were escorted to the research room and handed a packet. One to six subjects were run in any one session. In the packet the materials were organized as follows: face sheet, task one, task two, task three (the intelligence measure), and
task four. The experimenter asked the subjects to fill out a face sheet with their name, age, and when they took Introduction to Psychology. This allowed the experimenter to document whether the subject would receive experimental credit or be paid. In addition, the face sheet asked subjects whether they had taken Communication 202 (a course where the FMST had been administered) and whether or not they had participated in another experiment that was being run where the same intelligence measure was administered.

After checking that everyone had a writing utensil, the following instructions were given: "Please begin filling out the top page of your packet and make sure to put your age between your name and subject number".

When subjects completed this page, the following instructions were given:

In this study, you will be asked to perform four tasks. In the first two tasks, you will be viewing the screen. For the second two tasks, the materials are in your packet. As we go through the tasks, please do not turn the page and go on to the other tasks until either I tell you or the materials instruct you to do so. We will now begin task one. Unclip your packet and put aside the top page. Please read along silently as I read the instructions aloud: In task one, you will be shown on the screen pairs of photographs depicting two facial expressions of emotion. There are fifteen pairs which you will view one at a time. For each pair of photographs, judge the similarity of the two photographs on the basis of the emotional qualities expressed, rather than on how the face looks. Use the scales below to rate the level of similarity between the photographs. A mark of one will represent a judgment that the pair of photographs is not similar at all. A mark of seven will represent a judgment that the pairs are exactly the same. A mark of two through
six will represent a judgment between these two extremes. When you are finished ranking each pair, please look up so that I will know when everyone is done.

When subjects completed task one, the following instructions were given:

We will now begin task two. Again, please read along silently as I read the instructions aloud: Task two includes six photographs of facial expressions of emotion which you will be shown on the screen. One at a time, you will be asked to rate these photographs on two scales. Both scales will ask you to rate the emotion expressed. On scale A, displayed below, a mark of one will represent a very unpleasant emotion. A mark of seven will represent a very pleasant emotion. Use the marks two through six if you think the emotion expressed in the photograph lies somewhere between unpleasant and pleasant. On scale B, displayed below, a mark of one will represent a passive emotion. A mark of seven will represent an active emotion. A mark of two through six will represent emotions which may be somewhere in between passive and active. Please look up when you are finished ranking each photograph.

When subjects are completed with task two, the following instructions will be given:

Task three is a little different from the others. It will be a timed task. You will have ten minutes for each side of the page. Please turn to that page. The only identifying information which you need to fill out is your year in college, after it says education, please put whether you are a freshman, sophomore, junior, or senior. You may now begin part one. Read the instructions silently to yourself. Do not turn the page until I tell you.

Subjects were given ten minutes to complete part one, and then told to stop. At the end of this time period, the following instructions were given:

Turn over the page now and begin part two. Read the instructions silently to yourself. Do not go on to task four until I tell you.
Again, subjects were given ten minutes to complete part two and were then told to stop.

For task four, the following instructions were given:
You may now put aside this page and begin task four.
Task four is not a timed task. Read the instructions to yourself and proceed at your own speed. If you have any questions, come up to me individually. When you are done, bring your packet to me.

There were three subsections to this section, each with its own written instructions and photographs. The instructions used in this study deviated slightly from the instructions of the FMST. The first deviation was an additional introductory written paragraph stating:

Tasks four involves a test called the Facial Meaning Sensitivity Test (FMST). This test refers to ten basic classes of facial meaning. These classes of facial meaning are ten basic categories of facial expressions of emotion. The test has three parts. Please take the test parts in order, and do not go back to a prior part once you have completed it and gone on to the next part.

FMST instructions from Leather's book (1986) for the first part read:

Part 1 of the FMST contains ten photographs that represent the ten basic classes of facial meaning. Study the ten photographs, and place the photograph numbers in the appropriate blanks in the answer sheet on the following page.

These instructions were changed in the following ways:
1) the phrase "(See the following page)" was inserted after "Part 1 of the FMST" in order to point the subjects toward the photographs they would use, 2) the phrase "in the answer sheet on the following page" was changed to "of the blanks
of the chart in Step 1" because the chart for responding was included on the same page, 3) at the end of the page, the following instructions were written "When you are done with PART ONE, please put both this page and the following page with the ten photographs aside before you begin PART TWO".

FMST instructions to the second part read:

On the following pages you will see thirty more photographs of facial expressions. Your task in Part 2 of the FMST is to group these facial expressions by class of meaning. Three of the photographs, for example, are intended to convey meanings that express a specific kind of disgust and, hence, should be perceived as part of that class of facial meaning. Among the thirty pictures are three expressions that may be classified as specific kinds of happiness. Your task, then, is to select the three photographs that you most closely associate with each of the ten classes of facial meaning (from Part 1), using each photograph only once, and to place the photograph numbers in the appropriate blanks of the chart on the following page.

The following changes were made in these instructions:

1) the phrase "on the following page" was changed to "in Step 2" and this chart was included on the same page, 2) at the end of the page, the following instructions were written "When you are done with PART TWO, put this page aside before beginning PART THREE. Keep the page with the thirty photographs, because you will need to look at this page for PART THREE".

FMST instructions for Part 3 read:

In Part 3 of the FMST you have a very specific discriminatory task. You must correctly identify very specific kinds of meaning. Consider the preceding thirty photographs three at a time, and place the photograph number in the blank provided in the chart on
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the following page. For example, you must decide whether picture 8, 12, or 30 communicates aversion. You must also identify repugnance and distaste in this series of three photographs.

Instructions to this part were changed as follows: 1) the phrase "on the following page" was changed to "in Step 3" and this chart was included on the same page.

In scoring all tasks, the experimenter remained blind to group membership of subjects.

RESULTS

Group differences were assessed using a 3x2 analysis of covariance with factors of group (Per-Mag, Anhedonia, Control) and gender. This analysis was performed on six dependent measures. These measures were scores on task one, two dimensions of task two, and three parts to task four. All of the parts of the FMST were scored according to the author's instructions. In task one, similarity ratings were tallied and divided by fifteen (number of pairs) resulting in an overall average score for assessment of similarity among the different emotions. Both parts of task two also were scored by averaging responses.

