RECOGNITION OF FACIALLY-DISPLAYED AFFECT IN SCHIZOPHRENIA.

by

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I certify that the substance of this thesis is my own work and has not already been submitted for any degree, and is not currently being submitted for any other degree.

I certify that any help received in preparing this thesis, and all sources, have been acknowledged in this thesis.

Kym Starr
30 April 1996

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ABSTRACT

The present research investigated facial-affect recognition by people with a diagnosis of schizophrenia. Experiment one piloted a facial-affect recognition task of the six basic emotions with 58 undergraduate university students (36 female, 22 male). No sex differences were found in performance of the facial-affect recognition task. Experiment two compared accuracy on the facial-affect recognition task for 19 paranoid schizophrenics, 14 nonparanoid schizophrenics, 16 depressives (clinical controls), and 20 normal controls. As predicted, positive emotions were found to be more accurately recognised than negative emotions. The hypothesis that nonparanoid schizophrenics would be less accurate than paranoid schizophrenics on the facial-affect recognition task was not supported. The hypothesis that depressed participants would be less accurate than normal on the facial-affect recognition task was also not supported. The hypothesis that schizophrenics would perform less accurately than the control groups on the facial-affect recognition task was supported by the current results. The hypothesis that the differences among the four groups on the six emotion labelling tasks could be explained simply by the relative difficulties of those tasks was also supported. The current research did not find a differential deficit for negative-affect recognition in schizophrenia. It was argued that differential deficits for negative-affect recognition found by previous research were artefacts of item difficulty. The current research also argued against a differential schizophrenic deficit for facial-affect recognition. Deficits in facial-affect recognition appear to be a function of generalised poor performance in visual attention and perception. Implications for theory, treatment and future research are discussed.

Chapter One

INTRODUCTION

Facial-affect recognition is an important interpersonal skill for social interaction (Ekman, 1992). People often interpret how another person is feeling from that person's facial expression (Izard, 1992).

Schizophrenia is often associated with poor interpersonal skills and a deterioration of social relationships (Rosenhan & Seligman, 1989). This social decline may be due, in part, to difficulty recognising facial-affect (Feinberg, Rifkin, Shaeffer, & Walker, 1986; Morrison, Bellack, & Mueser, 1988).

The facial-affect recognition literature has consistently reported that clinical groups, such as schizophrenics and depressives, perform less accurately than normal controls on tasks of facial-affect recognition (Feinberg, et al, 1986; Gessler, Cutting, Frith, & Weinman, 1989; Morrison, et al, 1988; Walker, McGuire, & Bettes, 1984). Furthermore, schizophrenics generally perform less accurately than depressives on facial-affect recognition tasks (Feinberg, et al, 1986; Persad & Polivy, 1993; Gur, Erwin, Gur, Zwil, Heimberg, & Kraemer, 1992; Rubinow & Post, 1992).

The present research investigated the ability to recognise facial-affect by people with a diagnosis of schizophrenia. Before the facial-affect literature is reviewed in detail (section 1.2, page 10), the general features of schizophrenia are summarised to provide an initial understanding of the schizophrenic condition (section 1.1).

1.1 GENERAL FEATURES OF SCHIZOPHRENIA

1.1.1 Diagnostic Criteria for Schizophrenia

The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, American Psychiatric Association, 1994) diagnostic criteria for schizophrenia are presented in Table 1.

Table 1 The DSM-IV Diagnostic Criteria for Schizophrenia.

A. *Characteristic Symptoms:* Two (or more) of the following, each present for a significant portion of time during a 1-month period (or less if successfully treated):

(1) delusions
(2) hallucinations
(3) disorganised speech (eg., frequent derailment or incoherence)
(4) grossly disorganised or catatonic behaviour
(5) negative symptoms, ie., affective flattening, alogia or avolition

Note: Only one Criterion A symptom is required if delusions are bizarre or hallucinations consist of a voice keeping up a running commentary on the person's behaviour or thoughts, or two or more voices conversing with each other.

B. *Social/occupational dysfunction:* For a significant portion of time since the onset of the disturbance, one or more major areas of functioning such as work, interpersonal relations, or self-care are markedly below the level achieved prior to the onset (or when the onset is in childhood or adolescence, failure to achieve expected level of interpersonal, academic, or occupational achievement).

C. *Duration:* Continuous signs of the disturbance persist for at least 6 months. This six-month period must include at least 1 month of symptoms (or less if successfully treated) that meet Criterion A (ie., active-phase symptoms) and may include periods of prodromal or residual symptoms. During these prodromal or residual periods, the signs of the disturbance may be manifested by only negative symptoms or two or more symptoms listed in Criterion A present in an attenuated form (eg., odd beliefs, unusual perceptual experiences).

Table 1 The DSM-IV Diagnostic Criteria for Schizophrenia. (Continued)

D. *Schizoaffective and Mood Disorder exclusion:* Schizoaffective Disorder and Mood Disorder With Psychotic Features have been ruled out because either (1) no Major Depressive, Manic, or Mixed Episodes have occurred concurrently with the active-phase symptoms; or (2) if mood episodes have occurred during active-phase symptoms, their total duration has been brief relative to the duration of the active and residual periods.

E. *Substance/general medical condition exclusion:* The disturbance is not due to the direct physiological effects of a substance (eg., a drug of abuse, a medication) or a general medical condition.

F. *Relationship to a Pervasive Developmental Disorder:* If there is a history of Autistic Disorder or another Pervasive Developmental Disorder, the additional diagnosis of Schizophrenia is made only if prominent delusions or hallucinations are also present for at least a month (or less if successfully treated).

(From the American Psychiatric Association, 1994, pp 285-286)

1.1.2 Incidence and Prevalence of Schizophrenia

Prevalence estimates for schizophrenia vary as a result of differences in definitions of schizophrenia (eg narrow versus broad), and in the location of samples (eg rural versus urban). DSM-IV reported that lifetime prevalence rates of schizophrenia are usually estimated to be between 0.5% and 1% (American Psychiatric Association, 1994).

Incidence rates are lower than prevalence rates, since schizophrenia tends to be a relatively chronic condition. DSM-IV reported that incidence rates were estimated to be 1 per 10 000 per year (American Psychiatric Association, 1994).

However, the incidence and prevalence of schizophrenia appears to differ among socioeconomic levels. The incidence of schizophrenia in poor socioeconomic classes is three times greater than the incidence in wealthy socioeconomic classes. Furthermore, the

prevalence of schizophrenia is eight times greater in the poor than in the wealthy (Rosenhan & Seligman, 1989).

The first episode of schizophrenia generally occurs in people who are under 45 years-of-age. There are sex differences in the average age of onset for schizophrenia. Males are more at risk for schizophrenia before age 25, whereas females are more at risk after age 25 (Rosenhan & Seligman, 1989).

1.1.3 Classification of the Schizophrenias

Many different symptomatologies come under the diagnosis of Schizophrenia. Researchers have attempted to simplify these symptomatologies into a classification system since the nineteenth century. Disagreement remains about which system best classifies the schizophrenias. Two classification systems for schizophrenia commonly used in the literature are reviewed in sections 1.1.3.1 and 1.1.3.2. The first system is the classic subtypes of schizophrenia (1.1.3.1, page 4), followed by the distinction between paranoid and nonparanoid schizophrenia (1.1.3.2, page 7).

The paranoid/nonparanoid distinction is favoured by the present research, due to its reduction of the symptomatology overlap evident between the classic subtypes. The paranoid/nonparanoid distinction is relevant to the present research because of reported differences between paranoid and nonparanoid schizophrenia on facial-affect recognition. Paranoid schizophrenics have performed more accurately on facial-affect recognition tasks than nonparanoid schizophrenics (Kline, Smith, & Ellis, 1992; Lewis & Garver, 1995).

1.1.3.1 The Classic Subtypes of Schizophrenia

The classification system used in DSM-IV lists five subtypes of schizophrenia: Paranoid, Disorganised, Catatonic, Undifferentiated, and Residual. Table 2 presents the diagnostic criteria for the subtypes. These classic subtypes of schizophrenia closely resemble those identified by Kraepelin (1913) and Bleuler (1911) (both cited in Nicholson & Nuefeld, 1993).

Table 2 The DSM-IV Subtypes of Schizophrenia and their Diagnostic Criteria.

1. Paranoid Type

A Type of Schizophrenia in which the following criteria are met:

A. Preoccupation with one or more delusions or frequent auditory hallucinations.

B. None of the following is prominent: disorganised speech, disorganised or catatonic behaviour, or flat or inappropriate affect.

2. Disorganised Type

A Type of Schizophrenia in which the following criteria are met:

A. All of the following are prominent:
(1) disorganised speech
(2) disorganised behaviour
(3) flat or inappropriate affect

B. The criteria are not met for Catatonic Type.

3. Catatonic Type

A Type of Schizophrenia in which the clinical picture is dominated by at least two of the following:

(1) motoric immobility as evidenced by catalepsy (including waxy flexibility) or stupor
(2) excessive motor activity (that is apparently purposeless and not influenced by external stimuli)
(3) extreme negativism (an apparently motiveless resistance to all instructions or maintenance or a rigid posture against attempts to be moved) or mutism
(4) peculiarities of voluntary movement as evidenced by posturing (voluntary assumption of inappropriate or bizarre postures), stereotyped movements, prominent mannerisms, or prominent grimacing
(5) echolalia or echopraxia

Table 2 The DSM-IV Subtypes of Schizophrenia and their Diagnostic Criteria (Continued)

4. Undifferentiated Type

A Type of Schizophrenia in which symptoms that meet Criterion A are present, but the criteria are not met for the Paranoid, Disorganised, or Catatonic Type.

5. Residual Type

A Type of Schizophrenia in which the following criteria are met:

A. Absence of prominent delusions, hallucinations, disorganised speech, and grossly disorganised or catatonic behaviour.

B. There is continuing evidence of the disturbance, as indicated by the presence of negative symptoms or two or more symptoms listed in Criterion A for Schizophrenia, present in an attenuated form (eg., odd beliefs, unusual perceptual experiences).

(From the American Psychiatric Association, 1994, pp 287-290)

Concerns exist regarding the utility of the DSM-IV subtypes in clinical practice (Andreasen, 1987; Nicholson & Neufeld, 1993; Tsuang & Winokur, 1974). Individuals with schizophrenia often present symptomatologies that overlap with two or more of the classic subtypes (Tsuang & Winokur, 1974). The definitions in DSM-IV have forced these individuals to be diagnosed under one subtype.

For example suppose an individual presents with disorganised speech, flat affect (symptoms associated with disorganised subtype) and bizarre posturing (a symptom associated with catatonic subtype). According to the DSM-IV criteria in Table 2, this individual would be diagnosed as catatonic subtype since disorganised subtype can only be diagnosed without catatonic symptomatology. Both disorganised and catatonic subtypes are descriptive of the individual, yet they would be classified, by definition, as catatonic.

The problem of overlap in symptomatology between the classic subtypes was also illustrated by Morrison (1974). Morrison reported that admission rates at a major psychiatric hospital, for the classic subtypes of schizophrenia, varied significantly over period of forty-six years. Only the diagnosis of paranoid schizophrenia remained constant over this time. Morrison concluded that a paranoid/nonparanoid distinction reduced the overlap in symptomatology of the classic subtypes.

The classic subtypes have a serious problem of overlap in symptomatology, especially between the disorganised and catatonic subtypes (Tsuang & Winokur, 1974). For this reason, the classic subtypes were discarded by the present research. The expected overlap in symptomatology between subtypes would have compromised a classic-subtype division of the present schizophrenic sample.

1.1.3.2 The Paranoid and Nonparanoid Subtypes of Schizophrenia

Another means of classification for the schizophrenias involves distinguishing between paranoid and nonparanoid subtypes of schizophrenia. All individuals who do not fit the criteria for paranoid schizophrenia (refer to Table 2) are classified as nonparanoid schizophrenics.

Research literature on presentation and course of schizophrenia supports a distinction between paranoid and nonparanoid schizophrenia (Nicholson & Neufeld, 1993). The research of Morrison (1974, refer to section 1.1.3.1, page 7) shows a stability in the frequency of diagnosis for paranoid schizophrenia, and an instability for diagnoses of the other classic subtypes. Morrison supported a paranoid/nonparanoid distinction and viewed any further division of nonparanoid schizophrenia to be subject to either environmental influences or diagnostic fads.

The paranoid/nonparanoid classification has less overlap between subtypes than the classic (DSM-IV) system of classification (Nicholson & Neufeld, 1993). This lack of overlap between

subtypes was indirectly supported by Farmer, McGuffin, & Spitznagel (1983). Farmer et al found two clusters, in their cluster analysis of schizophrenic symptoms, which partially parallel the paranoid/nonparanoid division (Nicholson & Neufeld, 1993). One factor, resembling paranoid schizophrenia, was characterised by delusions, better premorbid adjustment, and a later age of onset. The second factor, resembling nonparanoid schizophrenia, was characterised by a family history of schizophrenia, incoherent speech, blunted affect, and auditory hallucinations. This research provides evidence for overlap in symptomatology, course of illness, and outcome measures, between individuals diagnosed with the four classic subtypes subsumed under the nonparanoid label (Disorganised, Catatonic, Undifferentiated, and Residual).

Evidence presented against the paranoid/nonparanoid distinction was that some individuals experience symptomatology that is neither truly paranoid nor truly nonparanoid, but shows an undifferentiated combination of both symptomatologies (Berkowitz, 1981; Katz, Cole, & Lowry, 1964). Similarly, Magaro, Abrams, & Cantrell (1981), in an investigation of the Maine Scale of Paranoid and Nonparanoid Schizophrenia, concluded that some cases of schizophrenia were unclassifiable into distinct paranoid and nonparanoid subtypes. These cases were categorised as unclassifiable, or undifferentiated, schizophrenics.

Further evidence against the paranoid/nonparanoid distinction, is the reduction of paranoid symptomatology over time. As paranoid schizophrenics become chronic, evidence suggests their symptomatology becomes concordant with that of nonparanoid schizophrenics (Depue & Woodburn, 1975; Pfohl & Winokur, 1983; Ritzler, 1981). Cases of change from nonparanoid to paranoid symptomatology exist, although they are relatively rare (Tsuang, Wilson, Winokur, & Crowe, 1981).

By contrast, research evidence that paranoid and nonparanoid schizophrenics differ on a number of important variables, supports the paranoid/nonparanoid distinction. Paranoid schizophrenics have a later onset of illness and a better premorbid adjustment (as measured by a higher level of social competency and a higher incidence of marriage) than nonparanoids (Burack & Zigler, 1989,

cited in Nicholson & Neufeld, 1993). Paranoid symptoms have reduced faster, and to a more significant degree following diagnosis, than nonparanoid symptoms (Goldberg, Schooler, & Mattsson, 1967). Furthermore, there was evidence that paranoid schizophrenics have a better prognosis than nonparanoid schizophrenics (Kendler, Gruenberg, & Tsuang, 1984; Nicholson & Neufeld, 1993).

Furthermore, the paranoid/nonparanoid distinction is relevant to the facial-affect recognition literature. Kline et al (1992) found that paranoid schizophrenics performed more accurately on a facial-affect recognition task than nonparanoid schizophrenics. They concluded this difference was due to a poorly organised emotional schema in nonparanoid schizophrenics (for more detail refer to section 1.2.4.4, page 26).

In an attempt to reconcile the evidence for and against the paranoid/nonparanoid distinction, Nicholson & Neufeld (1993) proposed a reconceptualisation of the division. Rather than viewing paranoid and nonparanoid schizophrenia as discrete subtypes, they proposed that schizophrenia exists in a continuum of severity. Paranoid schizophrenia was viewed as the less severe form of the illness, since it was associated with a later age at onset, better premorbid status, and a better prognosis. Nonparanoid schizophrenia was considered the more severe form of the illness, since it was associated with earlier onset, poorer premorbid adjustment, and poorer prognosis. The individuals whose symptoms did not allow a clear classification into paranoid or nonparanoid subtypes fell in the middle range of the continuum, and were 'unclassifiable' or 'undifferentiated' schizophrenics.

The present research used the paranoid/nonparanoid distinction to classify the schizophrenic sample. The classic subtypes were discarded by the present research since their overlap in symptomatology (Andreasen, 1987; Nicholson & Neufeld, 1993; Tsuang & Winokur, 1974) would have caused redundancy in a classic-subtype division of the present schizophrenic sample. The paranoid/nonparanoid distinction substantially reduces the overlap in symptomatology between subtypes of schizophrenia (Nicholson & Neufeld, 1993).

