Referential Delusions of Communication and Projection of Self-Perceived Negative Traits

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Doctor of Clinical Psychology

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Declaration

I hereby certify that the work embodied in this thesis is the result of original research and has not been submitted for a university degree or other similar qualification to any other University or Institution.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University library**, being made available for loan and photocopying subject to the provisions of the Copyright Act 1968.

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# Table of Contents

Declaration........................................................................................................... ii
Acknowledgements............................................................................................ iii
Table of Contents............................................................................................... iv
List of Tables ....................................................................................................... v
List of Figures ...................................................................................................... vi
Abstract .............................................................................................................. vi

## Introduction

- Single-symptom research ................................................................. 1
  - Delusions as a candidate for single-symptom research ............. 5
- Definitions of delusions of reference ............................................. 6
- Prevalence of delusions of reference .................................................. 6
- Differentiating delusions of reference ............................................... 7
- A two-factor model of referential delusions of communication .... 8
  - Preliminary support for the Startup et al. (2009) two-factor model 9
- Delusions, emotion, negative self-schemas, and poor self-esteem... 11
- Affective processes .............................................................................. 13
- Self-esteem ......................................................................................... 14
- Recall biases ....................................................................................... 18
- Investigating self-concept ................................................................. 22
- The self-referent incidental recall task (SRIPT) ......................... 23
- Thought suppression ........................................................................... 24
- Defensive projection ........................................................................... 28
- Social dysfunction .............................................................................. 31
- Summary of the literature ................................................................. 32
- General design of the study ............................................................... 33
- Aim and Hypotheses ........................................................................... 34

## Method

- Participants ............................................................................................ 35
- Characteristics of the sample .............................................................. 36
- Materials .............................................................................................. 38
  - Demographic measures ............................................................... 38
  - Cognitive functioning ................................................................. 38
  - Clinical measures ......................................................................... 39
  - Auditory verbal hallucinations .................................................... 39
  - Delusions of communication ....................................................... 40
- Self-Referent Incidental Recall Task (SRIPT) ................................ 41
  - Gesture interpretation task – pilot testing: stimulus selection ... 42
  - Gesture interpretation task – main study .................................... 44
- Procedure ............................................................................................ 46
Task description ........................................................................................................ 47
Equipment ............................................................................................................... 47
Statistical analysis .................................................................................................. 48

Results ...................................................................................................................... 51
Assessor agreement ................................................................................................. 51
Logistic regression analyses ................................................................................... 55
Negative self-esteem: endorsed negative SRIRT words ........................................ 56
Gesture interpretation errors: total errors ............................................................... 58
Erroneous perception of the presence of gestures .................................................. 61
Negative interpretations ......................................................................................... 65
The influence of endorsed negative traits on errors ................................................. 67
Suppressor effects .................................................................................................... 68

Discussion ............................................................................................................... 70
Results from the SRIRT .......................................................................................... 71
Negative self-schemas: number of endorsed negative SRIRT words ..................... 72
Total errors: the interpretation of gestures ............................................................ 74
Negative interpretations ......................................................................................... 76
Auditory verbal hallucinations ................................................................................. 77
Anxiety ...................................................................................................................... 80
The influence of IQ .................................................................................................. 83
Number of admissions ............................................................................................. 85
Age ........................................................................................................................... 85
Depression ............................................................................................................... 86
Projection of unwanted thoughts ............................................................................. 88
Defence .................................................................................................................... 89
Startup et al. 2009 theoretical model ...................................................................... 90
Strengths .................................................................................................................. 90
Limitations ................................................................................................................ 91
Under-representation of delusions of communication .............................................. 91
Single-symptom research ......................................................................................... 93
Implications .............................................................................................................. 94
Anxiety ..................................................................................................................... 94
Social ....................................................................................................................... 96
Attributions .............................................................................................................. 96
Future Directions ..................................................................................................... 97
Attribution ............................................................................................................... 97
Self-concept ............................................................................................................. 98
Social ...................................................................................................................... 99