The first step in this analysis was to test the linearity assumption. This was to check that all groups of subjects were the same, or only differed within the limits of chance, with respect to the regression of intelligence on the dependent variables. This assumption was met for all
six measures (see Table 1). Therefore, the factor of intelligence was used as a covariate.

A covariance analysis was conducted for all six measures. The results were non-significant for group, gender, and their interaction on all measures (see Table 2).

The occurrence of three potentially influential factors was tabulated for all subjects. The first factor was whether or not subjects were paid $2 or received experimental credit for participating in the study. The second factor was whether or not subjects had taken a Communications course at the University where the FMST was administered and discussed in class. The third factor was whether or not subjects participated in a prior experiment where the Shipley Institute of Living Scale was administered. Initially, the plan was to use the prior Shipley scores if subjects had recently taken that task. This plan was abandoned when it was discovered that this other study did not administer the Shipley according to standardized time limit instructions. For all three
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factors, groups did not appear to differ more than expected by chance, and only one subject had taken Communication 202, so a formal analysis was not conducted (see Table 3).

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Insert Table 3 about here

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Group means on all six measures are presented in Table 4.

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Insert Table 4 about here

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DISCUSSION

It was hypothesized that members of the two psychosis-prone groups would display less differentiation than controls in judging emotions expressed by facial expressions, would judge those same emotions as less pleasant than controls, and would also be less accurate in labelling emotions. These kinds of deficits have been observed in a schizophrenic population. Results of the current research do not provide support for any of these hypotheses. In addition, it was also hypothesized that females would be more accurate at labelling emotions than males. The results also did not provide support for this
hypothesis.

**Differentiation/Similarities Task:**

Subjects participated in a task designed to assess their range when judging similarity or dissimilarity of emotional displays in facial expressions. Six expressions were shown to them: happiness, anger, fear, surprise, distrust, and sadness. Subjects were shown fifteen possible pairs of these six emotions and were asked to rate the level of similarity between the two. Level of similarity between the pairs was averaged and used as an index of range of differentiation. Group means did not differ significantly, nor did these differences approach significance. It appears, then, that Anhedonic and Per-Mag subjects are able to perceive a range of emotions comparable to that of normal subjects. Group means between males and females also did not differ significantly, nor did they approach significance. It also appears, then, that males and females have comparable ranges when perceiving emotions from facial expressions.

**Dimension Task:**

Subjects participated in a task designed to assess their judgment of the same six emotions used previously on two dimensions: pleasantness-unpleasantness, and active-passive. Group means were analyzed separately for each dimension and did not differ significantly or approach
significance. Means between the sexes also did not approach significance. Therefore, it appears that male and female Anhedonic, Per-Mag, and control subjects do not differ in their judgment of the pleasantness and level of activity of an emotion expressed on a face. Though the Anhedonic group in general is characterized by a lower ability to experience pleasure, on this task they rated emotions as equally pleasurable as any other group.

**Emotion Labelling Task:**

Subjects participated in three parts of an emotion labelling task (FMST). Results for the three parts were analyzed separately to determine if there were differences at each successively difficult part of the task. Groups means did not differ significantly for the three parts, nor did the differences approach significance. Per-Mag, Anhedonic, and control subjects were comparably accurate in matching ten facial expression to ten category labels of emotion. All groups were also comparably accurate in matching thirty more subtle emotional expressions to those ten category labels and to thirty sub-category labels. Results also show no significant differences in accuracy due to gender.

In summary, although deficits in facial affect recognition and judgment of facial affect have been observed in a schizophrenic population, these same deficits were not
observed in this study in two groups of hypothetically psychosis-prone subjects. The present results suggest that these deficits may develop later in the course of schizophrenia and that assessing these skills may not be indicated when trying to identify a group vulnerable to schizophrenia.

It is interesting that no gender differences were found in the present study while several studies reviewed by Hall (1979) found females to be more skilled than males in both sending and receiving emotional cues. The lack of gender differences found here contradicts these findings. On the other hand, this lack of gender differences may or may not be contradictory for the psychosis-prone group. Of all the studies reviewed which examined facial affect decoding skills in schizophrenic subjects, seven included both sexes. In five of these studies (Cutting, 1981; Mandal, 1986; Feinberg et al., 1986; Walker et al., 1984; Walker et al., 1980) different sexes were included in the same group and this possible effect was neither analyzed nor commented upon. Two of the studies that did analyze gender differences in the schizophrenic groups (Muzekari and Bates, 1977; Novic et al., 1984) found them to be absent. However, the Novic et al. study examined only four schizophrenic females. Nevertheless, though there may be gender differences in these skills in normal subjects, the evidence
thus far indicates these differences may disappear once
schizophrenia has taken its course. Therefore, the lack of
gender differences in the psychosis-prone groups may or may
not be contradictory, but may represent some effects of the
schizophrenic process. There is not enough data to make a
more clear statement about this speculation. However, the
lack of gender differences in the control subjects is
surprising.

Limitations of the Present Study

Since the inception of this study, a review article
entitled "Deficits in Facial Affect Recognition and
Schizophrenia" was published by Morrison, Bellack, and
Meuser (1988). Points from this review article are relevant
and will be used as a guideline for discussion in the
following three sections.

These authors cite various methodological factors as
possibly accounting for some of the inconclusiveness
regarding facial affect recognition deficits among
schizophrenic subjects. These same methodological problems
are relevant to the present study.

One methodological factor concerns the different sets
of facial affect display materials used in the various
studies. The most common materials were those of Izard and
Ekman et al., while other investigators designed their own.
The authors suggest using a validated set of materials and recommend direct comparisons between the two common sets to determine their differential efficacy in identifying these deficits in schizophrenic subjects. While the present study did use a validated set of materials (FMST), it was not one of the two sets commonly used in studying these deficits in the schizophrenic population. Since it is not yet clear whether the Ekman and Izard sets are equally comparable, it must also be questioned whether either or both of these sets of materials would be comparable to the FMST. In addition, whether or not they are comparable in a normal or in a schizophrenic population may not imply their comparable efficacy in identifying these deficits in a psychosis-prone population.