Research has found differences between paranoid and nonparanoid schizophrenics on variables such as onset of illness, premorbid adjustment (Burack & Zigler, 1989), course of illness (Goldberg, et al, 1967), and prognosis (Kendler, et al, 1984; Nicholson & Neufeld, 1993). This research supports the utility of the paranoid/nonparanoid distinction. Of particular relevance to the present research is the finding of differences between paranoid and nonparanoid schizophrenics on tasks of emotion recognition (Kline, et al, 1992; Lewis & Garver, 1995). For these reasons, the present research classified the schizophrenic sample into paranoid and nonparanoid subtypes.

1.2 FACIAL-AFFECT RECOGNITION

Facial-affect recognition refers to the identification of the emotional expression portrayed on a person's face. Recognition of emotional expression is an important component of social interaction. Ekman (1992) reported that people with congenital facial paralysis (Mobius Syndrome) have difficulty developing and maintaining relationships due to their lack of capability for facial expressiveness.

Schizophrenia is also associated with poor interpersonal skills, and a deterioration of social relationships (Rosenhan & Seligman, 1989). This social decline may be due, in part, to difficulty recognising facial expressions of affect (Feinberg, et al, 1986; Morrison, et al, 1988). It is important to establish a link between facial expression and emotion to justify the present study's use of a facial-affect recognition task as a measure of emotion perception. For this reason, the current and following (1.2.1, page 12) sections review the literature that has investigated the relationship between facial expressions and emotions.

Humans, and other higher order primates, have voluntary control over facial muscles This allows the voluntary formation of various facial expressions (Izard, 1994). People often interpret how another person is feeling from that person's facial expression (Izard, 1994). This can benefit, or hinder, the person portraying the emotion. For example, a child who appears sad may encourage

warmth and affection from its mother, whereas a soldier who shows fear may be targeted by an enemy.

The ability to alter our facial expressions voluntarily, so that they may be incongruent to our true feelings, is adaptive (Izard, 1994). People can hide facial expressions in an attempt to hide what they are feeling from other people. They can also show expressions of emotions they do not feel, in an attempt to control the behaviour of people around them. For example, actors use voluntary control of facial expressions to evoke the perception of emotion in others.

However, facial expression may not be the only, or a necessary system for portraying emotion. Other channels can also effectively portray emotive information (Ekman, Friesen, O'Sullivan, & Scherer, 1980). Emotion can be portrayed in the tone of voice. For example, fear may be evidenced by a shaky, hesitant voice. Emotion can also be portrayed in the position of the body, or by body movement. For example, anger may be expressed by tensed muscles and closed fists.

The interpretation of the facial expressions of others may not always reveal what people are feeling. The person's tone of voice or body position may reveal additional information that is useful for interpreting that individual's emotional experience. Although researchers have suggested that there may be distinct tones of voice for each emotion (Tomkins, 1962, cited in Ekman, 1992), this has not been empirically investigated (Ekman, 1992). In contrast, the interpretation of emotion by facial expression has been widely investigated (Camras, 1992; Ekman, 1992; Ekman, 1994; Ekman, & Friesen, 1971; Ekman, et al, 1980; Izard, 1992; Matsumoto, 1992).

The present study used the recognition of facial expression as a measure of emotion perception. Facial expression was chosen above other channels of emotion perception because it has been more widely investigated, and has shown stronger empirical links with emotion, than the other channels (Ekman, 1992). Ekman (1992) argued that the interpretation of facial expression has provided the strongest evidence for distinguishing one emotion from another. A summary of this evidence is presented in section 1.2.1 below.

1.2.1 The Six Basic Facial Expressions of Emotion

Extensive research supports the existence of basic emotions that are a universal aspect of human experience (Ekman, 1992; Ekman, 1994; Camras, 1992; Izard, 1992; Izard, 1994; Johnson-Laird & Oatley, 1992; Matsumoto, 1992). The most consistent evidence for universal emotions is that facial expressions have been similarly recognised by various cultures to reflect particular emotion states (Ekman, 1992; Ekman, 1994; Izard, 1992; Izard, 1994; Johnson-Laird & Oatley, 1992; Matsumoto, 1992). The six basic emotions generally reported are happiness, sadness, anger, surprise, disgust, and fear.

Izard (1994) argued, that basic emotions are innate responses to internal and external stimuli. Emotions are attributed evolutionary significance for their communicatory role with other members of the species (Izard, 1994). Furthermore, Ekman (1992) postulated that each basic emotion is not a single affective state, but represents a family of related states. He stated that each emotion family shares characteristics, such as commonalities in expression, in physiological activity, and in the type of event that triggers them.

There is some controversy in the literature surrounding the existence of basic emotions. One argument against basic emotions, is that the research is inconsistent in its labelling of which emotions 'basic' (Turner & Ortony, 1992). Although there is variation in which emotions are labelled basic by different researchers, there is a core of consistency that supports the existence of basic emotions. Most researchers have five emotions in common, in their list of basic emotions. These emotions are happiness, sadness, anger, disgust, and fear (Ekman, 1992; Ekman, 1994; Johnson-Laird & Oatley, 1992). Variations in which emotions are considered basic generally comprise additions to this core group of five emotions. For example: Ekman (1992, 1994) added surprise, and sometimes contempt, to the basic five; whereas Johnson-Laird & Oatley (1992) added desire.

The evidence of universality in facial-affect recognition (Ekman, 1992; Izard, 1992; Matsumoto, 1992) appears more consistent than evidence for the universality of the subjective experience of basic emotions (Ekman, 1992). Most research in the area of basic emotions has investigated the existence of universal facial expressions of emotion (Ekman, 1992; Ekman, 1994; Izard, 1992; Izard, 1994; Johnson-Laird & Oatley, 1992; Matsumoto, 1992). The reason that facial-affect recognition has been investigated in this context is the inherent difficultly in operationally defining the subjective experience of emotion (Ekman, 1992). The two concepts are related, however, since many researchers agree that facial expressions are linked to the subjective experience of emotion (Ekman, 1992; Izard, 1992; Whissel, 1985).

Ekman (1992) noted that there was more than one facial expression for each emotion. He argued that there were certain configurations of facial muscles that represented each emotion. For example: in anger, the eyebrows are converged downwards; in disgust, the nose is wrinkled upwards; and in happiness, the corners of the mouth turn up in a 'smile'.

The facial expressions of emotion commonly considered universal are happiness, sadness, anger, fear, disgust, and surprise. These are the six emotions favoured by Ekman and colleagues (Ekman, 1992; Ekman, 1994; Ekman, & Friesen, 1971; Ekman, et al, 1980) who are dominant researchers in the area of universality of emotions. These six emotions are considered universal because they have been consistently identified across western and non-western, as well as literate and preliterate, cultures (Ekman, 1992).

Matsumoto (1992) found that Japanese (a non-western culture) and American (a western culture) samples did not differ in their recognition accuracy for happiness and surprise. He found that Americans were more accurate than Japanese in recognising anger, sadness, disgust, and fear. The Americans and Japanese agreed, however, that happiness was the easiest to identify and fear was the most difficult.

A possible contamination for research with literate cultures (western and non-western) is that the people in those cultures may

have learned the emotional expressions from inter-cultural contact, or from a common source such as movies or television. It was argued that for an emotion to be universal it must transcend the boundaries of language (Ekman, 1994). To remove the source of this contamination, emotion recognition has also been studied in preliterate cultures that have had minimal contact with outside cultures.

Ekman (1994) summarised a study he conducted of emotion recognition with the South Fore, a preliterate culture in New Guinea. This research provided strong evidence for the universality of happiness, sadness, anger, disgust, and fear. The South Fore had significant levels of agreement in interpreting facial expressions of these emotions. However, the evidence for a unique facial expression of surprise was not as strong. Surprise tended to be confused with fear in this preliterate culture. All six emotions, however, have been identified consistently in western and non-western literate cultures (Ekman, 1992; Ekman, 1994, Matsumoto, 1992).

The evidence presented above is weighted towards supporting universality in facial expressions of emotion. To a lesser extent, the evidence also supports the universal experience of basic emotions. The present study examined emotion recognition in schizophrenia using the six emotions favoured by Ekman (1992, 1994) and Matsumoto (1992); happiness, sadness, anger, disgust, surprise, and fear.

1.2.2 Recognition of Facial-Affect in Non-Clinical Populations

The previous section argued that the ability to recognise emotional expression on other peoples' faces is universal. This section reviews facial-affect recognition performance in normal populations. To investigate facial-affect recognition in clinical populations such as schizophrenia, the performance of people without a mental illness is used as a standard.

Facial-affect recognition has been shown to improve with age. Boyatzis, Chazan, & Ting (1992) found that five-year-old children

were better at identifying emotions than three-and-a-half-year-olds. In another study, when judging facially depicted emotion, adults were shown to be better at considering a broader context than children (Lightfoot & Bullock, 1990).

Differences in facial-affect recognition between the sexes have also been reported. Erwin, Gur, Gur, Skolnick, Mahwhinney-Hee, & Smailis (1992) found that females were more accurate judges of facial-affect in male than female models. Conversely, males were more accurate judges of facial-affect in female than male models. However, overall ability to judge facial-affect was not different between the sexes.

Some emotions are more difficult to recognise than others. There is wide agreement that happiness is the easiest emotion to recognise (Gross & Ballif 1991; Matsumoto, 1992; Mazurski & Bond, 1993), whereas, fear is the most difficult to recognise (Matsumoto, 1992; Mazurski & Bond, 1993). The ease of recognition for the other emotions is not as clearly established. Mazurski & Bond (1993) presented inter-rater agreements for a series of slides depicting facial affect. They reported the mean percentages of inter-rater agreement for each emotion as follows: happiness (94.1%), surprise (81.8%), disgust (80.3%), sadness (79.1%), anger (74.1%), and fear (70.4%). This research showed happiness was very easy to recognise. Surprise, disgust and sadness, did not seem to differ greatly from each other, in their inter-rater agreements. The most difficult emotion to recognise was fear, followed by anger.

1.2.3 Recognition of Facial-Affect in Schizophrenia and other Clinical Populations.

The literature has consistently reported that clinical groups, such as schizophrenics and depressives, perform less accurately than normal controls on tasks of facial-affect recognition (Feinberg, et al, 1986; Gessler, et al, 1989; Morrison, et al, 1988; Walker, et al, 1984). Furthermore, schizophrenics have generally performed less accurately than depressives on facial-affect recognition tasks (Feinberg, et al, 1986; Mandal & Rai, 1987; Persad & Polivy, 1993; Gur, et al, 1992; Rubinow & Post, 1992).

It was argued that the majority of research showing a deficit between normals and schizophrenics on facial affect recognition tasks was methodologically flawed, since control tasks were not included (Feinberg, et al, 1986; Kerr & Neale, 1993; Walker et al, 1984). Without control tasks, it is impossible to determine whether the deficits in facial-affect recognition are specific to emotion identification, or are merely a reflection of the generalised poor performance in attention and perception that is characteristic of schizophrenia (Kerr & Neale, 1993).

Performance on facial affect recognition tasks is not only influenced by the pure recognition of facially expressed emotion (Kerr & Neale, 1993). A general ability to extract information from facial features is also necessary, as is the ability to decode or label emotions visually (Walker et al, 1984). Relatively little research on the deficits between schizophrenics and normals has compared a facial emotion recognition task, and a control task of non-emotion facial perception. Research in this area has compared control tasks such as facial identity recognition (Feinberg, et al, 1986; Kerr & Neale, 1993) and facial age-discrimination (Gessler, et al, 1989; Heimberg, Gur, Erwin, Shtasel, & Gur, 1992) with facial-affect recognition.

The rationale used for differential deficit research argues that if schizophrenics have similar deficits on facial-affect recognition and non-affect facial recognition tasks, then the deficit in facial-affect recognition is not specific to emotion perception. The facial-affect recognition deficit would be more likely to reflect a generalised poor performance in facial perception.

However, before this rationale can be applied the two tasks must be matched on item difficulty. If the tasks vary in item difficulty, any evidence of a differential deficit may simply be an artefact of variations in item difficulty (Chapman and Chapman, 1973). The influence of item difficulty on differential deficit research is explained fully in the following section (1.2.3.1).

1.2.3.1 Item Difficulty: An Important Methodological Issue for Differential Deficit Research

Chapman and Chapman (1973) outlined the methodological problems in deficit research in schizophrenia. They showed that variations in mean item difficulty between tasks can in itself produce differential deficits in performance between a normal and a pathological group (such as schizophrenics). This effect was illustrated by comparing children from two age groups on varying difficulties of vocabulary items. The higher age group was analogous to a normal sample, while the lower age group, in this example, was analogous to a pathological sample.

Figure1 (from Chapman & Chapman, 1973) shows the percentage accuracy of a group of 34 third-grade children and a group of 39 fifth-grade children on the vocabulary items of the Stanford-Binet Intelligence Scale. Six sequential groups of vocabulary items comprise the x-axis on Figure1. Each group represents a different level of difficulty. Difficulty was measured by the average percentage accuracy for third and fifth grades. An item difficulty level of twenty meant that 20% of children overall passed that item. The easiest items, located at the greatest distance from the origin on the x-axis, were those which 100% of children passed.

The y-axis on Figure1, shows the percentage of third-grade and fifth-grade children who passed each set of items. As can be seen from Figure1, the curves for the two grades tend to join at the extremes of difficulty. This is where the items were very easy, or very difficult. Items that were very easy, were by passed by the majority of both age groups. Similarly, items that were very difficult, were failed by the majority of both age groups. Hence, the convergence of scores between the grades, in these regions.

The greatest separation between the curves for the grades was attained at about 50% item difficulty. This represented the region of greatest deficit between third and fifth-grade children. The overall structure of Figure1 shows that the third-grade children are a group that displays lower accuracy than the fifth-grade children. A ceiling effect for the vocabulary items is evident by the convergence of scores for very low item-difficulties. Similarly, the

convergence of scores for very difficult items merely shows a floor effect. Therefore, it would be wrong to interpret Figure1 as showing a differential deficit for third-graders, on the vocabulary items at 50% item-difficulty.

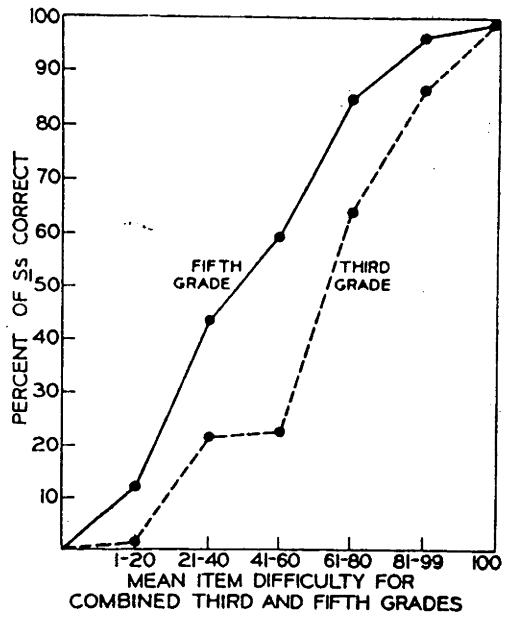

Figure1 Accuracy of Third and Fifth-Grade Children on Stanford-Binet Vocabulary items of Graded Difficulty (from Chapman & Chapman, 1973)

Chapman & Chapman (1973) argued that this relationship between difficulty and discriminating power could be generalised to any two groups that differ in accuracy, for example normal and pathological groups. Schizophrenics can be viewed as a group of low functioning individuals compared with a normal group. Kraepelin (1913, cited in Nicholson & Nuefeld, 1993) viewed schizophrenia as characterised by a general decline of cognitive functioning. Bleuler (1911, cited in Nicholson & Nuefeld, 1993), however, believed schizophrenics are heterogeneous in their pattern of cognitive deficits with certain cognitive functions affected and others spared. Commonly associated with schizophrenia include deficits of executive functions, memory, motor performance, visuo-spatial performance, and attention (Rosenhan & Seligman, 1989; Lezak, 1995).

In Chapman & Chapman's (1973) example, the third-grade children are expected to be analogous to a schizophrenic group, since both

represent low accuracy. The fifth-grade group would be analogous to a normal group, since both represent high accuracy. Suppose a researcher had a facial-affect recognition task of medium difficulty (about 50% pass rate), and a non-emotion facial recognition task of significantly less difficulty (about 90% pass rate). Purely based on item difficulty, the researcher would find a greater deficit between schizophrenics and normals for the facial-affect recognition task, than for the non-emotion facial recognition task. A similar result would occur if the non-emotion facial recognition task was much more difficult (about 10% pass rate) than a facial-affect recognition task of medium difficulty (about 50% pass rate). The more difficult non-emotion task would have a smaller deficit than the facial-affect recognition task of medium difficulty.

In this way, the item difficulty of tasks can directly affect the size of deficit found between a normal and a pathological group. Tasks of differing item difficulty would be expected to show different levels of deficit between the groups; medium levels of difficulty would evidence the greatest deficit.