Conclusion ............................................................................................................. 99

References .............................................................................................................. 102

Appendices ............................................................................................................ 123
List of Tables

Table 1  *Participant demographics*  

Table 2  *Pilot data: participants’ gesture likelihood scores on the trial gestures and incidental movements*  

Table 3  *Intraclass correlations between assessor ratings for individual SAPS, RDRS, and BPRS-E items*  

Table 4  *Mean (M) and Standard Deviation (SD) for endorsed, non-endorsed, and recalled SRIRT words*  

Table 5  *Mean (M) and Standard Deviation (SD) of errors on the Gesture Interpretation Task (GIT)*  

Table 6  *Final model for endorsed negative SRIRT words on the gesture interpretation task*  

Table 7  *Final model for total errors on the gesture interpretation task*  

Table 8  *Final model for errors whereby non-gestures were interpreted as gestures or SRIRT words on the gesture interpretation task.*  

Table 9  *Final model for total errors as negative SRIRT words on the gesture interpretation task*  

Table 10  *Final model for total errors as negative SRIRT words on the gesture interpretation task with the addition of the interaction between delusions of communication and endorsed negative SRIRT words.*  

Table 11  *Analyses comparing the inclusion of anxiety to analyses without anxiety*
List of Figures

Figure 1. Total Errors and the interaction between DoC and AH  

Figure 2. Non-gestures seen as gestures or SRI RT words and the interaction between DoC and AH
Abstract

Single-symptom research has resulted in valuable contributions to our understanding of psychotic symptoms. Despite a high rate of occurrence, it remains that relatively little research has been undertaken in the area of delusions of reference. One kind of delusion of reference, known as delusions of communication (DoC), involves mistaken beliefs that others are communicating with the self in subtle and mysterious ways. Preliminary evidence suggests that these delusions are similar to auditory verbal hallucinations (AVH) in that what seems to be communicated concerns the self and originates from the self, although the origin is not recognised but attributed externally, though in the case of DoC the impairments in reality discrimination occur for non-verbal material. However, no direct evidence has been provided so far that it is the patients’ unwanted thoughts about themselves that are externalised. It was anticipated that the current research would provide direct evidence that people with DoC perceive their own implicit and explicit self-evaluations as being communicated to them through gestures. It was hypothesised that people with DoC would be more likely to perceive a gesture as present when it was not, that they would make more negative interpretations of gestures, and that negative interpretations made by people with DoC would be more likely if they had endorsed negative traits as self-descriptive. It was also anticipated that negative interpretations would be more likely to be made by people with DoC if they had both endorsed and recalled negative self-descriptive traits. It was hypothesised that people with DoC would be most likely to make negative interpretations of gestures if they had recalled negative traits, however had not endorsed these traits as self-descriptive previously. Patients between the ages of 18 and 60 on the wards of psychiatric inpatient facilities were recruited for the study. The
Self Referential Incidental Recall Task (SRIRT) was used to identify traits that participants either perceived as applying to themselves, or feared could apply to them. Video clips were presented to test errors of gesture interpretation. Error rates were analysed with generalised linear models with a binomial distribution and a logit link function with severity ratings as predictors. Age, gender, age at onset, number of hospital admissions, acuity, and IQ were entered as covariates. Contrary to the hypotheses, severity of DoC was not an independent predictor, though it did enter into two highly significant interactions with AVH. When both hallucinations and delusions were severe, the rate of total errors and of errors in which non-gestures were seen as gestures or SRIRT words, was greatly increased. Covariates that were predictive of errors were anxiety, number of hospital admissions, lower levels of depression, and lower IQ scores. The strengths, limitations, and implications of the research results are discussed, along with future directions.
Referential delusions of communication and projection of self-perceived negative traits.

Psychosis and the processes that contribute to it are complex and multi-dimensional (Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001; Garety, Bebbington, Fowler, Freeman, & Kuipers, 2007). A variety of theories have attempted to account for the development and maintenance of psychosis, with a large body of research supporting the view that psychotic symptoms such as delusions and hallucinations fundamentally involve judgements about the self, others, and the social world (Garety et al., 2007).