Another methodological factor is the length of stimulus presentation. In real social interactions, facial expressions of emotion typically occur briefly and change quickly. Therefore, the task of viewing a facial expression in a still photograph may hardly approximate the real life task of decoding emotional expressions. Most of the studies in this area, including the present one, allow subjects to view photographs for a virtually unlimited period of time. This unlimited period of time may not be representative of real life. Feinberg et al. (1986) controlled stimulus duration to more closely represent real life spontaneous
expressions. These authors found schizophrenic patients to be more impaired than depressed patients on overall facial perception skills and to be particularly more impaired on recognizing and discriminating emotions.

An additional factor discussed by these authors (Morrison et al., 1988) is the more general methodological issue of careful diagnosis and description of subjects. In this study, psychosis-prone subjects were identified by the Wisconsin scales. While these scales have been widely used, there is still a lack of clear follow-up data drawn from a large sample of subjects showing that subjects identified by these scales do indeed display a higher than average incidence of developing psychosis. While these subjects have been shown to display symptoms of schizotypy, this is a different matter from a large scale longitudinal analysis of their hypothesized high risk status.

**Contributions of the Present Study**

In the present study, the pattern of results for each dependent measure is consistent, indicating the results are not due to a lack of experimental control of the subjects or the situation; rather, the measures tapped the same variable in the same ways across subjects and situations.

As discussed in the literature review, other studies have used subjects identified by the Wisconsin scales and
have found significant results for different variables and have, therefore, provided evidence for the construct validity of these scales. Unlike these studies, the present study sheds some doubt on this issue. If the scales do indeed adequately measure psychosis-proneness, then the negative findings of the present study indicate that this population does not have any observable deficits in facial affect recognition and judgment and that the locus of psychosis-prone subjects’ social competence deficits is elsewhere.

The design and question of the present study fits neatly with suggestions by Morrison et al. (1988). They suggest that in order to further investigate this area, it would be worthwhile to examine these deficits in primary relatives of subjects with schizophrenia, subjects with schizophrenia-spectrum disorders, and subjects at risk for schizophrenia. The examination of premorbid abilities in subjects at risk as well as studies of subjects during both acute episodes and periods of remission would help establish the stability of these deficits in schizophrenia. Examining subjects at risk for psychosis is essentially what the present study accomplished. The contribution of these results is to suggest that these deficits are not stable throughout the course of schizophrenia or even present prior to the onset of the disorder; rather, they intensify or
develop as the disorder progresses. These findings are supportive of Cutting's conclusion that these deficits are not related to premorbid factors (1981). Emotion recognition judgments constitute one circumscribed area of judgment influencing the success of social interactions. Perhaps deficits in these particular judgments follow more general deficits in the ability to make more complex judgments regarding social interactions. A more thorough and well controlled investigation of these deficits in a schizophrenic population could help elucidate this progression.

An area to consider here is how these results contribute to possible hypotheses regarding the development of these facial affect decoding deficits in schizophrenia. Rado proposed the pleasure deficit as primary, yet the psychosis-prone subjects in this study did not rate emotions as less pleasurable overall than any other group. The Wisconsin group (Chapman, Edell, and Chapman, 1980) describe subjects identified by their scales as socially withdrawn, particularly the Anhedonic group. Therefore, the psychosis-prone subjects currently examined can be said to exhibit signs of social withdrawal, yet no signs of facial affect decoding deficits. This may lend credence to the hypothesis that these deficits are a result of poor social learning. Following a similar line of reasoning, because attentional
deficits have been identified more than once in the psychosis-prone population (Balogh and Merritt, 1985; Simons et al., 1982) and facial decoding deficits have not (although the present study is the only attempt to assess these known by this author), it is possible that the attentional deficits are the more general and primary deficits.

Another hypothesis stated by Morrison et al. is that schizophrenic subjects may exhibit deficits in the perception of only certain emotions, such as negative ones. They criticize researchers in the area for not analyzing responses to positive and negative emotions separately and recommend this in the future. Therefore, the present author examined the present data to determine if a formal reanalysis of the data was warranted. The description and results of this examination are outlined in the following paragraphs.

Only one study reviewed in this paper examined response to pleasant versus unpleasant affects (Mandal, 1986). In addition, this study examined the responses to aroused versus non-aroused affects. Therefore, the preliminary analysis of the present data utilized Mandal's classification of pleasant affects (happiness, surprise), unpleasant affects (sadness, fear, anger, and disgust), aroused affects (fear, anger, and disgust), and non-aroused
affects (sadness, happiness, and surprise). In discussing this, these classifications will be referred to as the four dimensions, so as not to confuse them with the emotion categories. Each of these four dimensions were examined in a sample of five from each of the six groups. Part I of the FMST was examined first. The average score for each dimension was computed. The numbers ranged from 8.0 to 10.0 and suggested only chance variability.

A second sample of five was taken from each group to compute responses to Part II of the FMST. The first computation scored the number of emotions correctly identified for each of the four dimensions. Numbers ranged from extremes of .67 to .93, the majority falling between .76 and .89. A further computation was performed on the same sample of five, in the female groups only. This computation scored the number of emotions correctly identified, but scored these by the weights assigned by Leathers (1986). This narrowed the range of numbers to .74-.90. These numbers also only indicate chance variability.

A third sample of five was taken from the female groups to analyze Part III of the FMST. Only females were scored because prior sampling indicated only chance effects. Once again, this seemed to be the case in Part III. Percentages of emotions correctly scored (by weights) for each dimensional classification ranged from .70 to .90.
In the event that Mandal's classification of the emotion categories was invalid, the present author took an additional look at the first sample of five in the female groups and their performance on Part I of the FMST. This author examined the ten categories of emotion and analyzed two other possible classifications of positive and negative emotions (positive 1: happiness, interest, surprise, determination; negative 1: disgust, sadness, bewilderment, contempt, anger, fear; positive 2: positive 1 plus bewilderment; negative 2: negative 1 without bewilderment). The range for the first classification was 8.0-10.0 and for the second: 7.67-10.00.