1.2.3.2 Facial-Affect Recognition Research that has attempted to control for the effects of Item Difficulty.

Some researchers have attempted to determine whether schizophrenics have a differential deficit for affect recognition by comparing their relative performances on a facial affect recognition task, and a non-affect control task matched for item difficulty. The research in this area is inconsistent.

Walker et al (1984) included a facial discrimination task as a control, and found some evidence for a specific deficit in emotion recognition for schizophrenics, although the overall group by task interaction was insignificant. Other researchers, who have included a control task of comparable item difficulty to the emotion recognition task, have found no evidence for a specific deficit in emotion recognition in schizophrenia (Feinberg, et al, 1986; Gessler, et al, 1989; Kerr & Neale, 1993).

A possible explanation for generalised poor performance in facial recognition by schizophrenics, is deficits in eye movement responses to visual stimuli, such as a face (Gordon, Coyle, Anderson, Healey, Cordaro, Latimer, & Meares, 1992). Gordon, et al (1992) found that eye movement of schizophrenics, compared with normals, showed a reduced fixation duration to facial features (eyes, nose, and mouth) in the early stages (first three seconds) of processing a face. Another finding was that schizophrenic individuals had a significantly smaller number of overall fixations on the face than normal controls. These findings suggest impaired attention to, and subsequent processing of, facial stimuli by schizophrenics.

1.2.3.3 The Recognition of Particular Emotions in Schizophrenia and Other Clinical Populations.

Although the studies cited in section 1.2.3.2, controlled for item difficulty, they did not differentiate between the recognition of specific emotions. Therefore, the research did not eliminate the possibility that schizophrenics may have a differential deficit for recognising some emotions, but not others. If there are differential deficits between schizophrenics and normals for the recognition of particular emotions, research that does not distinguish between the emotions would be affected by this unexplained variability. The resultant unexplained variability would reduce the power of this research. For example, suppose there is only one emotion on which schizophrenics experience a differential-recognition-deficit. If this emotion is included in a group of non-deficit emotions, the overall effect size for the deficit would be substantially reduced.

Suppose the size of the deficit between a schizophrenic and normal group on an emotion recognition task, with a reduced effect size, is comparable to the size of the deficit on a control task. This result could be used as evidence that schizophrenics do not have a differential deficit for emotion recognition. The research can not conclude, however, that schizophrenics do not have a differential deficit for recognition of a particular emotion.

Facial-affect recognition research suggests that schizophrenics have differential abilities in perceiving particular emotions.

Schizophrenics generally display a greater deficit compared to normals for perceiving negative affects (such as sadness, anger and fear) than for perceiving positive affect (such as happiness) (Anstadt & Krause, 1989; Bellack, Mueser, Wade, Sayers, & Morrison, 1992; Mueser, Bellack, Wade, Sayers, Tierney, & Haas, 1993). Bellack, et al (1992) found that schizophrenics consistently underestimated the intensity of negative emotions (ie anger and distress) but were not deficient in the perception of positive emotional displays. Anstadt & Krause (1989) had schizophrenics and normals draw the various facially expressed emotions. They found that accuracy was the same for both groups with the exception of sadness where the schizophrenics had 20% of the action units correct and normals had 51% correct.

There is a paucity of research in the area of schizophrenic recognition for particular emotions, however, and the available research is inconclusive. Some research has found no difference in the ability of schizophrenics to recognise the various emotions; Heimberg, et al (1992) found no difference between happy and sad discrimination for schizophrenics. They argued this result was inconsistent with studies that have shown schizophrenics were worse at judging negative affect as opposed to positive affect. A deficiency in the literature is that most studies investigating the recognition of different emotions did not use the entire range of six basic emotions. Extensive research supports the existence of six basic emotions (happiness, sadness, anger, fear, disgust, and surprise) (Ekman, 1992; Ekman, 1994). Research also suggests that these emotions are universally experienced across different cultures (Ekman, 1992; Ekman, 1994; Izard, 1994).

Of the six basic emotions, four are considered negative. These are sadness, anger, fear, and disgust. Happiness and surprise are generally classed as positive emotions (Russell, 1994). Surprise, however, may be considered positive or negative depending on the source of the emotion (Ekman, 1994). An unexpected surprise can either be pleasant or unpleasant. For a more detailed discussion on the universality of emotions, refer to section 1.2.1 (page 12).

The majority of research investigating the ability of schizophrenics to recognise specific emotions has not incorporated all six basic

emotions. There is a tendency to use a subset of the six basic emotions. For example, Heimberg, et al (1992) only compared the emotions of happiness and sadness, and found no evidence that schizophrenics performed worse on discriminating either emotion.

Kline et al (1992) investigated the performance of normals, paranoid schizophrenics, and nonparanoid schizophrenics, on facial-affect recognition of the six basic emotions. In their analysis, however, they grouped the six emotions into two groups, positive and negative. Anger, disgust, fear, and sadness, were grouped together as negative emotions, while happiness and surprise were grouped together as positive emotions. They found the three groups did not differ on their labelling of positive emotions. For the negative emotions, they found that paranoid schizophrenics and normals, performed significantly better than nonparanoid schizophrenics.

Although all six basic emotions were used in Kline et al's (1992) affect-labelling task, they did not investigate whether or not differences may have occurred within the classes of negative or positive emotions. Since no consistent investigations with the six basic emotions have been conducted, it has not been determined whether or not some negative emotions may cause a greater deficit than other negative emotions.

The general findings that schizophrenics show decreased performance for identifying negative emotions have been derived from studies that have not used the same negative emotions. Some research that reported schizophrenics have particular difficulty recognising negative emotions, has only used one negative emotion, anger (Bellack, et al, 1992; Mueser, et al, 1993). Other research that reported schizophrenics did not have particular difficulty with negative emotions, has also only used one negative emotion, sadness (Heimberg, et al, 1992). It is therefore important to compare the ability of schizophrenics to recognise all six basic emotions.

1.2.4 Explanations for the evidence, that Schizophrenic individuals have an Emotion Recognition Deficit

The majority of research investigating facial-affect recognition deficits in schizophrenia has not been directed by theory. The main focus of the research has been to determine whether or not schizophrenics have difficulty recognising emotions; in particular, difficulty recognising negative emotions. Theoretical explanations have been applied *ad hoc*, in an attempt to explain the findings.

This section summarises four theoretical explanations for the emotion recognition deficit in schizophrenia: the first is a neuropsychological explanation (section 1.2.4.1). The second explanation views emotion recognition as a process of imitation (section 1.2.4.2). The third explanation proposes that the negative-emotion recognition deficit is a defence mechanism to protect the schizophrenic (section 1.2.4.3). The fourth explanation argues that only nonparanoid schizophrenics show a deficit for negative emotion recognition. Paranoid schizophrenics are not expected to have a deficit due to the strong representation of negative emotions in their perception of other people (section 1.2.4.4). Following this, an alternative explanation for the negative-emotion recognition deficit is presented (section 1.2.4.5).

The alternative explanation argues that the apparent difficulty in recognising negative emotions is an artefact of item difficulty. The present research argues that unless the explanation offered by item difficulty is discounted, the theoretical explanations become irrelevant (for a full explanation refer to section 1.2.4.5).

1.2.4.1 Neuropsychological Explanations for Facial-Affect Recognition Deficits.

Evidence that facial-affect recognition is a distinct cognitive process is provided by research from brain injured individuals. Ross (1981) found that deficits in facial-affect recognition after right hemisphere damage were distinct from generalised impairments in visuospatial skills. Humphreys, Donnelly, & Riddoch (1993)

presented two case studies of individuals with face processing impairments. The first individual could process facial emotion but not facial identity, while the second could process facial identity but not facial emotion. This provides evidence that distinct processes are involved in the processing of facial identity and facial emotion.

Neuropsychological research suggests that, at least for right handed individuals, facial-affect recognition is mediated by the right hemisphere of the brain (Gur, Skolnick, & Gur, 1994; Luh, Redl, & Levy, 1994). For example, there is consistent evidence that emotion recognition deficits correlate with damage to the right hemisphere (Rapcsak, Comer, & Rubens, 1993). Harris & Snyder (1992) found that the right hemispheric dominance for emotion perception was robust enough to be unaffected by the mood of the rater.

Facial-affect recognition deficits have been associated with damage to various regions of the brain. For example, poor performance on facial-affect recognition tasks has been noted in individuals with damage to the amygdala (Adolphs, Tranel, Damasio, & Damasio, 1994), the temporal lobe (Rapcsak, et al, 1993), and the frontal lobe (Kolb, & Taylor, 1981; Kolb, Wilson, & Taylor, 1992).

Individuals with schizophrenia often show deficits similar to those associated with frontal lobe impairment (Lezak, 1995; Walsh, 1985). The frontal and prefrontal lobes of the brain are generally considered to control an individual's executive functions (Walsh, 1985). Executive functions are cognitive processes that allow individuals to respond and adapt to their environment. Executive functions include abilities such as planning, sequencing, and organisation of verbal and visual information. Emotion recognition may be another frontal ability affected in schizophrenia (Walsh, 1985).

There is also some neuropsychological evidence that positive and negative emotions are processed differently. Right hemispheric functioning was linked with processing negative emotions, such as anger, whereas left hemispheric functioning was associated with processing positive emotions, such as happiness (Reuter-Lorenz & Davidson, 1981; Natale, Gur, & Gur, 1983). Other research, however,

found no differences between brain regions involved in processing positive or negative affect (Etcoff, 1984).

The evidence for a distinction in the processing of negative and positive emotions is inconclusive. More conclusive data is needed to explain the greater recognition deficit for negative, than for positive, emotions in schizophrenia.

1.2.4.2 Recognition of Emotion via Imitation

Lipps (1907, cited in Walbott, 1991) proposed a theoretical explanation for the process of facial-affect recognition. Lipps postulated that emotion recognition is facilitated by an 'imitation drive'. He argued that people learn how facial expressions are related to emotions through self-perception. They relate the expression on their own face to the emotion they feel. When recognising another person's facial expression, people use the information gathered previously through self-perception. Lipps argued that people imitate the expression they perceived, then attribute feelings to that expression from their prior self-perceptive experience. These feelings, or emotions, are then attributed to the other person.

Walbott (1991) examined this theory by videoing participants as they completed an emotion recognition task. Two weeks later, the participants were asked to recognise the emotional expressions on their own faces from the video recorded as they had completed the emotion recognition task. Walbott found that the correspondence between the rating of emotions in the original recognition task, and the rating of emotions from the participants' faces, was above chance. This provides some indirect evidence that imitation may assist in emotion recognition.

If imitation is important for emotion recognition, it could be argued that schizophrenics who had flattened affect would perform poorly. Flat affect refers to a paucity of emotional expression, and is a symptom commonly associated with schizophrenia (Rosenhan & Seligman, 1989). It would be expected that schizophrenic individuals with flat affect would not automatically imitate the presented emotion. According to imitation theory, they would then

have difficulty recognising the presented emotion. However, this theory does not differentiate between different emotions and would have difficulty explaining why schizophrenics have a greater deficit for recognising negative than positive emotions.

1.2.4.3 Deficits in Recognition of Negative Emotions as a Psychological Defence Mechanism

Another theoretical explanation for the apparent difficulty schizophrenics have recognising negative emotions is that the deficit is part of a defence mechanism. It was argued that a defence mechanism (conscious or unconscious) protected the schizophrenic against the stress caused by the perception of negative emotions in others (Bellack, et al, 1992).

The defence mechanism theory was linked with studies of expressed emotion (Bellack, et al, 1992). Expressed emotion refers to the expression of negative emotion. High expressed emotion in families of schizophrenics has been associated with higher relapse rates among schizophrenics (Bellack, et al, 1992; Mueser, et al, 1993). It was argued that problems with recognising negative emotion may be a defence for schizophrenics in environments with high expressed emotion.

Bellack, et al, (1992) forwarded the defence mechanism theory as a possible explanation for schizophrenics' difficulty with negative-affect recognition. They also acknowledged the possibility that attention difficulties, or a neuropsychological deficit, could explain the results. There was no empirical evidence to support the defence mechanism explanation.

1.2.4.4 Greater Cognitive Representation of Negative Emotions for Paranoid, than Nonparanoid, Schizophrenics.

Kline et al (1993) presented evidence that only nonparanoid schizophrenics, and not paranoid schizophrenics, have a deficit in negative emotion recognition. The groups did not differ on their recognition of positive emotions. However, nonparanoids were significantly poorer at recognising negative emotions than

paranoids and normals. Kline et al concluded that the difficulty recognising negative emotions is not a general schizophrenic deficit, but is limited to the poorly organised emotional schema of nonparanoid schizophrenics.

The result that paranoid schizophrenics did not have a deficit for negative emotion recognition supported Kline et al's (1993) theory that paranoid schizophrenics have a strong representation of negative emotions in their perception of other people. Paranoid schizophrenics commonly experience delusions of persecution and interference that could make them more aware of negative emotions in others (Kline et al, 1993).

Kline et al's (1993) theory has intuitive appeal, however they did not acknowledge that their results could also be explained by the differential item difficulties between positive and negative emotion recognition tasks (for explanation refer to section 1.2.4.5, page 27).

1.2.4.5 An Alternative Explanation why Schizophrenic individuals, have Specific Difficulty Recognising Negative Emotions: An Artefact of Item Difficulty.

An alternative explanation to those in the preceding sections (1.2.4.1 to 1.2.4.4), is that findings of a greater deficit in recognising negative (as opposed to positive) emotions is merely an artefact of differential difficulties in perceiving the emotions. With all other variables controlled, items of medium difficulty would show the greatest deficit between a normal and pathological group. Items of extremely high and extremely low difficulty would show a comparatively reduced deficit between the groups (Chapman & Chapman, 1973, for a more detailed explanation refer to section 1.2.3.1 on page 17).

Research supports that, for normal adults, negative emotions are more difficult to recognise than positive emotions (Matsumoto, 1992; Mazurski & Bond, 1993; Kline et al, 1993). Similarly, research supports that for clinical groups such as individuals with schizophrenia or depression, negative emotions are more difficult to recognise than positive emotions, (Morrison, et al, 1988; Walker, et

al, 1984; refer also to section 1.2.3.3, page 20). Research also supports that clinical groups (such as schizophrenics), show a greater deficit, compared with the abilities of normals, in the recognition of negative than positive emotions (Anstadt & Krause, 1989; Bellack, et al 1992; Mueser, et al, 1993; refer also to section 1.2.3.3, page 20).

This pattern of results suggests that positive emotions are extremely easy to recognise. If positive emotions are extremely easy to recognise, neither a normal nor a pathological group would be expected to have particular difficulty recognising positive emotions. Therefore, there would not be a deficit between the normal and pathological group for the recognition of positive emotions.

Furthermore, the pattern of results suggests that recognition of negative emotions is at a medium level of difficulty. If this is true, a clinical group would be expected to show a deficit, compared to normals, in the recognition of negative emotions (refer to section 1.2.3.1, page 17).

To summarise, if the most difficult items (that is the negative emotions) are of medium difficulty, it would be expected that schizophrenics would show a greater deficit in those items, compared with the easier positive affect recognition items. This argument is consistent with the available evidence. For example, in Mazurski & Bond (1993) happiness was correctly identified by 94.1% of participants on average. This represents an extremely easy task. The negative emotions (anger, sadness, disgust, and fear) were correctly identified by between 70.4 and 80.3% of participants. The task of identifying negative emotions was not extremely easy or difficult, but was within a medium range of difficulty.

Item difficulty can also explain the results of Kline et al (1993) who found that paranoid schizophrenics and normals outperformed nonparanoid schizophrenics in recognising negative emotions. The groups were equivalent in their perception of positive emotions.

Research suggests that paranoid schizophrenia is a less severe form of the illness than nonparanoid schizophrenia (Nicholson & Neufeld, 1993; refer also to section 1.1.3.2, page 7). This suggests that paranoid schizophrenics would perform with greater accuracy, in general, than nonparanoid schizophrenics. Chapman & Chapman (1973) argued that a less accurate group was expected to show a deficit, compared with a more accurate group, for tasks of moderate difficulty. The groups were expected to be equivalent in accuracy for tasks of extremely low or high difficulty.

Kline et al (1993) suggested that, for recognising positive emotions, a ceiling effect may have caused the equivalence between the paranoid and nonparanoid groups. This explanation suggests that the results were caused by item difficulty. They went on to argue that the difference between the paranoid and nonparanoid schizophrenics in recognising negative emotions, supported their theory that nonparanoid schizophrenics had a less developed cognitive representation for negative emotions than paranoid schizophrenics (refer to section 1.2.4.4, page 26). However, this explanation does not advocate item difficulty as the cause of the results.

Kline et al (1993) attributed the equivalence between the groups on the recognition of positive emotions to the positive items being too easy. An item-difficulty explanation would suggest that the difference found between the groups on the recognition of negative emotions was due to the moderate level of difficulty for those negative items (refer also to section 1.2.3.1, page 17, for an explanation of the effects of item difficulty on deficit research).