Single-symptom research

Scientific investigation into psychotic disorders has often encountered problems due to the heterogeneity of symptom presentation and outcomes, thus hindering the progress of research (Garety et al., 2007). Much of the research in social functioning and the interpretation of social information focuses on persecutory delusions, or on ‘paranoia’, which may be undefined or the criteria may differ across studies. Some of the research into delusions clearly considers delusions of reference as separate to paranoid, persecutory or other delusion sub-types (Bentall & Kaney, 1996; Freeman, 2007; Startup & Startup, 2005), whereas in some studies persecutory delusions or paranoia are grouped together with other symptoms such as delusions of reference (e.g. Frith & Corcoran, 1996; Russell et al., 2006). Research also indicates variations in processes such as onset, maintenance, and expression of different individual symptoms. It is clear that inconsistencies exist across studies. These points necessitate the study of individual psychotic symptoms in order to elucidate factors involved in the emergence and maintenance of psychosis (Freeman & Garety, 2000).
Previous single-symptom research has resulted in valuable contributions to our understanding of psychotic symptoms (Blakemore, 2003; David, 2004; Startup & Startup, 2005). It is predicted that a better understanding of the mechanisms that underlie specific delusions will lead to more effective psychological interventions for psychotic disorders and symptoms (Freeman & Garety, 2003). Despite a high rate of occurrence, it remains that relatively little research has been undertaken in the area of delusions of reference (American Psychiatric Association, 2000; Bentall, 2001; Startup & Startup, 2005). Furthermore, until Startup and Startup’s (2005) study, no research into delusions of reference as a single symptom existed. In their investigation, Startup and Startup (2005) were able to reliably identify different kinds of delusions of reference.

Ben-Zeev and his colleagues (Ben-Zeev, Morris, Swendsen, & Granholm, 2011) proposed that investigating delusion subtypes as a unitary phenomenon, is likely to obstruct the development of well informed research and treatment through lack of specificity needed for obtaining the most accurate information about symptoms. Persons (1986) has been one of the predominant figures who has argued for the important advantages of single-symptom research over the study of diagnostic categories. She lists six main benefits of this approach. Firstly, it avoids the misclassification of participants, which is a potential problem in diagnostically-driven research designs. The approach allows for the study of specific phenomena that may not be diagnosis specific, and the isolation of individual components of pathological presentations. Persons (1986) further argues that single symptom research allows for the consideration of clinical manifestations (symptoms) falling along a continuum with non-clinical phenomena, facilitates the refinement of diagnostic classification systems, and contributes to ongoing theory development.
The heterogeneity of schizophrenia and other psychotic disorders and the sometimes-episodic presence of particular symptoms in these syndromes are some of the reasons offered by Persons (1986) when she addresses the misclassification of participants in diagnosis-driven research designs. Categorising study participants by diagnosis may provide testable hypotheses about the diagnosis, but not about specific symptoms per se. Furthermore, it may not account for the diagnostic category, or the interaction between the diagnostic category and specific symptoms. It is well-known that the presence of delusions, for example, is not confined simply to schizophrenia spectrum disorders. In addition, diagnostic categorisation does not differentiate between participants with or without particular symptoms, and makes hypothesising about the underlying mechanisms that account for the diagnoses and diagnostic anomalies broader and more difficult. The single-symptom method provides clearer, more plausible, and readily testable ways in which more elaborate and specific links and inter-relationships between phenomena or symptoms can be distinguished (Person's, 1986). Such procedures can facilitate enhanced psychological theory development.

Persons’ (1986) reasoning also reveals some of the potential explanations for the limited investigation into delusions of reference in particular, in that diagnoses and their subtypes, such as paranoid schizophrenia, have dominated the research. That is, emphasis on the study of diagnostic categories has meant that symptoms such as delusions of reference, and subsequently delusions of communication, are not yet well researched. In order to be interested in diagnoses, it is important that we are also interested in symptoms. It follows that an increased knowledge of the latter will inform our understanding of the former.