All of these preliminary analyses indicated no group differences in subjects' responses to pleasant, unpleasant, aroused, and non-aroused affects. Therefore, no formal analysis was conducted on the FMST or on the dimension task. No support was provided for a differential deficit in decoding skills between positive and negative emotions in the psychosis-prone groups. This does not lend support for the hypothesis regarding differential deficits in schizophrenic subjects.

The present results shed some doubt on previous research findings in two areas. One area is the construct validity of the Wisconsin scales. The other area is that of gender differences in decoding and encoding of nonverbal
cues. The results of the present study show no differences in decoding facial expressions of emotion between males and females, which contradicts many other researchers. However, these findings are consistent with the lack of gender differences noted in studies of facial affect recognition using schizophrenic subjects. In the present study, the gender effect is consistently the weakest effect; however, these findings are not clearly informative. In the present analyses for both gender and group, it is unclear whether the lack of effect is due to the Wisconsin scales, the dependent measures, or to an actual lack of any deficits.

Directions for Future Research

This researcher had not found any other examination in the literature of decoding skills in the psychosis-prone population. This makes interpretation of the present study difficult. For example, if these deficits were examined in psychosis-prone subjects identified by means other than the Wisconsin scales, then the current study could make clearer statements about interpretations. This could be one direction for future research. Another direction would be to assess these skills in primary relatives of schizophrenic subjects as suggested by Morrison, Bellack, and Meuser, (1988). Only after such further investigations could a clearer statement be made regarding the development of these
deficits in schizophrenia.

Another important area for further investigation involves testing the reliability and validity of the types of measures used in the present study. There are no direct replications in the literature of studies examining schizophrenic subjects; rather, there is a variability of designs. Perhaps the most important question is whether skills in the judgment and recognition of facial affect are related to skills in general interpersonal functioning. This study, as well as others, examines a single nonverbal channel of uncontrolled duration which may not approximate real life. Therefore, future research could examine multiple communication channels and could control the duration of the stimulus. In addition, performance on these measures could be compared to closer approximations of interpersonal skill such as rating of social skills and ratings of performance in role play procedures.

Summary

The present study examines the judgment and recognition of emotion from facial expression in a group of normal college students, as well as in two groups of hypothetically psychosis-prone college students identified be either the Physical Anhedonia or Per-Mag Wisconsin scales.

The psychosis-prone groups display sub-clinical
schizotypal symptoms, some of which involve difficulties in interpersonal situations. The present study focussed on one component of overall adequacy in interpersonal functioning, or social competence. This component is the ability to decode emotional cues from facial expressions. Deficits in this ability have been documented in a schizophrenic population, but had not been examined previously in a hypothetically psychosis-prone population. Similar deficits were expected in this population.

Anhedonic, Per-Mag, and control groups did not differ on a task assessing range of differentiation of emotions, or on a task assessing judgment of emotions along certain dimensions, or on an emotion labelling task. Therefore, none of the hypotheses were supported in this study. In addition, no gender differences were found in any groups.

These results are inconsistent with the idea that facial affect decoding deficits develop early in the process of schizophrenia and may be a marker of vulnerability to psychosis. Rather, these results lend more credence to hypotheses regarding poor social learning or attentional deficits as the more primary deficits. However, it is emphasized that the present findings are limited and subject to various interpretations. Further research needs to investigate the reliability and validity of the types of measures used to assess these deficits. In addition,
longitudinal research is necessary to answer questions regarding the construct validity of the Wisconsin scales. The present study contributes additional descriptive information regarding high and low scorers on these scales.
References


Judgment and Recognition of Emotion


Judgment and Recognition of Emotion


Judgment and Recognition of Emotion


Judgment and Recognition of Emotion


Appendix A

Chapman Psychosis-Proneness Scales

Instructions

This booklet contains a questionnaire consisting of approximately 200 questions. Answer each question True (1) or False (2) as best applies for you, using the answer sheet provided.

The questionnaire asks about a number of different attitudes and experiences people might describe themselves as having. Please blacken choice "1" on your scantron if the statement is true as best applies for you, and blacken choice "2" if the statement is false as best applies for you. You may leave an item blank, if you wish, but try to answer even if you are not sure the statement really applies to you.

It is best to work as quickly as possible.

After we begin, please keep your answer to yourself and do not discuss them with your neighbors. Again, please no talking while you are filling out the questionnaire.

Answer the questionnaire only for times you were not using drugs.

This will take you about 50 minutes to fill out.