Kline et al (1993) were inconsistent in the explanation of their results. They presented item difficulty as a possible explanation for half of their results, but did not acknowledge that item difficulty could explain all of their results. This was a serious oversight by Kline et al (1993), which detracts from the theoretical explanation of their results.

Morrison, et al (1988) reviewed facial-affect recognition research in schizophrenia. They stated that there was no research specifically testing whether item difficulty could explain differential deficits

between positive and negative emotion recognition in schizophrenics. There has also been a paucity of research examining the six basic emotions in this context. Most research used one example of a positive, and one or two examples of a negative, emotion (refer to section 1.2.3.3, page 20).

The present research sought to determine what pattern of deficits, between normals and schizophrenics, emerged when all six basic emotions were considered. If the emotion recognition deficits in schizophrenia can be explained simply by item difficulty, the proposal of theoretical explanations (such as those in sections 1.2.4.1 to 1.2.4.4) would be redundant. The position of theoretical explanations would be considerably strengthened, however, if a pattern of results is evident that can not be explained by item difficulty.

1.3 THE PRESENT STUDY

1.3.1 Experiment One

Experiment one was conducted with tertiary students as participants. The task used in the present study was a facial-affect labelling task. Participants were given a choice of six emotions from which to label each face. The six emotions were happiness, sadness, anger, disgust, surprise, and fear. These are widely considered to be six universal emotions (refer to section 1.2.1, page 12).

1.3.1.1 Aims

The purpose of experiment one was to pilot the facial-affect recognition task. The pilot aimed to determine the relative item difficulties for each of the six basic emotions.

1.3.1.2 Hypotheses

Experiment one had the following hypotheses:

1. In accordance with the literature, it was predicted that negative emotions would be more difficult to recognise than positive emotions (refer to section 1.2.2, page 14).

2. The specific order of difficulty for the six emotions, was predicted to correspond with Mazurski & Bond (1993). Happiness was predicted to be the easiest emotion to recognise, followed in order by surprise, disgust, sadness, anger, and fear.

3. Experiment one predicted that no sex differences would be evident in performance of the facial-affect recognition task.

1.3.2 Experiment Two

Experiment two was conducted with four groups of participants. Paranoid and nonparanoid schizophrenics were the target groups. Participants with no history of mental illness were a normal control group. Depressed participants served as a clinical control group.

1.3.2.1 Aims

Experiment two was designed to test whether or not there are differential deficits in the perception of the six basic emotions between normals, depressives, and schizophrenics. Furthermore, it aimed to determine whether or not the pattern of differences between the groups can be explained simply by variations in item difficulty. If differences between the groups can be explained by item difficulty, a true differential deficit can not be postulated for the recognition of specific emotions in schizophrenia.

1.3.2.2 Hypotheses

The second experiment used the facial-affect recognition task designed for experiment one to test the following hypotheses:

4. That on average, nonparanoid schizophrenics will perform less accurately than paranoid schizophrenic participants on the emotion labelling tasks.

5. That on average, paranoid and nonparanoid schizophrenics will perform more poorly than depressed and normal participants on the emotion labelling tasks.

6. That on average, depressed persons will perform less accurately than normal persons on the emotion labelling tasks.

7. The differences in performance deficit among the four groups, on the six emotion labelling tasks, will be as expected from the relative item difficulties of the emotion labelling tasks.

In explanation of hypothesis four, it is predicted that the groups will not differ in their relative performances across the six emotion categories. This means that each group will agree on the easiest and the most difficult emotions to recognise. Each group is expected to have an equivalent progression of accuracy on the emotion labelling tasks.

There is not expected to be an interaction effect between participant group and emotion task. If an interaction effect is evident, it is expected to reflect a ceiling and/or a floor effect. This would show the groups' performance converging for very easy, and/or very difficult, items.

Chapter Two

METHOD

2.1 EXPERIMENT ONE

2.1.1 Sample

Fifty-eight first year psychology students from the Australian National University comprised the present sample. The students sampled ranged from 18 to 42 years of age (mean age = 23, standard deviation = 6). There were 36 female (62%), and 22 male (38%), participants. With females coded as 1, and males as 2, the mean for sex of participant was 1.38 (standard deviation = 0.50).

All participants were right handed, to control for any differences in performance due to handedness. Handedness has been related to cerebral hemisphere organisation and functioning (Harshman, Hampson, & Berebaum, 1983).

No participant had a history of psychiatric illness, severe head injury, alcohol abuse, or drug abuse. Students participated voluntarily and received credit toward their psychology course for participation in the study.

2.1.2 Design

The first hypothesis for experiment one predicted differences between mean item-difficulties for the six depicted emotions for normal participants. Specifically, it was predicted that positive emotions (happiness and surprise), would be easier to recognise

than negative emotions (sadness, fear, anger, and disgust). The second hypothesis predicted there would not be a sex difference in performance of the facial-affect recognition task.

To test these hypotheses, a split plot factorial design was employed. Accuracy on the facial-affect recognition task was the dependent variable. There were two independent variables. The first was sex of participant, comprising two levels, female and male. This was a between subjects' variable. The second independent variable was emotion, comprising six levels: happiness, sadness, anger, disgust, surprise, and fear. This was a within subjects' variable.

Russell (1994) criticised the use of within-subjects designs for facial-affect recognition studies. He argued that recognition scores were inflated when participants viewed all emotion types within a short time. It was claimed that such exposure did not occur in everyday encounters with facial expression. Russell believed that between-subjects designs should be used for facial-affect recognition tasks. Matsumoto & Ekman, (1988, cited in Russell, 1994) was a between-subjects emotion recognition study that failed to verify the strength of results found in within-subjects studies. Russell argued that the failure of this between-subjects study to replicate the strong results of within-subjects studies cast doubt on the universality of emotions.

There are two problems with Russell's argument for the disuse of within-subjects designs. The first problem is that it is uncommon for emotions to be viewed in total isolation of each other in everyday experience (Ekman, 1994). The second problem with Russell's argument results from a well-known statistical property of between-subjects designs; they are less statistically powerful than within-subjects designs. Within-subjects designs do not have the inter-subject variability that reduces the main effect size in a between-subjects design (Kirk, 1982). This statistical difference between the designs may explain why the strength of results in the reported between-subjects study was less than that of the within-subjects studies.

The within groups design employed by the present study for the emotion variable also served as an experimental control. The

within groups design controlled for differences between participants on the dependent variable (emotion recognition score), as each participant completed all six levels of the independent variable (emotion).

Other control measures were intricately associated with the experimental procedure and are discussed in that section (2.1.4, page 36).

2.1.3 Materials

A selection of the pictures of facial affect, developed by Mazurski & Bond (1993), were used as stimuli for the current research. These slides were validated by studies of rater agreement with an Australian sample of about 100 participants. The slides were bought, from Mazurski & Bond, on CD-ROM for Macintosh computers.

There was a total of thirty slides selected for use in the current design; five slides for each of the six depicted emotions. The slides were selected to retain the average item difficulty of each emotion as reported in Mazurski & Bond (1993). This was so the present results could be reasonably compared to those of Mazurski and Bond (1993). There were two criteria for slide selection. The first was that the rater agreement for each slide, was close to the mean rater agreement for that emotion group. The mean rater agreement, as reported in Mazurski & Bond (1993), was calculated for each group of slides depicting one emotion. Slides with a rater agreement close to this mean were chosen for the present research. The second criterion for slide selection was that the mean rater agreement for the five selected slides, for each emotion, closely approximated the mean rater agreement from that emotion group as a whole. Slides for the present study were chosen with rater agreements above and below the reported mean rater agreement. This choice was made so that the selected slides, for a particular emotion, had a mean rater agreement close to the mean for the entire selection of slides for that emotion (as reported in Mazurski & Bond; refer to Appendix A for calculations used in slide selection, and the list of slides selected for use in the current design).

Apparatus used in the current experiment was a computer program, designed on the Psyscope software package, installed on a Macintosh computer. For the present research the slides were reduced in size from Mazurski & Bond's originals. This served to reduce the time taken for the psyscope program to display the sides. The large size of the original slides required large amount of memory causing a long time delay between pressing the space bar and viewing the slide. The slides in the current program were 35mm wide by 47mm long. The details of the program are described in the procedure (section 2.1.4, page 36).

2.1.4 Procedure

To begin their involvement the participants provided general demographic information (age, sex, and level of education). Participants were then instructed how to complete the facial-affect recognition task (described in section 2.1.4.1.2, page 38). The instructions to participants were as follows:

"On the computer screen you will be presented with pictures of people's faces, one at a time. Before each face comes onto the screen, you will be prompted by the computer to press the space bar on the keyboard (researcher points to the space bar). This will make the next face appear on the screen, so make sure you are watching the screen when you press the space bar.

After the face leaves the screen, the computer will prompt you to press the key that corresponds to the emotion you thought was on that face. The emotions are happiness, sadness, anger, disgust, surprise, and fear (researcher points to each response key in turn). Do you have any questions before you begin?"

The participant's questions were answered, then they completed the facial-affect recognition task. Any further questions the participants had about the study were then answered. Finally, the participants were thanked for their help with the study.

2.1.4.1 Facial-affect recognition task

2.1.4.1.1 Issues surrounding facial-affect recognition tasks

There are two main paradigms that have been used to test facial-affect recognition. These are emotion-discrimination and emotion-labelling.

An emotion-discrimination trial involves the presentation of two faces to an individual, who determines whether the faces portray the same or different emotions. Emotion-labelling trials involve the presentation of one face and a list of emotions to an individual. They then have to decide which of the listed emotions corresponds to the emotion portrayed by the face. The majority of research in the area of facial-affect recognition has used one of these two tasks, most commonly emotion-labelling (Morrison, et al, 1988).

A number of methodological issues concerning facial-affect recognition tasks were raised by Russell (1994). Russell argued that recognition scores in facial-affect recognition research may have been inflated by: participants previewing the faces before the actual recognition task; the order of presentation of the faces; the use of within subjects design; and the use of a forced choice response format.

Russell (1994) argued that participants who knew the range of emotions to be tested, and had seen the entire range of expression types, would be advantaged in the subsequent recognition task. Previewing the faces, before the recognition task, was suggested to highlight similarities within, and differences between, expression types. The percentage of correct responses in the recognition task may therefore have been inflated in studies where participants had previewed the entire range of stimulus material (Russell, 1994). For this reason, the present study did not allow participants to preview the stimulus material prior to the recognition task.

Another problem was when the order of presentation of faces was the same for each participant. This would be likely to result in order effects. Participants would have an identical context, provided by the previous stimulus presentations, in which to judge

each face. This would be likely to inflate agreement between participants (Russell, 1994). To control for order effects, the present study used random orders of stimulus presentation for each participant. This meant that no participant was likely to receive the same order of stimulus presentation.

The final criticism Russell (1994) made of facial-affect recognition tasks was the use of a forced choice response format. Russell argued that a restricted range of emotion labels may not include a label the participant thought would be most appropriate for a particular stimulus. He argued this restriction in response choice would artificially inflate inter-rater agreement. In reply to Russell's criticism, Ekman (1994) argued that given the restricted choice, the fact that participants from varied cultures agreed on what labels to choose for particular expressions, was evidence for universality of emotions. Ekman (1994) argued it was irrelevant whether individuals would choose the same or a different set of labels given a free-choice. The high level of agreement between people using the labels provided was evidence for the utility of the labels for research purposes.

2.1.4.1.2 The facial-affect recognition task used for the present research.

The present task was designed for use with normal, schizophrenic, and depressed individuals.

The task used in the present study was a facial-affect labelling task (refer to section 2.1.4.1.1, page 37). Participants were given a choice of six emotions from which to label each face. The six emotions were: happiness, sadness, anger, disgust, surprise, and fear. These have been widely considered to be six universal emotions (refer to section 1.2.1, page 12).

There was a total of thirty trials in the experiment, comprising five trials for each of the six emotions. Participants were not allowed to preview the pictures before the actual task (as recommended by Russell, 1994; refer to section 2.1.4.1.1, page 37). The trial orders were randomised in a simultaneous design. This meant that each participant had a different, randomly selected, order of stimulus

presentation. The simultaneous design controlled for order effects, as well as practice and fatigue effects. Previous research has been criticised for not using different orders of presentation for each participant (refer to section 2.1.4.1.1, page 37).

The facial-affect recognition task was programmed on a Macintosh computer. Schizophrenic individuals often have attention difficulties, and have been associated with an inability to focus and sustain attention to relevant stimuli (Chapman & Chapman, 1973; Garmezy, 1977, Place & Gilmore, 1980). To control for poor performance due to inattention, participants were prompted to press the space bar to display the stimulus. This was to ensure they were attending to the screen when the stimulus was displayed. After pressing the space bar, the participants were presented with an image of a face expressing a particular emotion.

There has been a wide range of exposure times used in the literature for facial-affect recognition tasks; Feinberg et al (1986) used tachistoscopic presentations of about 500 ms, Heimberg et al (1992) had a seven second duration, while Kerr & Neale (1993) used an exposure time of fifteen seconds. Considering that in real life situations people often change their emotional expressions quite rapidly, brief exposure times are considered more ecologically valid (Morrison et al, 1988).

The stimulus duration for the present design was also influenced by the aforementioned concern that people with schizophrenia have problems attending to stimuli. If the exposure time in the current design was too brief, the schizophrenic participants may have performed poorly solely due to their attention difficulties.

The present design used a stimulus exposure duration of three seconds (as used in Borod, Martin, Alpert, Brozgold, & Welkowitz, 1993). This was considered a brief enough duration to approximate ecological validity, while being long enough in duration to allow for schizophrenic participants' attention difficulties.

After the termination of the stimulus participants were prompted to identify which emotion had been portrayed. They were presented with a list of the six emotions on the screen. The

emotions were listed in six orders with each emotion having an equal chance of being presented in each position. The presentation of the six orders of listed emotions was randomised for every trial. This was to control for the possibility of a tendency to choose the response presented in a particular position.

Participants responded by pressing the response key corresponding to the emotion they perceived to be depicted. The numbers one through six on the main keyboard were used as response keys for the six emotions (1 = happiness, 2 = sadness, 3 = anger, 4 = disgust, 5 = surprise, 6 = fear). The number corresponding to each emotion was chosen randomly. The response keys were clearly labelled with the name of the emotion they represented.

The response keys were not changed between trials so participants could become accustomed to the keys. This was to reduce errors due to unfamiliarity, or confusion, with the response keys. The order of response keys was not expected to influence participant responses, because the order of emotions presented on the monitor was randomised.

The participants had a limited time of fifteen seconds to respond before the presentation of the next trial. This was considered ample time to respond, and helped limit the overall time taken to run the experiment.

2.2 EXPERIMENT TWO

2.2.1 Sample

The present sample comprised four groups of participants. The present study investigated facial-affect recognition in schizophrenia. The current schizophrenic sample was divided into paranoid and nonparanoid groups to test the hypothesis that paranoid schizophrenics perform more accurately than nonparanoid schizophrenics on facial-affect recognition. The target clinical samples comprised 19 people with a current diagnosis of paranoid schizophrenia (4 female, 16 male), and 14 people with a current diagnosis of nonparanoid schizophrenia (2 female, 12 male).

Nineteen people with no psychiatric history (4 females, 16 males) were included as a normal control group to provide a standard against which to compare the schizophrenic groups. Sixteen people with a current diagnosis of major depressive episode (8 female, 8 male) were included as a clinical control group. The depressed group was included to control for the general effects of having a psychiatric illness, such as the experience of psychiatric hospitalisations. The schizophrenic groups were hypothesised to perform less accurately than the depressed group. That the depressives, unlike the schizophrenics, did not experience psychotic thought disorder indicated that schizophrenic difficulties would be associated with their particular illness and not with the presence of a general psychiatric condition.

To control for any differences in performance due to handedness all participants were right handed. Handedness has been related to cerebral hemisphere organisation and functioning (Harshman, et al, 1983). All participants were voluntary, and were informed of the research rationale before consenting to their involvement with the study.

Schizophrenic and depressed participants were recruited from major inpatient psychiatric services within the Australian Capital Territory and New South Wales, as well as from community based rehabilitation services for people with a psychiatric illness. Participants from the clinical samples were referred to the experiment by staff of the recruitment organisation. The current psychiatric diagnosis was the basis for participant selection.

Clinical participants were interviewed by the researcher after they consented to the experiment. The interview centred on the Maine Scale of Paranoid and Nonparanoid Schizophrenia (Magaro, et al, 1981), and the Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962).

The Maine scale (described in section 2.2.3.1, page 46) was used to divide the schizophrenic participants into paranoid and nonparanoid samples. To divide schizophrenic participants into the two groups a cut-off score of 12 on the Maine Paranoid Scale, and a cut-off score of 10 on the Maine Nonparanoid Scale, with at least a

3 point difference between the scales, was used (as recommended in Magaro et al, 1981).