In addition, the study of single symptoms may also have been impeded by the previous lack of assessment tools targeting these symptoms. Further development
of such measures is likely to improve the specificity and distinctive characteristics of the phenomena being studied (Person’s, 1986). Persons (1986) furthers her argument with the observation that the chance of a Type II error is increased with the use of diagnostically-categorised study designs. For example, people with schizophrenia may not all experience the specific symptom of interest, and conversely people in the control group may experience the symptom in question. Single-symptom research may partially address some of the difficulties comparing people with and without schizophrenia, which can be problematic because of the common severe, generalised impairment associated with schizophrenia.

Persons’ (1986) discussion of single-symptom research takes into account the view that psychological symptoms sit along a continuum with non-clinical phenomena. She postulates that this method allows for a broader theoretical framework for psychological processes, for example, the notion that the processes underlying specific anomalies in schizophrenia are similar or the same as those that underlie these anomalies in other populations. The single symptom approach can more readily address this area of empirical investigation. Examining single symptoms can also add to the clarification of psychiatric classification by providing more precise diagnostic boundaries, and it can contribute to understanding the nature of underlying pathological processes. In turn, elucidating underlying symptoms may add to the ability to differentiate between diagnoses.

Persons (1986) qualifies that she is not suggesting that single-symptoms studies are the only valid method of scientific investigation, nor the panacea for the problems encountered in diagnostically-based research. Rather, she suggests that when examining the factors underlying symptoms and diagnostic categories, single symptom research may provide more accurate or specific information in a number of ways, and
it is important that these advantages are recognised both in research into psychosis, and for other diagnostic categories.

**Delusions as a candidate for single-symptom research**

Delusions are considered one of the more central and distinctive features of schizophrenia and other psychotic disorders (Andreasen & Olsen, 1982; DSM-IV-TR, American Psychiatric Association, 2000). They are false beliefs, held with a high degree of conviction despite evidence to the contrary, which are inconsistent with cultural beliefs or norms (APA, 2007; Bentall, 2001; DSM-IV, APA, 2000). They are often of a personal nature, and commonly involve the misinterpretation of experiences or perceptions. It is only in recent years that delusions and the mechanisms that underlie them began to attract increased research interest (Bentall, 2001). The surge in interest in this area has prompted various lines of investigation, and consequently expanded our knowledge about the nature of delusions.

One assumption that has been held about delusions is that they are qualitatively different from normal beliefs. However, cognitive models propose that delusions exist on a continuum with ordinary beliefs and experiences (Bentall & Fernyhough, 2008). Furthermore, evidence indicates that delusions are often somehow linked to real experiences, although the strength of that link remains notoriously difficult to ascertain. Consistent with this line of thinking, research suggests that life events “do play some role in precipitating episodes of psychosis” (Bebbington, Bowen, Hirsch, and Kuipers, 1995).

Cognitive theories of delusions implicate cognitive and emotional factors and perceptual abnormalities as contributing to the occurrence of delusional beliefs (Garety & Freeman, 1999). These aberrations include impulsive decision-making, externalising blame for negative experiences or events, and a bias towards threat-

**Definitions of delusions of reference**

A number of different categories of delusions have been identified, including referential delusions (i.e. delusions of reference), persecutory delusions, grandiose, and somatic delusions (Bentall, 2001; DSM-IV, APA, 2000). Delusions of reference (DoR) in particular have been identified as one of the most frequently occurring symptoms in schizophrenia and other psychotic disorders (American Psychological Association, 2007; Boydell, Dean, Dutta, Giouroukou, Fearon, & Murray, 2007; Startup & Startup, 2005). These types of delusions represent an extreme and false belief that external events, actions, or gestures have a special and personal (often negative) meaning or significance for the self (American Psychological Society, 2007; Bentall, 2001; Frith, 1992). For example, a person may believe that a presenter on the television is speaking directly about or to them, that a world event has been intentionally contrived for them, or that these events hold a special personal meaning.