1. PLEASE ENTER YOUR SEX IN ITEM 1. Male = 1. Female =

2. I have sometimes enjoyed feeling the strength in my
muscles.

3. Sometimes I have had feelings that I am united with an object near me.

4. On seeing a soft, thick carpet, I have sometimes had the impulse to take off my shoes and walk barefoot on it.

5. I sometimes have a feeling of gaining or losing energy when certain people look at me or touch me.

6. There just are not many things that I have ever really enjoyed doing.

7. Sometimes when I look at things like tables and chairs, they seem strange.

8. The sound of rustling leaves has never much pleased me.

9. Sometimes I feel like everything around me is tilting.

10. I have always hated the feeling of exhaustion that comes from vigorous activity.

11. At times when I was ill or tired, I have felt like going to bed early.

12. I don't understand why people enjoy looking at the stars at night.

13. I have been fascinated with the dancing of flames in a fireplace.

14. I have sometimes been fearful of stepping on sidewalk cracks.

15. I have often enjoyed receiving a strong, warm handshake.
16. The color that things are painted has seldom mattered to me.
17. I can remember when it seemed as though one of my limbs took on an unusual shape.
18. The taste of food has always been important to me.
19. I have always loved having my back massaged.
20. I have wondered whether the spirits of the dead can influence the living.
21. The bright lights of a city are exciting to look at.
22. The sounds of a parade have never excited me.
23. Things sometimes seem to be in different places when I get home, even though no one has been there.
24. I think I could learn to read others' minds if I wanted to.
25. The beauty of sunsets is greatly overrated.
26. I have felt that my body and another person's body were one and the same.
27. When I have seen a statue I have had the urge to feel it.
28. At times I perform certain little rituals to ward off negative influences.
29. I have felt that I might cause something to happen just by thinking too much about it.
30. I have been disappointed in love.
31. After a busy day, a slow walk has often felt relaxing.
32. Parts of my body occasionally seem dead or unreal.
33. I have always had a number of favorite foods.
34. I have occasionally had the silly feeling that a TV or radio broadcaster knew I was listening to him.
35. Sometimes people whom I know well begin to look like strangers.
36. There have been times when I have dialed a telephone number only to find that the line was busy.
37. It has always made me feel good when someone I care about reaches out to touch me.
38. I usually work things out for myself rather than get someone to show me how.
39. I have sometimes felt that strangers were reading my mind.
40. I have sometimes had the feeling that one of my arms or legs is disconnected from the rest of my body.
41. Sex is okay, but not as much fun as most people claim it is.
42. My hands or feet have never seemed far away.
43. When I have walked by a bakery, the smell of fresh bread has often made me hungry.
44. Flowers aren't as beautiful as many people claim.
45. It has often felt good to massage my muscles when they are tired or sore.
46. It has seemed at times as if my body was melting into
47. Poets always exaggerate the beauty and joys of nature.
48. There have been a number of occasions when people I know have said hello to me.
49. Some people can make me aware of them just by thinking about me.
50. I have worried that people on other planets may be influencing what happens on earth.
51. I have never had the passing feeling that my arms or legs had become longer than usual.
52. I have usually finished my bath or shower as quickly as possible just to get it over with.
53. The hand motions that strangers make seem to influence me at times.
54. I have felt as though my head or limbs were somehow not my own.
55. Numbers like 13 and 7 have no special powers.
56. I have seldom cared to sing in the shower.
57. People often behave so strangely that one wonders if they are part of an experiment.
58. Now and then when I look in the mirror, my face seems quite different than usual.
59. I cannot remember a time when I talked with someone who wore glasses.
60. I have never had the feeling that certain thoughts of
mine really belonged to someone else.

61. Often I have a day when indoor lights seem so bright
    that they bother my eyes.

62. I've never cared much about the texture of food.

63. When I pass by flowers, I have often stopped to smell
    them.

64. I have sometimes had the feeling that my body is
    decaying inside.

65. It is not possible to harm others merely by thinking
    bad thoughts about them.

66. I have had the momentary feeling that someone's place
    has been taken by a look-alike.

67. I have sometimes felt that some part of my body no
    longer belonged to me.

68. I like playing with and petting soft little kittens or
    puppies.

69. I have felt that there were messages for me in the way
    things were arranged, like a store window.

70. Beautiful scenery has been a great delight to me.

71. When introduced to strangers, I rarely wonder whether I
    have known them before.

72. I never wanted to go on any of the rides at an
    amusement park.

73. I have sometimes danced by myself just to feel my body
    move with the music.
74. I have often found walks to be relaxing and enjoyable.
75. I have never found thunderstorms exhilarating.
76. I cannot remember a single occasion when I have ridden on a bus.
77. I have noticed sounds on my records that are not there at other times.
78. When I start out in the evening I seldom know what I'll end up doing.
79. I never have the desire to take off my shoes and walk through a puddle barefoot.
80. I sometimes have to touch myself to make sure I'm still there.
81. My sex life is satisfactory.
82. When eating a favorite food, I have often tried to eat slowly to make it last longer.
83. I have sometimes felt confused as to whether my body was really my own.
84. At times I have felt that a professor's lecture was meant especially for me.
85. The boundaries of my body always seem clear.
86. I enjoy many different kinds of play and recreation.
87. It worries me if I know there are mistakes in my work.
88. I have felt that something outside my body is a part of my body.
89. I think flying a kite is silly.
90. I have usually foundlovemaking to be intensely pleasurable.

91. I almost never dream about things before they happen.

92. Sometimes I have had the feeling that a part of my body is larger that it usually is.

93. I have had very little fun from physical activities like walking, swimming, or sports.

94. A good soap lather when I'm bathing has sometimes soothed and refreshed me.

95. For several days at a time I have had such a heightened awareness of sights and sounds that I cannot shut them out.

96. At times I have wondered if my body was really my own.

97. I am more sensitive than most other people.

98. The first winter snowfall has often looked pretty to me.

99. I sometimes have had the feeling that some parts of my body are not attached to the same person.

100. When I'm feeling a little sad, singing has often made me feel happier.

101. One food tastes as good as another to me.

102. My hearing is sometimes so sensitive that ordinary sounds become uncomfortable.

103. I have had very little desire to try new kinds of foods.
104. I have never felt that my arms or legs have momentarily grown in size.
105. I have always found organ music dull and unexciting.
106. I have sometimes had the passing thought that strangers are in love with me.
107. Occasionally I have felt as though my body did not exist.
108. I have seldom enjoyed any kind of sexual experience.
109. I have had the momentary feeling that I might not be human.
110. Sex is the most intensely enjoyable thing in life.
111. Occasionally it has seemed as if my body had taken on the appearance of another person's body.
112. I don't know why some people are so interested in music.
113. Horoscopes are right too often for it to be a coincidence.
114. I go at least once every two years to visit either northern Scotland or some part of Scandinavia.
115. I have usually found soft music boring rather than relaxing.
116. Good luck charms don't work.
117. Standing on a high place and looking out over the view is very exciting.
118. I am sure I am being talked about.
119. The smell of dinner cooking has hardly ever aroused my appetite.
120. I have had the momentary feeling that my body has become misshapen.
121. I have often felt uncomfortable when my friends touch me.
122. Dancing, or the idea of it, has always seemed dull to me.
123. Sunbathing isn't really more fun than lying down indoors.
124. Sometimes I have had a passing thought that some part of my body was rotting away.
125. Trying new foods is something I have always enjoyed.
126. On some mornings, I didn't get out of bed immediately when I first woke up.
127. The sound of organ music has often thrilled me.
128. I sometimes have had the feeling that my body is abnormal.
129. The sound of the rain falling on the roof has made me feel snug and secure.
130. I have had the momentary feeling that the things I touch remain attached to my body.
131. I have not lived the right kind of life.
132. Ordinary colors sometimes seem much too bright to me (without taking drugs).
133. Sometimes part of my body has seemed smaller than it usually is.