The BPRS (described in section 2.2.3.2, page 49) was used as an indicator of symptom severity for the three clinical groups (for example Geyer & Braff, 1982; Kline et al, 1992; Lukoff, Liberman, & Nuechterlein, 1986; Muzekari & Bates, 1977).

Potential participants were excluded from the study if they had a history of drug or alcohol abuse, or had suffered a severe head injury. Cases of suspected drug induced psychoses or organic brain damage, were not included in the current sample.

The following sections (2.2.1.1 to 2.2.1.4) present the sample characteristics of the four groups in detail. Table 3 presents a summary of sample characteristics for the four groups.

2.2.1.1 The Paranoid Schizophrenic Sample

The paranoid schizophrenic sample was selected on the basis that they fulfil the DSM-IV criteria for schizophrenia - paranoid type (refer to Table 2 on page 5). Participants from the paranoid schizophrenic sample ranged from 17 to 65 years of age (mean age = 40 years, standard deviation = 16). There were 4 female (20%) and 16 male (80%) participants. With females coded as 1 and males as 2 the mean for sex of participant was 1.8 (standard deviation = 0.4). The educational attainment for this group ranged from less than four years of high school (less than 10 years), to completion of tertiary studies (more than 14 years). The mean level of educational attainment was the completion of four years of high school (mean = 10 years, standard deviation = 2).

The duration of psychiatric illness for the paranoid sample ranged from one year to forty years (mean = 19 years, standard deviation = 15). The number of hospitalisations for psychiatric reasons, including the current one for hospitalised participants, ranged from 1 to over 20 (mean = 5.6, standard deviation = 5.8).

For the paranoid schizophrenic sample, the Maine Paranoid Subscale scores ranged from 12 to 19, with a mean of 13.6

(standard deviation = 2.0). The Maine Nonparanoid Subscale scores ranged from 5 to 10, with a mean of 7.3 (standard deviation = 1.8). The BPRS scores ranged from 24 to 53, with a mean of 38.3 (standard deviation = 7.21).

Table 3
Means and Standard Deviations for Sample Characteristics of the Paranoid, Nonparanoid, Depressed and Normal Samples.

	Age	Education	Length of illness	Hospital-isations	Maine Paranoid Score	Maine Non-paranoid Score	BPRS
Paranoid n=19							
Mean	40.2	10.1	19.1	5.6	13.6	7.3	38.3
St. Dev.	15.7	2.08	15.13	5.8	2.0	1.8	7.21
Non-paranoid n=14							
Mean	39.1	10.6	19.8	5.3	5.6	10.75	32.7
St. Dev.	13.0	2.62	14.03	5.8	0.7	1.2	7.10
Depressed n=16							
Mean	45.4	10.7	16.6	7.8	5.3	5.3	34.3
St. Dev.	11.1	2.5	14.5	6.2	0.4	0.6	5.57
Normal n=20							
Mean	34.8	11.7	N/A	N/A	N/A	N/A	N/A
St. Dev.	14.8	1.8					

N/A = not applicable

2.2.1.2 The Nonparanoid Schizophrenic Sample

The nonparanoid schizophrenic sample was selected on the basis that they fulfil the DSM-IV criteria for schizophrenia (refer to Table 1, page 2), but did not fulfil the criteria for paranoid type (criteria presented in Table 2, page 5). Participants from the nonparanoid schizophrenic sample ranged from 25 to 63 years of age (mean age = 39, standard deviation = 13). There were 2 female (14.3%) and

12 male (85.7%) participants. With females coded as 1 and males as 2 the mean for sex of participant was 1.86 (standard deviation = 0.36). The educational attainment for this group ranged from less than four years of high school (less than 10 years), to completion of tertiary studies (more than 14 years). The mean level of educational attainment was the completion of four years of high school (mean = 11 years, standard deviation = 2.6).

The duration of psychiatric illness for the nonparanoid sample ranged from one year to forty years (mean = 20 years, standard deviation = 14). The number of hospitalisations for psychiatric reasons, including the current one for hospitalised participants, ranged from 1 to 20 (mean = 5.3, standard deviation = 5.8).

For the nonparanoid schizophrenic sample, the Maine Paranoid Subscale scores ranged from 5 to 7, with a mean of 5.6 (standard deviation = 0.7). The Maine Nonparanoid Subscale scores ranged from 10 to 13, with a mean of 10.75 (standard deviation = 1.2). The BPRS scores ranged from 24 to 44, with a mean of 32.7 (standard deviation = 7.10).

2.2.1.3 The Depressed Sample

The depressed sample was selected on the basis that they fulfil the DSM-IV criteria for major depressive episode (criteria presented in Appendix B). The depressed group were all hospitalised at the time of testing. Participants from the depressed sample ranged from 26 to 60 years of age (mean age = 45, standard deviation = 11). There were 8 female (50%) and 8 male (50%) participants. With females coded as 1 and males as 2 the mean for sex of participant was 1.5 (standard deviation = 0.5). The educational attainment for this group ranged from less than four years of high school (less than 10 years), to completion of tertiary studies (more than 14 years). The mean level of educational attainment was the completion of four years of high school (mean = 11 years, standard deviation = 2.5).

The duration of psychiatric illness for the depressed sample ranged from one year to forty years (mean = 17 years, standard deviation = 15). The number of hospitalisations for psychiatric reasons,

including the current one for hospitalised participants, ranged from 1 to 20 (mean = 7.8, standard deviation = 6.2).

For the depressed sample, the Maine Paranoid Subscale scores ranged from 5 to 6, with a mean of 5.3 (standard deviation = 0.4). The Maine Nonparanoid Subscale scores ranged from 5 to 7, with a mean of 5.3 (standard deviation = 0.6). The BPRS scores ranged from 24 to 45, with a mean of 34.3 (standard deviation = 5.57).

2.2.1.4 The Normal Sample

Participants from the normal sample ranged from 20 to 60 years of age (mean age = 35, standard deviation = 15). There were 4 female (21.1%) and 15 male (77.9%) participants. With females coded as 1 and males as 2 the mean for sex of participant was 1.79 (standard deviation = 0.42). The educational attainment for this group ranged from less than four years of high school (less than 10 years), to completion of tertiary studies (more than 14 years). The mean level of educational attainment was the completion of five to six years of high school (mean = 12 years, standard deviation = 1.8). Normal participants were recruited from community groups in the Australian Capital Territory and New South Wales.

2.2.2 Design

The first three hypotheses for experiment two predicted the four groups would show differing levels of performance on the emotion recognition task. The first hypothesis stated that the nonparanoid schizophrenic group would perform more poorly on the emotion recognition task than the paranoid schizophrenic, depressed, and normal groups. The second hypothesis was that nonparanoid and paranoid schizophrenic participants would perform more poorly than depressed and normal participants on the emotion labelling tasks. The third hypothesis was that depressed participants would perform more poorly than normals on the emotion labelling tasks. The fourth hypothesis was that differences in performance deficit, between the normal sample and the three clinical groups on the six emotion labelling tasks, would be as predicted by item difficulty.

To test these hypotheses, a split plot factorial design was employed. Accuracy on the facial-affect recognition tasks was the dependent variable. There were two independent variables. The first was participant group, comprising four levels: paranoid schizophrenic; nonparanoid schizophrenic; depressed; and normal. This was a between subjects' variable. The second independent variable was emotion, comprising of six levels: happiness; sadness; anger; disgust; surprise; and fear. This was a within subjects' variable.

2.2.2.1 Control Measures

Control measures included the within groups' design, which controlled for differences between participants on the dependent variable (emotion recognition), since each participant completed every level of the independent variable (emotion depicted).

Other control measures were intricately associated with the experimental procedure and are discussed in that section (2.2.4, page 50).

2.2.3 Materials

Materials for experiment two were as described for experiment one (section 2.1.3, page 35). Two additional measures were used in experiment two, as described below.

2.2.3.1 The Maine Scale of Paranoid and Nonparanoid Schizophrenia

The Maine Scale (presented in Appendix C) was developed by Vojtisek (1976 - cited in Magaro et al, 1981). The scale comprised two subscales; the paranoid subscale, and the nonparanoid subscale. Each subscale consisted of five items. The five items in the paranoid subscale, and three of the items in the nonparanoid subscale, were taken from the Venables & O'Conner (1959 - cited in Magaro et al, 1981) Short Scale for Rating Paranoid Schizophrenia. The two additional items for the nonparanoid subscale were adapted from symptoms included in Overall & Gorham's (1962) Brief Psychiatric Rating Scale (refer to section 2.2.3.2).

The paranoid items refer to overt expressions of hostility, and delusions of persecution, control, reference, and grandeur. The two nonparanoid items taken from the BPRS refer to cognitive disorganisation and hallucinations. The other three nonparanoid items refer to time disorientation, unusual postures, and incongruous emotional responses.

The ratings for the five items for each scale, are summed to give total scores for paranoid and nonparanoid schizophrenia. Magaro, et al (1981) suggested cut-off scores, on the subscales, for dividing schizophrenic individuals into paranoid and nonparanoid. They suggested a cut-off score of twelve for the paranoid scale, and ten for the nonparanoid scale, with at least a three-point difference between the paranoid and nonparanoid scales. For example, suppose an individual scored fourteen points on the paranoid subscale and eleven points on the nonparanoid subscale. This individual would be classified as paranoid, since they had scored more than twelve points on the paranoid subscale, and their nonparanoid score was three points less than their paranoid score.

Magaro, et al (1981) conducted reliability and validity tests of the Maine Scale with a sample including paranoid and nonparanoid schizophrenics, and a variety of other clinical diagnoses including depression. The test-retest reliability of the Maine Scale was adequate for both the nonparanoid subscale ($r=.73$, $p<.001$, $n=26$), and the paranoid subscale ($r=.89$, $p<.001$, $n=26$).

The inter-rater reliability of the Maine Scale was also adequate (Magaro, et al, 1981). Inter-rater reliabilities of two raters', measured by Spearmen rank-order correlations, were .61 for the paranoid subscale and .77 for the nonparanoid subscale. This was consistent with the inter-rater reliability (.69) of the two raters on the Research Diagnostic Criteria (RDC) of Spitzer, Endicott, & Robbins (1978). The Spearmen rank-order correlation between the raters diagnoses from the Maine Scale, and diagnoses made using the RDC was .71.

Magaro, et al (1981) investigated the construct validity of the Maine Scale by two methods. The first method was to compare scores on variables, previously shown to distinguish paranoid from

nonparanoid schizophrenics, for individuals rated as paranoid or nonparanoid based on the Maine Scale. They found that paranoids', diagnosed by the Maine scale, significantly outperformed Maine Scale diagnosed nonparanoids' on measures of reaction time, Stanford-Binet IQ score, and the Expanded Similarities Test (all cited in Magaro, et al, 1981). This was consistent with the literature reports of paranoid schizophrenics outperforming nonparanoids on these, and similar, measures (Magaro, et al, 1981; refer also to section1.1.3.2 on page 7 for differences in functioning between paranoid and nonparanoid schizophrenics).

The second method Magaro, et al, (1981) used to investigate construct validity was a factor analytic design. They found four factors using a principal component solution and a varimax rotation. Four of the paranoid subscale items (P1, P2, P4 and P5) loaded strongly on the first factor. Four of the nonparanoid items (N1, N2, N3, and N4) loaded strongly on the second factor. The remaining paranoid (P3 - grandeur), and nonparanoid (N5 - unusual posturing) items loaded on the third and fourth factors respectively. This analysis shows the Maine scale to have adequate construct validity.

Magaro, et al, (1981) also found the Maine Scale to have good concurrent and discriminant validity. The Maine Scale was significantly correlated with subscales from other diagnostic instruments used for distinguishing paranoid from nonparanoid schizophrenia. For example, the Maine Scale was correlated with the appropriate subscales of the Symptom Rating Scale (Jenkins, Stauffacher, & Hestner, 1959), and the Symptom-Sign Inventory (Foulds, 1965 - cited in Magaro et al, 1981). This provided evidence of concurrent validity.

Evidence of discriminant validity was obtained by showing that the paranoid and nonparanoid subscales of the Maine Scale were not significantly correlated ($r=.25$, ns, $n=48$). The paranoid and nonparanoid subscales of the Symptom Rating Scale were, however, significantly correlated ($r=.93$, $p<.001$, $n=47$), as were those of the Symptom-Sign Inventory ($r=.66$, $p<.001$, $n=47$). This showed the Maine Scale to have a higher standard of discriminant validity than

two of the other scales commonly used to distinguish between paranoid and nonparanoid schizophrenics (Magaro, et al, 1981).

The research in Magaro, et al, (1981) provides strong evidence for the validity and reliability of the Maine Scale of Paranoid and Nonparanoid Schizophrenia.

2.2.3.2 The Brief Psychiatric Rating Scale

The Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962) is generally considered the most widely used scale for the objective rating of mental state (Manchanda, Saupe & Hirsch, 1986).

The BPRS (presented in Appendix D) was used in the present research as an indicator of symptom severity for the three clinical groups. Other research has also used the BPRS for this purpose (for example Geyer & Braff, 1982; Kline et al, 1992; Lukoff, et al, 1986; Muzekari & Bates, 1977).

The BPRS is an 18-item rating scale (Bell, Milstein, Beam-Goulet, Lysaker, & Cicchetti, 1992). Ratings for each item are made following an interview with the participant. Seven items required an observation of participant behaviour during the interview (Tension, Emotional withdrawal, Mannerisms and Posturing, Motor retardation, Excitement, Blunted affect, and Uncooperativeness). The other 11 items are based on the content of the participant's verbal report (Somatic concern, Anxiety, Depression, Guilt, Hostility, Suspiciousness, Unusual thought content, Grandiosity, Hallucinations, Disorientation, Conceptual disorganisation).

Each item is rated on a seven point scale ranging from 1 (symptom not present) to 7 (symptom extremely severe). Therefore the higher the BPRS total score, the greater the severity of current symptomatology.

The BPRS has been found to have good reliability, validity and clinical utility (Bell, et al, 1992; Manchanda et al, 1986). Manchanda et al (1986) reported an inter-rater reliability of $r=0.88$. Similarly, Bell et al (1992) reported an inter-rater reliability of $r=0.87$.

Bell et al (1992) found the BPRS to have adequate convergent validity in a high correspondence (85.72%) between scores on the BPRS and the Positive and Negative Syndrome Scale for a group of schizophrenics (PANSS; Kay, Fiszbein, & Opler, 1987). The BPRS also showed adequate predictive validity. Low scores on the BPRS were associated with low work performance measures and high BPRS scores were associated with high work performance measures (Bell et al, 1992).

2.2.4 Procedure

Participants were interviewed for approximately 30 minutes to begin their involvement in the experiment. The interviews were based on the Maine Scale of Paranoid and Nonparanoid Schizophrenia (Magaro, et al, 1981), and the Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962). These scales are described in detail in sections 2.2.3.1 and 2.2.3.2 respectively (pages 46 to 50). The information obtained from these scales is presented in section 2.2.1. (pages 42 to 45).

Participants then completed the facial-affect recognition task as described in section 2.1.4.1.2 (page 38). Any further questions the participants had about the study were then answered. Finally, the participants were thanked for their help with the study.

Chapter Three

RESULTS

3.1 EXPERIMENT ONE

Experiment one was conducted with normal participants to determine the relative item difficulties, on the facial-affect recognition task, for each of the six basic emotions.

The mean accuracies for the six emotions are presented in Table 4. The maximum score for each emotion was five, since there were five pictures presented for each emotion during the task. A score of five meant that the participant recognised all five pictures of that emotion accurately.

The total sample of 22 males and 36 females was included in the analysis. Results of evaluation of assumptions of normality, homogeneity of variance-covariance matrices, linearity, and multicollinearity were satisfactory.

It was hypothesised that happiness would be the easiest emotion to recognise, followed by surprise, disgust, sadness, anger, and fear, respectively (refer to page 31). From Table 4 it appeared that happiness, as expected, was recognised most accurately (mean = 4.7, standard deviation = 0.61). Fear, as expected, was recognised least accurately (mean = 1.9, standard deviation = 1.23). The order of accuracy for the other emotions was not entirely as predicted. Disgust followed happiness as the next most accurately recognised emotion (mean = 3.8, standard deviation = 0.94), followed by surprise (mean = 3.7, standard deviation = 0.99), anger (mean = 3.3, standard deviation = 1.25), and sadness (mean = 3.1, standard deviation = 1.21).