**Prevalence of delusions of reference**

Delusions of reference are common among inpatients with a psychotic disorder (Startup & Startup, 2005). In their International Pilot Study of Schizophrenia, the World Health Organisation (1973) found that 67% of patients with a diagnosis of schizophrenia experienced delusions of reference. Later findings by the World Health Organisation have shown that delusions of reference (DoR) were the most common symptom of psychosis identified in people with schizophrenia presenting to health services for the first time (Sartorius et al., 1986). In a more recent study, Startup and
Startup (2005) found that 77% of their sample of psychiatric inpatients reported at least one type of DoR, while 42% of outpatient volunteers from a schizophrenia research register reported DoR. In 2007, approximately 50% of Boydell et al.’s sample of psychiatric service users with first episode psychosis experienced DoR.

Some important theories have contributed to our understanding of delusions of reference and the mechanisms that underlie them, in particular a single-symptom study undertaken by Startup and Startup (2005) which reliably identified various types of these delusions.

**Differentiating delusions of reference**

Startup and Startup (2005) extended the literature and progress in the theoretical understanding of delusions of reference with their single-symptom investigation. They conducted a factor analysis to investigate whether all DoR co-occur, or whether delusions of communication and delusions of observation are independent of each other. Their results showed that these two delusional dimensions were independent. Furthermore, they found that delusions of observation (beliefs about gossip and surveillance) were associated with persecutory delusions and auditory verbal hallucinations (Startup & Startup, 2005). Conversely, delusions of communication (DoC) consist of beliefs that others are communicating through the public media, the arrangement of inanimate objects, or by using subtle, non-verbal means. Startup and Startup (2005) argued that, in the latter delusions, what seems to be communicated concerns the self and originates from the self, although the origin is not recognised but attributed externally. In this way they are similar to auditory verbal hallucinations and both kinds of percept-like experience appear to derive from impairments in reality discrimination. Startup and Startup (2005) proposed that the main difference between auditory verbal hallucinations and delusions of
communication is that the impairment in reality discrimination is centred on non-verbal content in delusions of communication as opposed to verbal channels in auditory verbal hallucinations.

Other empirical research has supported the finding that delusions of reference and auditory verbal hallucinations are independent. For example, Startup and his colleagues (Startup, Sakrouge, & Mason, 2010) conducted a study testing the interpretations on the Referential Thinking (REF) Scale (Lezenweger, Bennett, & Lilenfeld, 1997), a self-report measure of simple and guilty ideas of reference. They found a highly significant correlation between scores on the REF and the severity of delusions of reference, but REF scores were not correlated with the severity of auditory verbal hallucinations (Startup et al., 2010). Similarly, research conducted by Bucci and her colleagues, which used a 2 x 2 design that crossed presence versus absence of delusions of communication with presence versus absence of auditory verbal hallucinations, found no significant main effects or interactions for auditory verbal hallucinations regarding either bias or gesture interpretation (Bucci et al., 2008a; Bucci et al., 2008b). Thus, although delusions of reference have been found to resemble auditory verbal hallucinations in some respects, they operate through separate channels, and the research indicates that they are independent.

A two-factor model of referential delusions of communication

Although much of the research they cite as support for their dual-factor model was not specifically targeted at investigating delusions of reference, Startup, Bucci, and Langdon (2009) provide a logical and compelling theory of the development of referential delusions of communication. In line with previous theories, Startup and his colleagues (2009) acknowledge a role for cognitive impairments, resulting in anomalous experiences and the emergence of delusions. They propose that
these impairments are associated with the content of the delusion, whereas a second factor is involved in the adoption and maintenance of the delusion.