134. The warmth of an open fireplace hasn't especially soothed and calmed me.

135. On hearing a good song I have seldom wanted to sing along with it.

136. Sometimes I have felt that I could not distinguish my body from other objects around me.

137. I have often enjoyed the feel of silk, velvet, or fur.

138. I have sometimes sensed an evil presence around me, although I could not see it.

139. If reincarnation were true, it would explain some unusual experiences I have had.

140. I have never doubted that my dreams are the product of my own mind.

141. The government refuses to tell us the truth about flying saucers.

142. I've never cared to sunbathe; it just makes me hot.

143. A brisk walk has sometimes made me feel good all over.

144. I often get so mad that I lose track of some of the things I say.

145. I never get so angry I can't speak coherently.

146. Thinking things over too carefully can destroy half the fun of doing them.

147. It's important to save money.
148. I usually quit before finishing one activity in order to start something else.
149. As often as once a month I have become so angry that I have had to hit something or someone to relieve my anger.
150. I frequently overeat and wonder why later.
151. Most people say "please" and "thank-you" more often than is necessary.
152. My friends consider me to be a cool, controlled person.
153. When I want something, delays are unbearable.
154. I don't have much sympathy for people whom I can push around and manipulate easily.
155. Most of the mourners at funerals are just pretending to be sad.
156. My way of doing things is apt to be misunderstood by others.
157. Most people think of me as restless.
158. I always let people know how I feel about them, even if it hurts them a little.
159. I almost always do what makes me happy now, even at the expense of some distant goal.
160. I have had to invent some good excuses to get out of work or taking exams.
161. I think people spend too much time safeguarding their future with savings and insurance.
162. I break rules just for the hell of it.
163. I usually find myself doing things on "impulse".
164. I usually act first and ask questions later.
165. I rarely act on impulse.
166. I prefer being spontaneous rather than planning ahead.
167. I always stop at red lights.
168. I sometimes do dangerous things just for the thrill of it.
169. No one seems to understand me.
170. I let go and yell a lot when I'm mad.
171. I find it difficult to remain composed when I get into an argument.
172. Long-term goals are not as important for me as living for today.
173. During one period when I was a youngster I engaged in petty thievery.
174. Driving from New York to San Francisco is generally faster than flying between these cities.
175. I often do unusual things just to be different from other people.
176. I usually consider different viewpoints before making a decision.
177. Sometimes when walking down the sidewalk, I have seen children playing.
178. In school, I sometime got in trouble for cutting up.
179. Being in debt would worry me.
180. I like to use obscene language to shock people.
181. People who drive carefully annoy me.
182. If I burped loudly while having dinner at the house of someone I knew, I would be embarrassed.
183. I liked to annoy my high school teachers.
184. When I really want something, I don't care how much it costs.
185. I believe that most light bulbs are powered by electricity.
186. My parents often objected to the kind of people I went around with.
187. I would probably purchase stolen merchandise if I knew it was safe.
188. I have never been in trouble with the law.
189. I do many things that seem strange to others but don't seem strange to me.
190. I wouldn't worry too much if my bills were overdue.
191. I try to remember to send people birthday cards.
192. I usually laugh out loud at clumsy people.
193. On some occasions I have noticed that some people are better dressed than myself.
194. I avoid trouble whenever I can.
195. It would embarrass me a lot to have to spend a night in jail.
196. I find that I often walk with a limp, which is the
result of a skydiving accident.

197. I have never combed my hair before going out in the morning.

198. I usually control my feelings well.
Appendix B

Shipley Institute of Living Scale

Part I

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

EXAMPLE:

<table>
<thead>
<tr>
<th>LARGE</th>
<th>red</th>
<th>big</th>
<th>silent</th>
<th>wet</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) TALK</td>
<td>draw</td>
<td>eat</td>
<td>speak</td>
<td>sleep</td>
</tr>
<tr>
<td>(2) PERMIT</td>
<td>allow</td>
<td>sew</td>
<td>cut</td>
<td>drive</td>
</tr>
<tr>
<td>(3) PARDON</td>
<td>forgive</td>
<td>pound</td>
<td>divide</td>
<td>tell</td>
</tr>
<tr>
<td>(4) COUCH</td>
<td>pin</td>
<td>eraser</td>
<td>sofa</td>
<td>glass</td>
</tr>
<tr>
<td>(5) REMEMBER</td>
<td>swim</td>
<td>recall</td>
<td>number</td>
<td>defy</td>
</tr>
<tr>
<td>(6) TUMBLE</td>
<td>drink</td>
<td>dress</td>
<td>fall</td>
<td>think</td>
</tr>
<tr>
<td>(7) HIDEOUS</td>
<td>silvery</td>
<td>tilted</td>
<td>young</td>
<td>dreadful</td>
</tr>
<tr>
<td>(8) CORDIAL</td>
<td>swift</td>
<td>muddy</td>
<td>leafy</td>
<td>hearty</td>
</tr>
<tr>
<td>(9) EVIDENT</td>
<td>green</td>
<td>obvious</td>
<td>skeptical</td>
<td>afraid</td>
</tr>
<tr>
<td>(10) IMPOSTER</td>
<td>conductor</td>
<td>officer</td>
<td>book</td>
<td>pretender</td>
</tr>
<tr>
<td>(11) MERIT</td>
<td>deserve</td>
<td>distrust</td>
<td>fight</td>
<td>separate</td>
</tr>
<tr>
<td>(12) FASCINATE</td>
<td>welcome</td>
<td>fix</td>
<td>stir</td>
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### Judgment and Recognition of Emotion

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(39) TEMERITY  rashness  timidity  desire  kindness
(40) PRISTINE  vain  sound  first  level
Part II

Instructions: Complete the following by filling in either a number or letter for each dash (____). Do the items in order, but don't spend too much time on any one item.