Table 4

Means and Standard Deviations for Accuracy of Facial-Affect Recognition as a Function of Emotion, and Sex of Participant

	Emotion					
Group	Happy	Surprise	Disgust	Sad	Anger	Fear
Females						
n = 36						
Mean	4.7	3.8	4.0	3.2	3.1	1.9
St. Dev	0.51	1.04	0.91	1.24	1.29	1.20
Males						
n = 22						
Mean	4.5	3.5	3.6	2.9	3.7	2.0
St. Dev	0.74	0.91	0.99	1.17	1.08	1.31
Total Sample						
n = 58						
Mean	4.7	3.7	3.8	3.1	3.3	1.9
St. Dev	0.61	0.99	0.94	1.21	1.25	1.23

A split-plot factorial Analysis of Variance (ANOVA) was conducted to compare differences in accuracy for sex of participant, and the six emotions. The sex of participant effect was not significant, $F(1, 56) = 0.26$, $p>0.05$. This result showed, as expected, that males and females did not differ in their performance of the facial-affect recognition task used by the present research. The sex-by-emotion interaction effect was also not significant, $F(5, 280) = 2.00$, $p>.05$. This was further evidence that the sexes did not differ in their recognition of facial-affect.

The main effect for emotion was significant, $F(5, 280) = 40.29$, $p<.001$. This showed that the emotions differed in recognition accuracy. The significant main effect for emotion justified comparing the accuracies of the six emotions in more detail. Five planned, orthogonal contrasts, using unique sums of squares, were conducted to compare the recognition accuracy of the emotions.

The first contrast compared the accuracy of the positive with the negative emotions. As predicted, the average accuracy of the positive emotions (happiness and surprise; mean = 4.2, standard deviation = 0.97) was significantly higher than the average accuracy of the negative emotions (disgust, sadness, anger, and fear; mean = 3.1, standard deviation = 1.36), $t(52) = 13.26$ $p<.001$.

The remaining four contrasts were planned using the expected order of accuracy of the emotions; happiness was expected to be the easiest emotion to recognise, followed by surprise, disgust, sadness, anger, and fear. The contrasts each compared the accuracy of two emotions. Unexpectedly, surprise (mean = 3.7, standard deviation = 0.99) was recognised significantly less accurately than disgust (mean = 3.8, standard deviation = 0.94), $t(52) = 4.17$, $p<.001$. Disgust was recognised significantly more accurately than sadness (mean = 3.1, standard deviation = 1.21), $t(52) = 6.04$, $p<.001$. Sadness was not recognised with significantly different accuracy from anger (mean = 3.3, standard deviation = 1.25), $t(52) = 1.85$, $p>.05$. Anger was recognised significantly more accurately than fear (mean = 1.9, standard deviation = 1.23), $t(52) = 6.41$, $p<.001$.

3.2 EXPERIMENT TWO

3.2.1 Comparison of Sample Characteristics

Table 3 (page 43) presents a summary of the sample characteristics for the four groups. Multivariate analyses of variance (MANOVA) were conducted to compare the four groups on sample characteristics. MANOVA was chosen as the test statistic since it reduces the likelihood of type I errors, compared to the error rate expected with multiple univariate tests (Tabachnick & Fidell, 1989).

A one-way MANOVA was conducted with Age and Education as dependent variables, and group (normal, depressed, paranoid schizophrenic, and nonparanoid schizophrenic) as the independent variable. The Wilks' Lambda multivariate test for the analysis was not significant, $F(6,126) = 1,88$, $p>.05$. This indicated that there was no significant difference, in average age and education level, for the four groups.

A second one-way MANOVA was conducted to compare the clinical samples (paranoid schizophrenic, nonparanoid schizophrenic, and depressed) (independent variable) on the duration of illness, number of hospitalisations, and BPRS score (dependent variables). The Wilks' Lambda multivariate test for the analysis was not significant, $F(6,90)$ 1.82, $p>.05$. This indicated that the three clinical groups did not differ on duration of illness, number of hospitalisations, and BPRS score (an indicator of symptom severity).

3.2.2 Comparison of Group Performances on the Facial-Affect Recognition Task.

Experiment two was conducted to determine whether normal, depressed, paranoid schizophrenic, and nonparanoid schizophrenic participants differed in their performances on the facial-affect recognition task. Results of evaluation of assumptions of normality, homogeneity of variance-covariance matrices, linearity, and multicollinearity were satisfactory for the normal, depressed, and schizophrenic samples.

The samples' mean accuracies for the six emotions are presented in Table 5. The maximum score for each emotion was five, since there were five pictures for presented for each emotion during the task. A score of five meant that the participant recognised all five pictures of that emotion accurately.

As seen in Table 5, happiness was the most accurately recognised emotion for all groups. Fear was the least accurately recognised emotion for all groups, except the nonparanoid schizophrenics. The nonparanoid schizophrenic group's mean recognition accuracy for disgust (mean = 1.3, standard deviation = 1.38) was lower than their accuracy for fear (mean = 1.4, standard deviation = 1.22). However, the recognition accuracy for disgust and fear did not seem to differ in the nonparanoid group because the difference between their means was slight (difference = 0.1) in comparison to their standard deviations (both >1.0).

Table 5

Group Means and Standard Deviations for Accuracy of Facial-Affect Recognition as a Function of Emotion.

	Emotion					
Group	Happy	Surprise	Disgust	Sad	Anger	Fear
Normals n=20						
Mean	4.3	3.5	2.7	2.7	3.2	1.7
St. Dev	0.81	1.17	1.32	1.16	1.12	1.37
Depressed n=16						
Mean	4.3	3.6	2.1	2.4	2.5	1.8
St. Dev	0.70	0.96	1.26	1.41	1.37	1.24
Paranoid n=19						
Mean	4.1	2.5	1.7	1.6	2.3	1.7
St. Dev	1.10	1.24	1.13	1.05	1.03	1.30
Nonparanoid n=14						
Mean	3.0	2.4	1.3	1.7	2.5	1.4
St. Dev	1.78	1.15	1.38	1.38	1.29	1.22
Total Sample n=69						
Mean	4.0	3.0	2.0	2.1	2.6	1.7
St. Dev	1.22	1.25	1.35	1.30	1.21	1.27

A split-plot factorial Analysis of Variance (ANOVA) was conducted to compare differences in accuracy for group of participant, and the six emotions. The group of participant effect was significant, $F(3, 65) = 7.06$, $p<.001$. This result showed, as expected, that the groups differed in their performance of the facial-affect recognition task.

The main effect for emotion was also significant, $F(5, 325) = 37.94$, $p<.001$. This showed that the emotions differed in their average recognition accuracy. The group-by-emotion interaction effect was not significant, $F(15, 325) = 1.33$, $p>.05$. This was evidence that the groups did not have different orders of recognition accuracy for the six emotions.

3.2.2.1 Comparisons between the Emotions

The significant main effect for emotion justified comparing the accuracies of the six emotions in more detail. Five planned orthogonal contrasts, using unique sums of squares, were conducted to compare the recognition accuracy of the emotions. The first contrast compared the accuracy of the positive with the negative emotions. As predicted, the average accuracy of the positive emotions (happiness and surprise; mean = 3.3, standard deviation = 1.10) was significantly higher than the average accuracy of the negative emotions (disgust, sadness, anger, and fear; mean = 1.9, standard deviation = 0.72), $t(63) = 11.47$, $p<.001$.

The remaining four contrasts were planned using the expected order of accuracy of the emotions; happiness was expected to be the easiest emotion to recognise, followed by surprise, disgust, sadness, anger, and fear. The contrasts each compared the accuracy of two emotions. Surprise (mean = 3.0, standard deviation = 1.25) was recognised significantly more accurately than disgust (mean = 2.0 standard deviation = 1.35), $t(63) = 6.98$, $p<.001$. Disgust was not recognised with significantly different accuracy than sadness (mean = 2.1, standard deviation = 1.30), $t(63) = 1.06$, $p>.05$. Sadness was not recognised with significantly different accuracy than anger (mean = 2.6, standard deviation = 1.21), $t(63) = 0.21$, $p>.05$. Anger was recognised significantly more accurately than fear (mean = 1.7, standard deviation = 1.27), $t(63) = 5.05$, $p<.001$.

3.2.2.2 Comparisons between the Groups

The significant main effect for group justified comparing the facial-affect recognition performances of the four groups in more detail. Three planned, orthogonal contrasts, using unique sums of squares, were conducted to compare the recognition accuracies of the groups. The first contrast found no difference in accuracy between the nonparanoid and paranoid schizophrenic groups, $t(65) = 1.11$, $p>.05$.

The second contrast compared the average performances of the schizophrenic groups (paranoid and nonparanoid), with the average performances of the control groups (normal and depressed). Figure

2 presents the average performances of the schizophrenic and control groups on the facial-affect recognition task. From Figure 2, the control groups appear to have performed more accurately, on average, than the schizophrenic groups. The difference between schizophrenic and control groups was significant, $t(65) = 3.49$, $p<.001$.

The final contrast found no difference in accuracy between the depressed and normal control groups, $t(65) = 1.03$, $p>.05$.

In summary, the only significant difference in facial-affect recognition among the four groups was that the control groups performed more accurately, on average, than the schizophrenic groups.

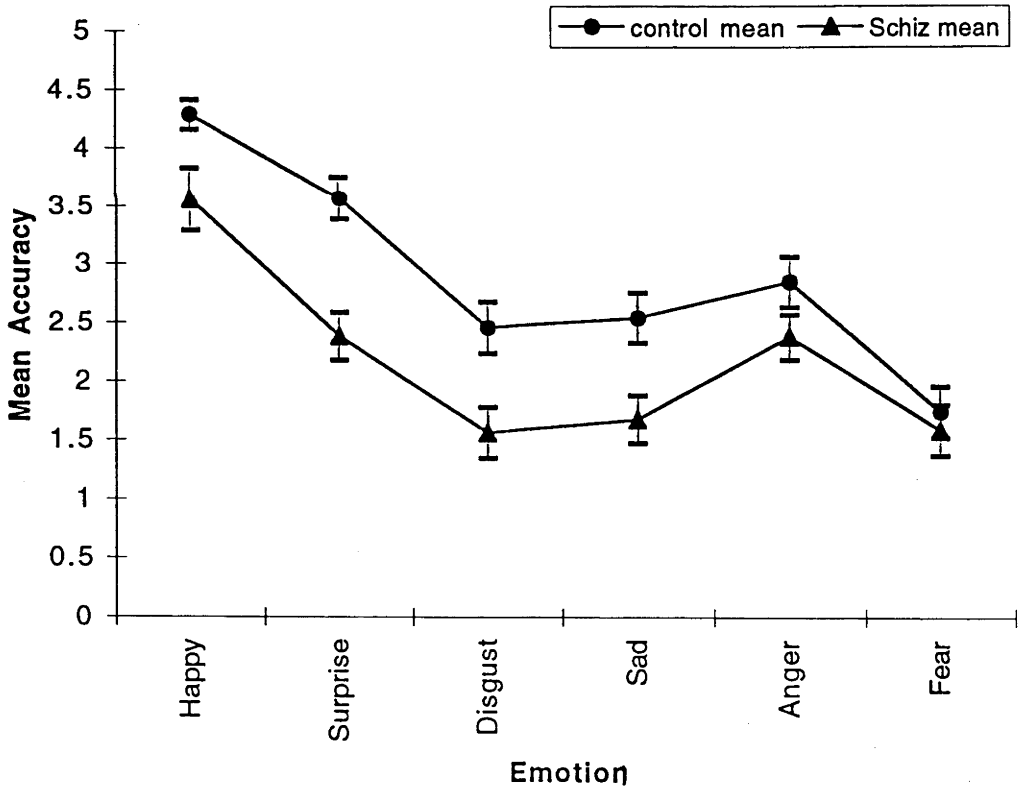

Figure 2 Mean Recognition Accuracies for the Control and Schizophrenic Groups on the Six Emotions.

Note: Error bars represent the standard error of the mean.

Chapter Four

DISCUSSION

The present research investigated facial-affect recognition by individual's with a diagnosis of schizophrenia. Previous research has suggested that schizophrenics have a deficit for recognising facial-affect, particularly for negative emotions. The present research aimed to determine whether the difficulties schizophrenics have with the recognition of negative emotions are part of a generalised poor performance in schizophrenia, or whether schizophrenics have a differential deficit for the recognition of negative emotions.

The current results are discussed in sections 4.1 to 4.3. Section 4.1 discusses the differential difficulties of recognising the six basic facially-displayed-affects. Section 4.2 discusses the differences between the diagnostic groups, and the lack of difference between the sexes, in facial-affect recognition. Section 4.3 argues that the differences found between the clinical groups can be explained by differences in difficulty for the emotion tasks.

The remaining sections present implications of the present results for theory (section 4.4), and treatment (section 4.5). A summary of conclusions is then presented (section 4.6) followed by suggestions for further research (section 4.7).

4.1 DIFFERENCES BETWEEN EMOTIONS IN FACIAL-AFFECT RECOGNITION

Hypothesis One predicted that negative emotions would be more difficult to recognise than positive emotions. This hypothesis is supported by the current results. In experiments one and two, positive emotions (happiness and surprise) were recognised with greater accuracy, on average, than negative emotions (disgust, sadness, anger, fear). This finding is consistent with previous research (Kline et al, 1993; Matsumoto, 1992; Mazurski & Bond, 1993; Morrison et al, 1988).

Hypothesis two predicted that happiness would be the least difficult emotion to recognise, whereas fear would be the most difficult to recognise. The expected order of accuracy for the emotions, from least to most difficult, was happiness, surprise, disgust, sadness, anger, and fear. This hypothesis is partially supported by the current results.

As predicted, happiness was the least difficult emotion to recognise for participants in experiments one and two. This finding is consistent with previous research (Gross & Ballif 1991; Matsumoto, 1992; Mazurski & Bond, 1993). As predicted, fear was the most difficult emotion to recognise for participants in experiments one and two. This finding is also consistent with previous research (Matsumoto, 1992; Mazurski & Bond, 1993).

The ease of recognition for the other emotions has not been clearly established in the literature. The current predictions were based on inter-rater agreements reported in Mazurski & Bond (1993) for the pictures of facial-affect used in the present research. Experiment one found that disgust was recognised more accurately than surprise by the undergraduate participants. This is not consistent with the inter-rater agreements reported in Mazurski & Bond. However, their reported mean inter-rater agreements for surprise (81.8%) and disgust (80.3%) did not differ greatly.

In experiment two, with normal and clinical participants, the predicted direction of results was found; surprise was recognised more accurately than disgust. This is consistent with the results of

Mazurski & Bond (1993) for their slides of facial affect. Mazurski & Bond also reported inter-rater agreements for slides in the Ekman & Friesen (1976) series (cited in Mazurski & Bond, 1993). For the Ekman & Friesen pictures, the average inter-rater agreement for surprise (90.2%) was greater than the inter-rater agreement for disgust (87.2%) (Mazurski & Bond, 1993). The consistency between the results of experiment two, the reported inter-rater agreements for Mazurski & Bond's pictures, and the reported inter-rater agreements for Ekman & Friesen's pictures suggests that surprise is less difficult to recognise than disgust. It is unclear why the opposite direction of results was found in experiment one. Further research is needed to investigate this inconsistency. Further research may determine whether the results of experiment one simply represented random statistical fluctuation, or whether differences in sample characteristics between experiment one and two may have affected the results.

Disgust was expected to be recognised with greater accuracy than sadness. The results of experiment one supported this prediction. This is consistent with Mazurski & Bond (1993) who found disgust (inter-rater agreement = 80.3%) was recognised more accurately than sadness (inter-rater agreement = 79.1%). Mazurski & Bond reported similar inter-rater agreements for the slides of Ekman & Friesen (1976). For the Ekman & Friesen pictures, disgust had an inter-rater agreement of 87.2%, which was higher than the inter-rater agreement for sadness (84.4%) (Mazurski & Bond,1993). In contrast, experiment two found no difference in recognition accuracy for disgust and sadness.

A possible explanation for the inconsistency between the results of experiments one and two is that experiment one used a homogenous group of participants, undergraduate university students, whereas experiment two used a heterogenous group of participants from normal and clinical populations. A homogenous group is expected to show less variation in their scores (evidenced by smaller standard deviations) than a heterogenous group (Runyon & Haber, 1988). Differences between scores are more likely to be significant if standard deviations are small. Therefore, a homogenous group is more likely to show significant differences between scores than a heterogenous group. This could explain why

a difference between disgust and sadness was found in the homogenous sample in experiment one, but no difference between the emotions was found in the heterogenous sample for experiment two. The sample in experiment one was similar to the sample used by Mazurski & Bond (1993) who also used undergraduate university students. This may explain the similarity in findings between Mazurski & Bond and experiment one.

Sadness was expected to be recognised with greater accuracy than Anger. The present results found no difference in accuracy for recognising sadness and anger. This is inconsistent with Mazurski & Bond (1993), who found sadness (inter-rater agreement = 79.1%) was recognised more accurately than anger (inter-rater agreement = 74.1%). However, this result is consistent with the inter-rater agreements reported by Mazurski & Bond for the Ekman & Friesen (1976) pictures. The inter-rater agreements reported by Mazurski & Bond for the Ekman & Friesen (1976) pictures, suggested that anger (inter-rater agreement = 85.0%) was not recognised more accurately than sadness (inter-rater agreement = 84.4%) (Mazurski & Bond,1993).