To elaborate, Startup, Bucci, and Langdon (2009) propose that neutral stimuli from the environment are inappropriately interpreted as significant, and activate erroneous processing of non-verbal communication (including gestures). The next stage in the model involves an individual believing that they have detected a self-referent non-verbal communication, which then results in that individual attempting to decode this communication using memories of non-verbal messages out of context, and with reference to negative self-schemas. This leads to a perception which is negative and self-referential. Beliefs are then formed upon the incorrect belief that one has been the recipient of a specific communication which is construed as self-referential. In conjunction with impairments in the capacity to accurately evaluate beliefs, for example problems with rejecting implausible explanations, this then leads on to the adoption of the referential delusion of communication when the beliefs are held with conviction. In time, memories of similar communications from the past, and revised self-schemas, may then feed back into the interpretive processing when decoding a message, circumventing the previous stages (Startup, Bucci, & Langdon, 2009). This model provides an interesting theoretical framework, which is certainly worthy of further investigation.

**Preliminary support for the Startup et al. (2009) two-factor model**

There is preliminary support for Startup and his colleagues’ (2005; 2009) predictions. One such study was Bucci et al.’s (2008) signal detection theory (SDT) research, which was conducted in order to examine the theory that delusions of communication (DoC) are a result of impaired reality discrimination in non-verbal communication channels. This was done using a novel task in which a series of brief
video clips obscured by visual noise were shown to participants. Two types of video clips were included in the series, one type presenting well-known gestures (to communicate some meaning), and the other presenting incidental movements (which conveyed no intended meaning). Following each clip, participants were asked to indicate whether they thought a gesture had been presented.

Consistent with Startup and Startup’s (2005) prediction, it was found that individuals with DoC showed a bias toward reporting the occurrence of gestures (Bucci et al., 2008a). It was suggested that this bias was, at least partially, due to the externalising of self-generated internal events, that is, due to impairments in reality discrimination for non-verbal material.

In a second study by Bucci and her colleagues (Bucci, Startup, Wynn, Baker & Lewin, 2008), further evidence was found that people with DoC have difficulty interpreting gestures and are inclined to externalise their own thoughts. In this study, the same video clips (containing gestures or incidental movements) were presented to participants, but without visual noise. Participants were required to choose one of four interpretations of the movement presented in each clip. People with DoC were found to be significantly more likely to make incorrect interpretations than healthy controls, were more prone to interpret incidental movements as gestures, and were more likely to interpret both gestures and incidental movements as having derogatory meaning (Bucci et al., 2008b). In both studies, Bucci and colleagues (2008a; 2008b) suggested that the misperception of gestures by people with DoC was influenced by a misattribution of self-generated internal events to an external source. That is, people with DoC externalise their own thoughts and see them as being communicated by others. In addition, it appears that this externalisation may be particularly likely to occur when the self-generated internal events are negative thoughts about the self (Bucci et al., 2008).
Bucci and her colleagues provided an important theory from their findings regarding gesture interpretation. Their proposal is consistent with other findings that people with delusions have difficulty inferring the intentions of others and tend to externalise negative events, particularly negative self-representations (Frith, 1992; Garety & Freeman, 1999; Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001). The interpretation of the results in both Bucci et al. (2008a; 2008b) studies, that people with DoC were externalising their own thoughts is plausible, however thus far, no direct evidence has been provided to show that it was the subjects’ own thoughts (i.e. self-views) that were perceived as being communicated. Thus, the currently proposed research was aimed at providing direct evidence of what thoughts participants have about themselves, and that it is specifically these thoughts that are being externalised (i.e. seen as communicated by others).