EXAMPLE: A B C D E

(1) 1 2 3 4 5 _
(2) white black short long down _ _
(3) AB BC CD D_
(4) Z Y X W V U _
(5) 1 2 3 2 1 2 3 4 3 2 3 4 5 4 3 4 5 6 _ _
(6) NE/SW SE/NW E/W N/_
(7) escape scape cape _ _ _
(8) oh ho rat tar mood _ _ _ _
(9) A Z B Y C X D _
(10) tot bard drab 537 _ _
(11) mist is wasp as pint in tone _ _
(12) 57326 73265 32657 26573 _ _ _ _
(13) knit in spud up both to stay _ _
(14) Scotland landscape scapegoat _ _ _ _ ee
(15) surgeon 1234567 snore 17635 rogue _ _ _ _
(16) tam tan rib rid rat raw hip _ _
(17) tar pitch throw saloon bar rod fee tip end plank _ _ _ _ meals
(18) 3124 82 73 154 46 13 _
(19) lag leg pen pin big bog rob _ _
(20) two w four r one o three _
Appendix C

IRB Human Subjects Proposal

1. Description of the research. This study is designed to investigate the judgment and experience of emotion derived from viewing facial expressions in a normal population showing schizotypal symptoms. The ability to perceive, experience, and decode emotions in others is one aspect of social competence that has been investigated in both normal and schizophrenic populations, but has not yet been investigated in a normal population showing schizotypal symptoms. Subjects will be assessed in their reactions to photographs displaying various facial expressions. The tasks include judgments of similarity of expression, dimensions of expression, and categories of expression.

The Chapman group at the University of Wisconsin have developed a set of measures which they believe tap "psychosis-proneness," sub-clinical manifestations of pathological functioning which put one at a higher risk for later development of psychotic disorder. Validation work thus far has involved finding psychotic-like or schizotypal symptoms in individuals who score high on these scales.

One purpose of the study is to investigate whether a normal population with schizotypal symptoms displays some similar deficits in emotion recognition as does the schizophrenic population. The reason for this purpose is twofold. If a similarity is found, it will provide further support for the construct validity of the Chapman scales as tapping personality traits associated with psychosis-proneness. In addition, it will also provide evidence for the idea that social perception is an important component of social skills. Presently, this component is unrecognized or de-emphasized in social skills training programs, programs which often are the primary therapeutic effort for the schizophrenic population.

2. Subjects participating in the study may find the tasks interesting and may benefit slightly by learning how psychological research is conducted. The primary benefits of this research, however, will be more long term, rather than short term. If scientists and clinicians studying schizophrenia, its development, and its treatment can eventually integrate the knowledge base to which this study will make a contribution, then hopefully schizophrenic or pre-schizophrenic clients in the future will benefit from improved therapeutic efforts and perhaps earlier interventions.
Judgment and Recognition of Emotion

3. Subjects from the Psychology 110 subject pool have already been administered the Chapman inventories as part of Dr. David Schuldberg's ongoing research project on personality styles and creativity. Dr. Schuldberg's project has IRB approval. Subjects scoring high or low on one of the Chapman traits will be recontacted and invited to participate further in the present study. This will fulfill experimental credit requirements for their Psychology 110 course. If they have fulfilled this requirement, a small honorarium will be offered.

Subjects will be scheduled to be seen in groups with an upper limit of six members. This experimenter will administer the tasks and will remain blind to experimental or control group status. Subjects will first be asked to view photographs of facial expressions on an overhead projector. Subjects will be led through the first two tasks, involving judgments of similarity and dimension, by oral instructions. Subjects will then fill out the Shipley Institute of Living scale, which is a brief paper and pencil test of intelligence. The variable of intelligence needs to be covaried out so that it does not confound comparisons on other tasks, which require differing degrees of verbal knowledge. The final task will then be administered. This is a task involving judgment of categories of expression. For this task, subjects will be provided with written instructions and their own set of photographs to view.

4. Subjects will be members of the Psychology 110 pool.

5. This experimenter will be blind to the subjects' group status, and therefore unlikely to communicate this information to the subject. There is no anticipated risk to subjects in any of the tasks and discomfort is also anticipated to be minimal. Data will be analyzed as a group. Therefore, the study is considered to fall in the "minimal risk" category as outlined by the American Psychological Association's Ethical Guidelines.

6. In the extremely unlikely event that a subject experiences psychological discomfort, he or she will be offered further debriefing as necessary. The unusual items on these scales will be discussed as experiences many "normal" people commonly experience from time to time, despite the fact that some of the experiences sound a little "crazy". It will be discussed that frequency of these experiences is probably more important than simply their occurrence in an individual. If an individual then does reveal the frequent occurrence of such experiences, the researcher can then discuss a referral to the Clinical
7. All questionnaire data and responses to the various tasks will be identified only by a code number and findings will refer only to groups of individuals. Face-sheet information by which subjects could be identified (necessary to permit re-contacting subjects) will be kept separately from data from this study. The information keying these two sets of data is safeguarded by Dr. David Schuldberg, the principal investigator of the larger study to which the present study is an offshoot.

8. Despite the current investigators' belief that the Chapman scales tap thought processes shared by normal and often creative individuals as well as psychosis-prone individuals, the scales have been designed by Dr. Chapman as a psychopathological measure, specifically, personality traits associated with psychosis-proneness. It would, of course, be unethical to inform subjects as to the precise purpose for which these scales have been designed, given their experimental and unvalidated nature alone.