Anger was expected to be recognised with greater accuracy than fear. The results of experiments one and two supported this prediction. This is consistent with Mazurski & Bond (1993) who found anger (inter-rater agreement = 74.1%) was recognised more accurately than sadness (inter-rater agreement = 70.4%). The current result is also consistent with the inter-rater agreements reported by Mazurski & Bond for the Ekman & Friesen (1976) pictures.

In summary, the current results suggest that positive emotions are less difficult to recognise than negative emotions. In the current results happiness was the most accurately recognised emotion, followed by surprise. Disgust was the next most accurately recognised emotion, followed by sadness and anger, which did not differ in accuracy. Fear was the most difficult emotion to recognise by facial-affect. These results are mostly as expected, and are generally consistent with the previous literature.

4.2 DIFFERENCES BETWEEN GROUPS IN FACIAL-AFFECT RECOGNITION

4.2.1 Sex Differences in Facial-Affect Recognition

Experiment one found no sex differences in the recognition of facially-displayed-affect. This result supported hypothesis three: that males and females would not differ on emotion recognition. The current result is consistent with previous research that found overall ability to judge facial-affect was not different between the sexes (Erwin et al, 1992). However, other research found sex differences in facial-affect recognition, with females more accurate than males (Gessler et al, 1989; Hall 1978).

The current results did not find an interaction between sex of participant and emotion depicted. This showed that males and females did not differ in their order of recognition accuracy for the six emotions. This provided further evidence that the sexes did not differ in their recognition of facial-affect. The lack of sex differences on the facial-affect recognition task used in the current research, suggests that the greater number of male than female participants in experiment two would not have affected the generalisability of the results to both sexes.

4.2.2 Differences between Normals, Depressives, and Schizophrenics in Facial-Affect Recognition

Hypothesis four predicted that nonparanoid schizophrenics would perform less accurately than paranoid schizophrenics on the facial-affect recognition task. This hypothesis was not supported by the current results. The current research did not find a difference in performance accuracy between the paranoid and nonparanoid groups. This result is inconsistent with previous research that found nonparanoid schizophrenics were less accurate than paranoid schizophrenics on facial-affect recognition (Kline et al, 1993; Lewis & Garver, 1995).

Apart from differences in facial-affect recognition, previous research has also found that paranoid and nonparanoid

schizophrenics differ on a number of other variables. Paranoid schizophrenics have a later onset of illness and a better premorbid adjustment (as measured by a higher level of social competency and a higher incidence of marriage) than nonparanoids (Burack & Zigler, 1989 - cited in Nicholson & Neufeld, 1993). Paranoid symptoms have reduced faster, and to a more significant degree following diagnosis, than nonparanoid symptoms (Goldberg, Schooler, & Mattsson, 1967). Furthermore, there is evidence that paranoid schizophrenics have a better prognosis than nonparanoid schizophrenics (Kendler, Gruenberg, & Tsuang, 1984; Nicholson & Neufeld, 1993). This evidence led Nicholson & Neufeld to suggest that paranoid schizophrenia is a less severe form of the illness than nonparanoid schizophrenia.

Kline et al (1993) and Lewis & Garver (1995) have been the only previous research to compare the facial-affect recognition of paranoid and nonparanoid schizophrenics. For this reason, the inconsistency between the previous research and the current results could not be resolved by the current research. Further research is needed to determine whether or not paranoid and nonparanoid schizophrenics differ in their recognition of facial-affect along with their apparent differences on variables such as age of onset, course of illness, and prognosis.

Hypothesis five predicted that the schizophrenic samples (paranoid and nonparanoid) would perform less accurately than the control samples (normal and depressed) on the facial-affect recognition task. This hypothesis was supported by the current results. The current results are consistent with previous literature that found schizophrenics performed more poorly on facial-affect recognition than normals and depressives (Gessler et al, 1989; Persad & Polivy, 1993; Roland, et al, 1992; Rubinow & Post, 1992; Walker, et al, 1984).

Hypothesis six predicted that depressed participants would perform less accurately than normal participants on the facial-affect recognition task. This hypothesis was not supported by the current results which found no difference in performance accuracy between depressed and normal participants. The current result is inconsistent with previous research that found depressives were

less accurate than normals in facial-affect recognition (Feinberg et al, 1986; Gur et al, 1992; Mandal & Bhattacharya, 1985; Persad & Polivy, 1993; Rubinow & Post, 1992; Walker et al, 1984). However, the current results support research that reported no difference in facial-affect recognition between normals and depressives (Gessler et al, 1989; Gaebel & Wölwer, 1992; Smoller & Brosgole, 1993). Further research is necessary to resolve the inconsistencies in the literature regarding whether or not depressives have an emotion recognition deficit. This was not the purpose of the current research.

In summary, the only significant difference in facial-affect recognition among the four groups was that the control groups performed more accurately, on average, than the schizophrenic groups.

4.3 DIFFERENCES BETWEEN CLINICAL AND NONCLINICAL GROUPS IN FACIAL-AFFECT RECOGNITION EXPLAINED BY ITEM-DIFFICULTY

Hypothesis seven predicted that the differences in performance deficit among the normal, depressed, and schizophrenic groups would be as expected from the relative item difficulties of the six emotion-labelling tasks. This meant that the groups were not expected to differ in their relative performances, across the six emotion categories. Each group was expected to agree on the easiest emotion to recognise, and the most difficult to recognise. Furthermore, each group was expected to have an equivalent progression of accuracy on the emotion labelling tasks. There was not expected to be an interaction effect between participant group and emotion task. If an interaction effect was evident, it was expected to reflect a ceiling and/or a floor effect. This would show the groups' performance converging for very easy, and/or very difficult, items.

Hypothesis seven was supported by the present research. The group-by-emotion interaction effect was not significant. This provided evidence that the groups did not differ in their order of accuracy for recognition of the six emotions. The schizophrenic groups performed uniformly less accurately than the control groups

across the six emotion labelling tasks. There was no difference in the deficits between the control and schizophrenic groups for positive and negative emotions. The current results are consistent with Heimberg et al (1992) who found schizophrenics performed no differently on happy and sad discrimination tasks.

The current result, that there was no specific deficit for any emotion, is inconsistent, however, with research that has suggested schizophrenics have particular difficulty recognising negative, as opposed to positive, emotions (Anstadt & Krause, 1989; Bellack, Mueser, Wade, Sayers, & Morrison, 1992; Kline et al, 1993; Mueser, et al, 1993). However, with the exception of Kline et al, none of this research used all six basic emotions. Furthermore, although Kline et al included the six basic emotions in their facial-affect-recognition-task, they grouped the six emotions into positive (happiness and surprise) and negative (disgust, sadness, anger, and fear) for their data analysis. Kline et al, did not investigate the six emotions individually. The current research investigated all six basic emotions individually, along with comparing the positive and negative groups of emotions. This suggests that the current research has greater validity than previous research that did not separately analyse the six basic facially-displayed affects.

The current result, that schizophrenics performed universally poorly on the facial-affect recognition tasks, suggests that schizophrenics do not have a differential deficit for the recognition of negative emotions. Item difficulty (refer to section 1.2.4.5, page 27) can explain the inconsistency between the current research and previous research that has argued for a differential deficit in negative affect recognition in schizophrenia.

Section 1.2.4.5 presented an argument that differences in item difficulty, between positive and negative emotions, could explain the apparent differential deficit for negative emotion recognition that has been reported in previous research for schizophrenia. Because positive emotions are more easily recognised than negative emotions, it is argued that the lack of difference between a normal and a schizophrenic group, for positive emotion recognition, represents a ceiling effect. The positive emotions are very easy to recognise causing both normal and schizophrenic groups to

recognise them with similarly high accuracy. The negative emotions are argued to be more difficult to recognise, but not to the extent where both groups would show very low recognition-accuracy (or a floor effect). The negative emotions are expected to have fallen in the medium levels of item difficulty, causing a difference, between the schizophrenic and normal groups, for recognition accuracy (refer to section 1.2.4.5 for a more detailed explanation). Hence, the finding of previous research that schizophrenics showed a larger deficit from normal functioning in the recognition of negative than positive affect.

The current results did not find a differential deficit for positive or negative emotion recognition. This suggests that the current emotion-labelling task did not include extremely easy or extremely difficult items, which would have lead to a ceiling or a floor effect respectively.

The item-difficulty explanation can account for the current research, which did not find a differential deficit for negative emotions, as well as for previous research that has supported a negative-emotion recognition deficit in schizophrenia. This suggests that schizophrenics do not have particular difficulty recognising negative emotions. The current research suggests that the differential deficits between positive and negative emotion recognition, reported in previous research, are merely an artefact of differential item difficulties for recognising positive and negative emotions.

The current results support that, for facial-affect recognition, schizophrenics are a lower functioning group than normals. The pattern of deficits between normals and schizophrenics on the six emotion-labelling tasks shows that schizophrenics performed uniformly less accurately than normals. This suggests that differential deficits for negative-emotion recognition found in previous research are an artefact of item difficulty effects (such as ceiling and floor effects).

4.4 IMPLICATIONS FOR THEORY

The current research suggests that schizophrenics do not have a differential deficit for negative, compared with positive, emotions. Item difficulty is capable of explaining the current results, as well as previous results, that have supported a differential deficit for negative emotion recognition (refer to section 4.3, page 64). This suggests a redundancy in theories that have attempted to explain a differential deficit for negative emotion recognition in schizophrenia.

One theoretical explanation for the apparent difficulty schizophrenics have recognising negative emotions is that the deficit is part of a defence mechanism. Bellack, et al, (1992; refer to section 1.2.4.3, page 26) argued that a defence mechanism (conscious or unconscious), protects the schizophrenic against the stress caused by the perception of negative emotions in others. Another theoretical explanation by Kline et al (1993) is that the difficulty recognising negative emotions is not a general schizophrenic deficit, but is limited to the poorly organised emotional schema of nonparanoid schizophrenics (refer to section 1.2.4.4, page 26).

These theories can not explain the current research, which provides evidence supporting no differential deficits for the recognition of particular emotions. Furthermore, the theories explaining a differential deficit for negative emotion recognition appear redundant after consideration of the argument that item difficulty can explain the schizophrenic differential deficits, for negative emotion recognition, found by previous research (section 4.3, page 64).

The possible redundancy of the above theories suggests that theories seeking to explain the schizophrenic difficulty with emotion recognition do not need to differentiate between positive and negative emotions. Imitation theory (Lipps 1907 - cited in Walbott, 1991) is one example of a theory that could explain the schizophrenic difficulty with emotion recognition, but did not differentiate between positive and negative emotions. Imitation theory (Lipps 1907 - cited in Walbott, 1991) argues that people

imitate the expression they perceive, then attribute feelings to that expression from their prior self-perceptive experience. These feelings, or emotions, are then attributed to the other person. It is possible that flattened affect in schizophrenia limits the imitation of other's facial expressions, and therefore causes a difficulty in facial-affect recognition (refer to section 1.2.4.2, page 25). This theory has little supporting evidence, however, and is hindered by knowledge that not all schizophrenics have the symptom of flattened affect.

The current research also has implications of redundancy for theories that attempt to explain the schizophrenic deficit for facial-affect recognition *per se*. Previous research has suggested that schizophrenics do not have a differential deficit for facial-affect recognition, but that deficits in facial-affect recognition reflect a generalised poor performance for facial perception in schizophrenia (Feinberg, et al, 1986; Gessler, et al, 1989; Kerr & Neale, 1993). The research attempted to determine whether schizophrenics have a differential deficit for affect recognition by comparing their relative performances on a facial affect recognition task, and a non-affect control task matched for item difficulty. The inclusion of tasks matched on item difficulty meant that a differential deficit for facial-affect recognition would represent a unique difficulty for schizophrenics that could not be explained as an artefact of item-difficulty. However, this research found no differences between the facial affect recognition task, and the non-affect control task, matched for item difficulty. This suggests that deficits reported by other research for emotion-recognition in schizophrenia represents a generalised poor performance of schizophrenics, rather than a particular problem with affect-recognition.

Although the above studies controlled for item difficulty, they did not differentiate between the recognition of specific emotions. The research did not, therefore, eliminate the possibility that schizophrenics may have a differential deficit for recognising some emotions but not others. If there are differential deficits between schizophrenics and normals for the recognition of particular emotions, research that did not distinguish between the emotions would have been affected by this unexplained variability (refer to section 1.2.3.3, page 20).

The current research found no evidence for differential deficits between schizophrenics and normals for the recognition of particular emotions. This provides strong evidence that the difficulty of schizophrenics with facial-affect recognition represents a generalised poor performance in facial perception, rather than a specific deficit for emotion perception.

A possible explanation for generalised poor performance in facial recognition by schizophrenics is deficits in eye movement responses to visual stimuli, such as faces (Gordon, Coyle, Anderson, Healey, Cordaro, Latimer, & Meares, 1992). Eye movements and visual tracking influence attention for visual stimuli. To attend to visual information, an individual must be able to scan the stimuli for relevant details. Eye tracking dysfunction has been linked with schizophrenia in over eighty studies from around the world (Levy, Holzman, Matthysse, & Mendell, 1993).

Schizophrenic individuals have shown deficits in eye movement response to a facial stimulus (Gordon, Coyle, Anderson, Healey, Cordaro, Latimer, & Meares, 1992). A face was presented for ten seconds, and eye movements were recorded. They found that eye movement of schizophrenics, compared with normals, showed a reduced fixation duration to facial features (eyes, nose, and mouth) in the early stages (first three seconds) of processing a face. Another finding was that schizophrenic individuals had a significantly smaller number of overall fixations on the face than normal controls. These findings suggest impaired attention to, and subsequent processing of, facial stimuli by schizophrenics.

Neuropsychology can also help to explain the deficits in facial perception that seem to be associated with schizophrenia. Neuropsychological research suggests that facial-affect recognition is a cognitive process distinct from generalised impairments in facial perception (Ross, 1981; Humphreys, et al, 1993; refer to section 1.2.4.1, page 23). This suggests that an individual could experience deficits in facial-affect recognition without general deficits in facial perception, and vice versa. The majority of research that controlled for the effects of item-difficulty has not found a differential deficit for facial-affect recognition, over general

face-perception, in schizophrenia. This suggests that although affect and non-affect face perception have distinct cognitive processes, schizophrenia seems to be associated with deficits in both areas. Therefore, in schizophrenia, it seems that a more generalised attention and perceptual mechanism is responsible for problems in facial-affect recognition and face perception.

Further research based on a single-case-study design is necessary to determine whether any individuals with schizophrenia have impaired facial-affect perception without concurrent impairments in general face perception. This would show a differential deficit for affect recognition, and would suggest that affect recognition deficits in schizophrenia were not necessarily caused by a generalised perceptual deficit.

In summary, main implication for theory of the current research is that item difficulty can explain the apparent differential deficit for recognition of negative emotions in schizophrenia. Furthermore, the current research supports the explanation of previous research that the apparent differential deficit for emotion-recognition in schizophrenia can be explained by differential item-difficulties. The current research supports the explanation that generalised poor performance in schizophrenia for face perception is linked to the deficits in facial-affect recognition. These deficits of facial perception could be explained by schizophrenic deficits in attention and eye movement responses to visual stimuli.

4.5 TREATMENT IMPLICATIONS

The previous section (4.4) argued that problems with facial-affect recognition do not represent a differential deficit for schizophrenia, but are better explained by deficits in facial, or visual, perception and attention. However, schizophrenics have consistently shown problems in facial-affect recognition (Feinberg, et al, 1986; Gessler, et al, 1989; Morrison, et al, 1988; Persad & Polivy, 1993; Roland, et al, 1992; Rubinow & Post, 1992; Walker, et al, 1984). Although deficits in facial-affect recognition may be caused by a more fundamental underlying deficit in visual perception, it remains likely that the facial-affect recognition deficit may still cause unique problems for schizophrenics in social situations.

A deficit that causes problems for many schizophrenics in social situations should have implications for treatment. Understanding the origins of the problem helps to guide future treatment strategies. The current research suggests that facial-affect recognition deficits are likely to be the effects of more general deficits in visual perception and attention. Therefore, treatment could be based purely on emotion recognition, or treatment may aim to target the underlying common deficit between emotion recognition and other deficits in social function.

Brenner, Hodel, Roder, & Corrigan (1992) presented a model of cognitive and social dysfunction in schizophrenia. They argued that elementary cognitive dysfunctions (such as of attention) lead to more complex cognitive dysfunctions (such as of concept formation). These cognitive dysfunctions are argued to cause dysfunctions in social skills. Brenner et al argued that treatment for schizophrenics must address the underlying cognitive dysfunction along with the associated social dysfunction.