**Delusions, emotion, negative self-schemas, and poor self-esteem**

Cognitive models of psychosis assume that pre-existing beliefs about, and ongoing appraisals of, the self and the world are fundamental in the development and maintenance of positive psychotic symptoms (Garety et al., 2007). Evidence points to deficits in self-perception and the elaboration of personal identity as having a fundamental role in the onset, maintenance, and exacerbation and relapse of schizophrenia and its symptoms (Gara, Rosenberg, & Mueller, 1989; Krabbendam et al., 2002). It has been claimed that one’s self-perception is developed within the context of our interactions with others, and that our self-perception also influences how we appraise and understand others (Penn et al., 2001). Early adverse experiences leading to emotional disturbance have been implicated in a cognitive vulnerability whereby negative schema of oneself and the world deplete self-esteem and promote aberrations in appraisal processes.
Similar to findings in regard to self-esteem, empirical investigations have shown significant correlations between negative self-schemata and the presence of delusions (Freeman & Garety, 2003; Garety et al., 2007). Research also indicates that psychotic symptoms, and particularly delusions, tend to be more fixed and greater in severity when they involve negative self-beliefs, and negative views of the world and other people (Garety et al., 2007; Krabbendam et al., 2002).

Investigations into the links between emotion, self-schemas, and self-esteem have elicited mixed findings. In one study, negative affect, negative self-evaluations, and low self-esteem correlated with the distress and preoccupation associated with delusions, and (less so) with conviction about the delusions (Smith et al., 2006). Meanwhile, another exploration showed that anxiety and biases in reasoning processes independently accounted for delusional conviction, and negative beliefs about the self have been independently associated with global positive symptoms of psychosis. Garety and her colleagues (2001) have speculated that underlying negative self-schemas such as “I am unlovable” or “I am weak” may impact upon an individual’s information processing, and result in perceived threat regarding psychotic experiences or adversity being construed through delusional reasoning. However, Garety et al., (2001) also speculated that negative self-evaluations may be a consequence rather than a cause of psychotic phenomena. Thus, from the research reviewed here so far, despite strong evidence that negative personal schemata are associated with psychotic symptoms, the direct nature of these associations remains uncertain, and it is possible that different associations between different symptoms exist (Garety et al., 2001).

There is a body of research which supports the assumption that low mood, poor self-esteem, and negative self-schemata play a role in the development of psychotic symptoms, and it has been postulated that psychotic symptoms and negative affect may interact to facilitate increased vulnerability or presence of each other
(Smith et al., 2006). It is apparent that further investigation into the nature of these and their relationships with symptoms of psychosis is required.

**Affective processes**

It has long been recognised that affective processes play an important role in schizophrenia and other psychotic disorders (Freeman & Garety, 1999; Peralta & Cuesta, 2009). In fact, research indicates that delusions are, in part, derived from emotional processes (APA, 2007). It has been found that negative emotional states influence the development and maintenance of symptoms of psychosis (Garety et al., 2007; Smith et al. 2006). Specifically, emotional distress combined with cognitive anomalies may play a role in increasing the risk of positive symptoms materialising (Garety et al., 2007).

It has been contended by Freeman et al. (Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002; Freeman et al., 2004) and others (Peralta and Cuesta, 2009) that delusions are a manifestation of affective processes (e.g., Freeman et al., 2002, 2004; Green et al., 2006), and anxiety is purported to be the major factor in the formation and expression of persecutory delusions in particular (Freeman, 2007: Peralta & Cuesta, 2009). Anxiety is implicated in the persistent nature and levels of distress associated with paranoia and persecutory delusions (Freeman, 2007; Jones & Fernyhough, 2008: Startup, Freeman, & Garety, 2007). For example, delusional conviction and persistence have been found to be exacerbated by worry processes (such as rumination) (Garety et al., 2007). In addition, it has been suggested that anxiety may be the predominant vulnerability factor for psychotic disorders (Freeman & Garety, 1999).

Evidence suggests that, in the general population, an individual’s interpersonal anxiety propagates the content of persecutory thoughts and ideas (Jones & Fernyhough, 2008). Peralta and Cuesta (2009) further argue that psychotic
symptoms and affect are inextricably interconnected. When anxiety is comorbid with psychotic disorders, it can facilitate increased distress, and diminish an individual’s daily functioning and quality of life (Achim et al. 2009). Furthermore, anxiety may be self-perpetuating and create a vicious cycle, in that attempts to suppress it may lead to a paradoxical effect whereby anxiety is experienced more often (Freeman and Garety, 1999).