One could truthfully inform subjects that the current investigators are studying attitudes and personality styles found in all people. Yet, there is a concern in the Department of Psychology of a subject later coming upon a published scientific article drawn from this research project which discusses the purpose for which these scales were designed. The concern centers around an individual rightly feeling the "good faith" agreement that researchers from the Department try to maintain with their subjects has been violated. Though truthful, such an informed consent does not entirely reveal the purpose of these scales as their author designed them.


10. Covered in 5-8 above and in the American Psychological Association’s Ethical Guidelines for Research with Human Subjects.

Rosemary Toomey
Graduate Student
Department of Psychology

Jim Walsh, Ph.D.
Masters Thesis Chair
Department of Psychology
Table 1

**Testing the linearity assumption with IQ covariate**

**Task One**

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Amount of variance accounted for by the covariate = .05

**Task Two - Scale A**

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Testing the linearity assumption with IQ covariate

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Covariance Analysis with IQ Covariate

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Covariance Analysis with IQ covariate

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**Covariance Analysis with IQ covariate**

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<td>Female Anhedonic</td>
<td>3 / 13</td>
</tr>
<tr>
<td>Male Anhedonic</td>
<td>0 / 12</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Groups</th>
<th>Subjects that took Communications / Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Controls</td>
<td>0 / 20</td>
</tr>
<tr>
<td>Male Controls</td>
<td>1 / 19</td>
</tr>
<tr>
<td>Female Per-Mags</td>
<td>0 / 20</td>
</tr>
<tr>
<td>Male Per-Mags</td>
<td>0 / 20</td>
</tr>
<tr>
<td>Female Anhedonic</td>
<td>0 / 16</td>
</tr>
<tr>
<td>Male Anhedonic</td>
<td>0 / 12</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Groups</th>
<th>Subjects that took the Shipley / Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Controls</td>
<td>1 / 19</td>
</tr>
<tr>
<td>Male Controls</td>
<td>1 / 19</td>
</tr>
<tr>
<td>Female Per-Mags</td>
<td>4 / 16</td>
</tr>
<tr>
<td>Male Per-Mags</td>
<td>5 / 15</td>
</tr>
<tr>
<td>Female Anhedonic</td>
<td>0 / 16</td>
</tr>
<tr>
<td>Male Anhedonic</td>
<td>1 / 11</td>
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</table>
Table 4

**Group means and standard deviations for six measures**

**Task One**

<table>
<thead>
<tr>
<th>Group</th>
<th>Control: Female</th>
<th>Male</th>
<th>Per-Mag: Female</th>
<th>Male</th>
<th>Anhed.: Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2.627</td>
<td>2.654</td>
<td>2.896</td>
<td>2.601</td>
<td>2.558</td>
<td>2.493</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.592</td>
<td>0.783</td>
<td>0.781</td>
<td>0.681</td>
<td>0.529</td>
<td>0.542</td>
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</tbody>
</table>

**Task Two - Scale A**

<table>
<thead>
<tr>
<th>Group</th>
<th>Control: Female</th>
<th>Male</th>
<th>Per-Mag: Female</th>
<th>Male</th>
<th>Anhed.: Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.526</td>
<td>3.475</td>
<td>3.691</td>
<td>3.574</td>
<td>3.532</td>
<td>3.508</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.499</td>
<td>0.440</td>
<td>0.482</td>
<td>0.341</td>
<td>0.336</td>
<td>0.541</td>
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</table>
Table 4 (Continued)

<table>
<thead>
<tr>
<th>Task Two - Scale B</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control: Female</td>
<td>4.629</td>
<td>0.766</td>
</tr>
<tr>
<td>Male</td>
<td>4.609</td>
<td>0.590</td>
</tr>
<tr>
<td>Per-Mag: Female</td>
<td>4.739</td>
<td>0.725</td>
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<tr>
<td>Male</td>
<td>4.551</td>
<td>0.699</td>
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<tr>
<td>Anhed. : Female</td>
<td>4.657</td>
<td>0.504</td>
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<tr>
<td>Male</td>
<td>4.381</td>
<td>0.861</td>
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<table>
<thead>
<tr>
<th>Task Four - Part One</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control: Female</td>
<td>91.50</td>
<td>13.09</td>
</tr>
<tr>
<td>Male</td>
<td>87.00</td>
<td>20.03</td>
</tr>
<tr>
<td>Per-Mag: Female</td>
<td>85.00</td>
<td>19.60</td>
</tr>
<tr>
<td>Male</td>
<td>88.00</td>
<td>16.09</td>
</tr>
<tr>
<td>Anhed. : Female</td>
<td>85.63</td>
<td>14.13</td>
</tr>
<tr>
<td>Male</td>
<td>88.33</td>
<td>13.37</td>
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</table>
Table 4 (Continued)

Group means and standard deviations for six measures

**Task Four - Part Two**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control: Female</td>
<td>73.00</td>
<td>12.35</td>
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<tr>
<td>Male</td>
<td>70.40</td>
<td>11.16</td>
</tr>
<tr>
<td>Per-Mag: Female</td>
<td>72.00</td>
<td>13.40</td>
</tr>
<tr>
<td>Male</td>
<td>73.80</td>
<td>10.37</td>
</tr>
<tr>
<td>Anhed. : Female</td>
<td>72.19</td>
<td>12.14</td>
</tr>
<tr>
<td>Male</td>
<td>71.67</td>
<td>14.20</td>
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</tbody>
</table>

**Task Four - Part Three**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control: Female</td>
<td>79.80</td>
<td>11.97</td>
</tr>
<tr>
<td>Male</td>
<td>78.25</td>
<td>9.44</td>
</tr>
<tr>
<td>Per-Mag: Female</td>
<td>75.10</td>
<td>10.42</td>
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<tr>
<td>Male</td>
<td>77.00</td>
<td>6.72</td>
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<tr>
<td>Anhed. : Female</td>
<td>78.44</td>
<td>9.61</td>
</tr>
<tr>
<td>Male</td>
<td>73.00</td>
<td>9.40</td>
</tr>
</tbody>
</table>