Hodel & Brenner (1994) reported evidence that improvements of the underlying cognitive functions alone did not appear to affect the subsequent social skills. It seems necessary to combine treatment of cognitive functions with social skills training to achieve improvements in both areas. This suggests that treatment for deficits in facial-affect recognition requires two levels of intervention. The first level would address the underlying deficit in visual perception and attention. The second level would focus on facial-perception, and more specifically, facial-affect perception. The current research supports such a combined approach to the treatment of the facial-affect recognition deficit in schizophrenia.

Morrison et al (1988) suggested that treatment specific to facial-affect perception could initially involve recognition-training with pictures of facial-affect (such as those used in the current research). They suggested the treatment could then progress to participation in role-played social interactions where emphasis is on the recognition of emotion-cues. This intervention focused on progressively improving facial-affect recognition in increasingly ecologically valid contexts.

Further research could determine the effectiveness of an affect-specific intervention, in combination with an intervention aimed at improving the attention and perceptual dysfunctions that appeared to underlie deficits in facial-affect recognition.

4.6 CONCLUSIONS

The current results allowed the conclusion that positive emotions are less difficult to recognise than negative emotions. The current study found that happiness was the most accurately recognised emotion, followed by surprise. Disgust was the next most accurately recognised emotion followed by sadness and anger, which did not differ in accuracy. Fear was the most difficult emotion to recognise by facial-affect.

The present research investigated the recognition of facial-affect by individuals with a diagnosis of schizophrenia. The current results support that schizophrenics are a lower functioning group than depressives and normals for facial-affect recognition. The pattern of deficits between normals, depressives, and schizophrenics on the six emotion-labelling tasks shows that schizophrenics performed uniformly less accurately than depressives and normals.

Previous research has suggested that schizophrenics have a deficit for recognising facial-affect, particularly for negative emotions. The present research concludes that schizophrenics do not have a differential deficit for the recognition of negative emotions. Furthermore, previous research that has suggested a differential deficit can easily be explained by effects of item-difficulty (in particular, ceiling effects for positive-emotion recognition).

The main implication for theory of current research is that item difficulty can explain the apparent differential deficit for recognition of negative emotions in schizophrenia. Furthermore, the current research supports the explanation that generalised poor performance for visual perception and attention in schizophrenia is underlying their deficits in facial-affect recognition. These deficits of facial perception could be explained by schizophrenic deficits in attention and eye movement responses to visual stimuli.

Together, these conclusions suggest that treatment for the facial-affect recognition deficit in schizophrenia should combine an affect-specific intervention with an intervention aimed at improving the attention and perceptual dysfunctions that appear to underlie deficits in facial-affect recognition.

A possible flaw with the current research is that the clinical samples were medicated. It was not possible to access an unmedicated sample, nor to access details of the current samples' medication. However, this is not expected to have had a strong influence on the current results since Lewis & Garver (1995) found that medication did not affect the facial-affect recognition performance of paranoid and nonparanoid schizophrenics.

4.7 IMPLICATIONS FOR FURTHER RESEARCH

From the current results, and the previous literature, it is unclear whether or not surprise is generally less difficult to recognise than disgust. Further research is needed to investigate this.

Further research is also needed to determine whether or not paranoid and nonparanoid schizophrenics differ in their recognition of facial-affect. Kline et al (1993) and Lewis and Garver (1995) is the only previous research to investigate differences between paranoid and nonparanoid schizophrenics on facial-affect recognition. They found that paranoid schizophrenics performed more accurately than nonparanoids for the recognition of negative affect. The current research found no difference in facial affect recognition between paranoid and nonparanoid schizophrenics. The inconsistency between the studies in this area suggests the need for further investigation.

If future research found that paranoid schizophrenics perform more accurately than nonparanoids for facial-affect recognition, the current study suggests this would be due to a generalised deficit in nonparanoids for visual perception and attention. Paranoids would also have deficits in this area, however nonparanoids would show a greater deficit. This would be consistent with the differences between paranoids and nonparanoids on other variables (such as

age of onset, course of illness, and prognosis) where paranoids appear to have less severe difficulties than nonparanoids.

Irrespective of whether paranoid and nonparanoid schizophrenics differ in their facial-affect recognition deficits, both groups displayed a need for treatment in this area. Future research could determine the effectiveness of an affect-specific intervention, in combination with an intervention aimed at improving the attention and perceptual dysfunctions that appear to underlie deficits in facial-affect recognition.

It is not conclusively established, however, that attention and perceptual dysfunctions are the basis of facial-affect recognition deficits in schizophrenia. Further research based on a single-case-study design is necessary to determine whether any individuals with schizophrenia have impaired facial-affect perception without concurrent impairments in general face perception. This would show a differential deficit for affect recognition, and would suggest that affect recognition deficits in schizophrenia are not necessarily caused by a generalised perceptual deficit. However, the available evidence suggests that more generalised impairments are responsible for the facial-affect recognition deficit in schizophrenia.

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Appendix A

THE SELECTION OF SLIDES USED FOR THE PRESENT STUDY

(FROM THE SERIES OF SLIDES REPORTED BY MAZURSKI & BOND, 1993)

1. Anger

The mean inter-rater agreement for the 20 anger slides (adult models) reported by Mazurski & Bond was 72.05% (standard deviation = 9.928). The mean inter-rater agreement for the five anger slides chosen for the present study was 72.4% (standard deviation = 3.78).

2. Disgust

The mean inter-rater agreement for the 20 disgust slides (adult models) reported by Mazurski & Bond was 80.6% (standard deviation = 13.36). The mean inter-rater agreement for the five disgust slides chosen for the present study was 81.2% (standard deviation = 4.15).

3. Fear

The mean inter-rater agreement for the 7 fear slides (adult models) reported by Mazurski & Bond was 64.6% (standard deviation = 8.58). The mean inter-rater agreement for the five fear slides chosen for the present study was 65.4% (standard deviation = 9.29).

4. Happy

The mean inter-rater agreement for the 20 happy slides (adult models) reported by Mazurski & Bond was 92.95% (standard deviation = 8.25). The mean inter-rater agreement for the five happy slides chosen for the present study was 91.8% (standard deviation = 2.95).

5. Sad

The mean inter-rater agreement for the 11 sad slides (adult models) reported by Mazurski & Bond was 78.7% (standard deviation = 11.07). The mean inter-rater agreement for the five sad slides chosen for the present study was 78.8% (standard deviation = 5.07).

6. Surprise

The mean inter-rater agreement for the 20 surprise slides (adult models) reported by Mazurski & Bond was 80.6% (standard deviation = 15.16). The mean inter-rater agreement for the five anger slides chosen for the present study was 82.6% (standard deviation = 8.01).

The 30 slides used for the present study are presented below (from Mazurski & Bond, 1993):

Emotion	Slide Number	Model Number To Camera	Orientation of Face	Inter-Rater Agreement (%)
Anger	1015	MA2	Towards	72
Anger	26	MA1	Towards	75
Anger	249	MA5	Towards	66
Anger	70	FA2	Away	74
Anger	89	FA3	Towards	75
Disgust	1025	MA2	Away	79
Disgust	237	MA4	Towards	88
Disgust	96	FA3	Away	81
Disgust	147	FA5	Towards	81
Disgust	19	FA1	Away	77
Fear	163	MA2	Towards	74
Fear	183	MA3	Towards	74
Fear	231	MA4	Towards	59
Fear	12	FA1	Towards	53
Fear	13	FA1	Away	67
Happy	175	MA3	Towards	91
Happy	245	MA5	Towards	93
Happy	154	MA2	Away	88
Happy	85	FA3	Towards	91
Happy	116	FA4	Away	96
Sad	1023	MA2	Towards	84
Sad	234	MA4	Away	78
Sad	33	MA1	Away	73
Sad	16	FA1	Towards	84
Sad	94	FA3	Away	75
Surprise	255	MA5	Towards	89
Surprise	1009	MA3	Towards	70
Surprise	124	FA4	Towards	83
Surprise	15	FA1	Away	81
Surprise	77	FA2	Towards	90

Notes:

M = Male; F = Female; A = Adult

Appendix B

DSM-IV DIAGNOSTIC CRITERIA FOR MAJOR DEPRESSIVE EPISODE

DSM-IV Criteria For Major Depressive Episode (American Psychiatric Association, 1994)

A. Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning: at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.

Note: Do not include symptoms that are clearly due to a general medical condition, or mood-incongruent delusions or hallucinations.

(1) depressed mood most of the day, nearly every day, as indicated by either subjective report (eg feels sad or empty) or observation made by others (eg appears tearful). Note: In children and adolescents, can by irritable mood.

(2) markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)

(3) significant weight loss when not dieting or weight gain (eg a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. Note: In children, consider the failure to make expected weight gains.

(4) insomnia or hypersomnia nearly every day

(5) psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)

(6) fatigue or loss of energy nearly every day

(7) feelings of worthlessness or excessive inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)

(8) diminished ability to think or concentrate, or indecisiveness, nearly every day (either subjective account or as observed by others)

(9) recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide

B. The symptoms do not meet criteria for a Mixed Episode

C. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

D. The symptoms are not due to the direct physiological effects of a substance (eg a drug or abuse, a medication) or a general medical condition (eg hyperthyroidism).

E. The symptoms are not better accounted for by Bereavement, ie after the loss of a loved one, the symptoms persist for longer than 2 months or are characterised by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation.

Appendix C

THE MAINE SCALE OF PARANOID AND NONPARANOID SCHIZOPHRENIA

(FROM MAGARO, ABRAMS, & CANTRELL, 1981)

PARANOID SUBSCALE (From Magaro, Abrams, & Cantrell, 1981)

P1 Does he (sic) tend to suspect or believe on slight evidence or without good reason that people and external forces are trying to or now do influence his behaviour, control his thinking?

1. No unjustified suspicions.
2. Will admit suspicion when pressed.
3. Easily admits suspicion.
4. Openly states others are trying to control him.
5. Has firm convictions that he is influenced or controlled.

P2 Does he tend to suspect or believe on slight evidence or without good reason that some people are against him (persecuting, conspiring, cheating, depriving, punishing) in various ways?

1. No unjustified suspicions.
2. When pressed expressed belief he is conspired against.
3. Frequently inclined to suspect.
4. Frank inclination to believe in persecution.
5. Strongly expresses conviction of persecution.

P3 Does he have an exaggeratedly high opinion of himself or an unjustified belief or conviction of having unusual ability, knowledge, power ,wealth or status?

1.No expressed high opinion of himself.
2. When pressed expresses a high opinion of himself.
3. Frequently expressed expresses high opinion of himself.
4. Open conviction of unusual power, wealth, etc.
5. Strongly expresses conviction of grandiose or fantastic power, wealth, etc.

P4 Does he tend to suspect or believe on slight evidence or without good reason that some people talk about, refer to or watch him?

1. No unjustified suspicions.
2. Will admit suspicion.
3. Easily admits suspicion.
4. Openly states others that he is being watched.
5. Has firm convictions of being watched.

P5 Compared to others how openly hostile is he? Does he show hostility or a high degree of ill will, resentment, bitterness or hate?

1. No open hostility.
2. Relatively little hostility.
3. Some hostility.
4. Rather hostile.
5. Very hostile.

NONPARANOID SUBSCALE (From Magaro, Abrams, & Cantrell, 1981)

N1 Does he (sic) have perceptions (auditory, visual) without normal external stimulus correspondence?

1. None.
2. When pressed admits hallucinations.
3. Easily admits hallucinations.
4. Openly admits frequent hallucinations.
5. Openly hallucinates.

N2 On the basis of the integration of the verbal productions of the patient, does he exhibit thought processes which are confused, disconnected or disorganised?

1. As normal.
2. Slight disorganisation.
3. Mild disorganisation.
4. Marked disorganisation.
5. Complete disorganisation.

N3 How incongruous are his emotional responses? eg giggling or crying for no apparent reason or not showing any emotion when emotion would be appropriately shown.

1. As normal.
2. Slightly different from normal.
3. Responses somewhat incongruous.
4. Distinctly incongruous.
5. Very markedly incongruous.

N4 How well oriented is he as to time? For instance, does he know (a) the season; (b) the month; (c) the calendar year: (d) the day of the week; (e) how long he has been in hospital?

1. As normal.
2. Occasional confusion.
3. Slight confusion.
4. Frequent confusion.
5. Marked continuous confusion.

N5 Does he assume or maintain peculiar, unnatural, or bizarre postures?

1. None.
2. On rare occasions.
3. For short periods.
4. Frequently.
5. All the time.

Appendix D

THE BRIEF PSYCHIATRIC RATING SCALE (BPRS) (OVERALL & GORHAM, 1962)

(AS USED IN BELL, MILSTEIN, BEAM-GOULET, LYSAKER, & CICCHETTI, 1992)

Brief Psychiatric Rating Scale

Each symptom is rated on the following scale:
1 = Not Present, 2 = Very Mild, 3 = Mild, 4 = Moderate,
5 = Moderately Severe, 6=Severe, 7 = Extremely Severe

1. SOMATIC CONCERN - Degree of concern over present bodily health. Rate the degree to which physical health is perceived as a problem by the patient, whether complaints have realistic basis or not.
2. ANXIETY - worry, fear, or over-concern for present or future. Rate solely on the basis of verbal report of patient's own subjective experiences. Do not infer anxiety from physical signs or from neurotic defence mechanisms.
3 EMOTIONAL WITHDRAWAL - Deficiency in relating to the interviewer and the interview situation. Rate only degree to which the patient give the impression of failing to be in emotional contact with other people in the interview situation.
4. CONCEPTUAL DISORGANISATION - Degree to which the thought processes are confused, disconnected or disorganised. Rate on the basis of integration of the verbal products of the patient; Do not rate on the basis of the patient's subjective level of his own level of functioning.
5 GUILT FEELINGS - Over concern or remorse for past behaviour. Rate on the basis of the patient's subjective experiences of guilt as evidenced by verbal report with appropriate affect; Do not infer guilt feelings from depression, anxiety, or neurotic defences.
6 TENSION - Physical and motor manifestations of tension, "nervousness", and heightened activation level. Tension should be rated solely on the basis of physical signs and motor behaviour and not on the basis of subjective experiences of tension as reported by the patient.
7. MANNERISMS AND POSTURING - Unusual and unnatural motor behaviour, the type of motor behaviour which causes certain mental health patients to stand out in a crowd of normal people. Rate only abnormality of movements; Do not rate simple heightened motor activity here.
8. GRANDIOSITY - Exaggerated self-opinion conviction of unusual ability or powers. Rate only on the basis of patients statements about himself (sic) or self-in-relation-to -others, not on the basis of his demeanour in the interview situation.
9. DEPRESSIVE MOOD - despondency in mood, sadness. Rate only degree of despondency; Do not rate on the basis of inferences concerning depression based upon general retardation and somatic complaints.

10. HOSTILITY - Animosity, contempt, belligerence, disdain for other people outside the interview situation. Rate solely on the basis of the verbal report of feelings and actions of the patient toward others; Do not infer hostility from neurotic defences, anxiety, nor somatic complaints. (Rate attitude toward interviewer under "Uncooperativeness").
11. SUSPICIOUSNESS - Belief (delusional or otherwise) that others have now, or have had in the past, malicious or discriminatory intent toward the patient. On the basis of verbal report, rate only those suspicions which are currently held whether they concern past or present circumstances.
12. HALLUCINATORY BEHAVIOUR - Perceptions without normal perceptual stimulus correspondence. Rate only those experiences which are reported to have occurred within the last week and which are described as distinctly different from the though and imagery processes of normal people.
13. MOTOR RETARDATION - Reduction in energy level evidenced in slow movements and speech, reduced body tone, decreased number of movements. Rate on the basis of observed behaviour of the patient only; Do not rate on basis of patients subjective impression of own energy level.
14. UNCOOPERATIVENESS - Evidences of resistance, unfriendliness, resentment, and lack of readiness to cooperate with the interviewer. Rate only on the basis of the patients attitude and responses to the interviewer and the interview situation; Do not rate on basis of reported resentment or uncooperativeness outside the interview situation.
15. UNUSUAL THOUGHT CONTENT - Unusual, odd, or bizarre thought content. Rate here the degree of unusualness, not the degree of disorganisation of though processes.
16. BLUNTED AFFECT - Reduced emotional tone, apparent lack of normal feeling or involvement.
17. DISORIENTATION - Rate degree of confusion to person, place or time. For instance, does the patient know (a) the season; (b) the month; (c) the calendar year: (d) the day of the week; (e) how long he has been in hospital?
18. EXCITEMENT - Heightened emotional tone, increased reactivity, impulsivity. Rate on the basis of observations of the patient; Do not rate on the basis of the patients subjective verbal reports of excitement.