Impairments in emotion perception and interpretation, including affect recognition, have been found to extend to more general areas of psychosocial functioning, which may occur regardless of the presence or absence of other symptoms of psychosis or cognitive deficits (Wolwer, Frommann, Halfmann, Piaszek, Streit, & Gaebel, 2005). Therefore, it is theorised that such impairments are a fundamental characteristic of psychotic disorders (Wolwer et al., 2005). Unfortunately, thus far investigations into the influence of affect, including anxiety, on delusions of reference remain lacking.

**Self-esteem**

As previously but briefly mentioned, self-esteem has been implicated as a possible factor in the development and maintenance of delusions (Barrowclough et al., 2003; Ben-Zeev, Morris, Swendsen, & Granholm, 2011). Barrowclough and her colleagues (Barrowclough et al., 2003) found a significant correlation between negative self-evaluation and the presence of delusions. Other literature indicates links between delusions and low self-esteem, including the possibility that poor self-esteem is a risk factor for the emergence of psychosis (Krabbendam et al., 2002; Warman et al., 2010). Delusions of reference were predicted by the presence of negative self-esteem in a study by Ben-Zeev and his colleagues (Ben-Zeev et al., 2011), whereby individuals with higher levels of negative self-esteem experienced subsequent
delusions of reference more often than those with lower levels of negative self-esteem. The researchers also postulated that individuals with negative beliefs about their personal traits may develop delusions that are reflective of a particular vulnerability towards and sense of being influenced by others, through perceived messages from the television or other such forms of media. That is, they may be predisposed to delusions of reference.

In considering social situations, it has been shown that people with persecutory delusions make abnormal inferences characterised by making overly external, global and stable accounts of negative events (Kaney & Bentall, 1989). This has been described as a ‘self-serving bias’, whereby individuals will attribute positive events to an internal source, and negative events to an external source (Bentall, 2001). In line with psychoanalytically-based theories of paranoia, a number of researchers have proposed that this self-serving bias represents excessive efforts at maintaining one’s self-esteem (Bentall, 2001).

Warman et al. (Warman, Lysaker, Luedtke, & Martin, 2010) explored the concept of global self-esteem and its link to delusion-proneness in a non-clinical sample. They found that those who were higher on delusion proneness had poorer self-esteem compared to those who were classified as having low delusion-proneness. Interestingly, there was a significant and inverse relationship found between self-esteem and ideas of reference. That is, poorer self-esteem was associated with an increase in ideas of reference (Warman et al., 2010). There was also a significant inverse relationship between self-esteem and paranoid ideation.

The direction of the causal relationship between delusions and self-esteem remains unclear (Warman et al., 2010), that is, whether self-esteem is a risk factor or a consequence of psychosis, or both. Nevertheless, the evidence for self-esteem exerting some influence in delusions is relatively robust (Bentall & Fernyhough, 2008).
The idea that paranoia and related symptoms may serve to protect against threats to one’s self-esteem (that is, serve as a defence mechanism) has existed for some time (Bentall, 2001). Early psychoanalytically-inspired opinions assumed the view that delusions were an attempt to externalise unacceptable beliefs or views, while more recent theorists claim that people with psychotic symptoms such as paranoia are hypervigilant to threat, and blame malevolent others for events that may compromise their self-esteem in order to protect their self-concept (Bentall, 2001).

Debate regarding the theory that delusions act as a defence mechanism continues (Warman et al., 2010). It has been argued that negative self-esteem, rather than defensive mechanisms, contribute to persecutory delusions (Freeman, 2007), and the available research provides evidence consistent with both theories. Warman et al. (2010) hypothesised from their results that at sub-clinical levels of delusional or unusual beliefs, self-esteem can be compromised, however when the severity of the delusional ideation reaches clinical significance, it begins to function as a defence mechanism. Longitudinal studies in the area of low-self esteem as a risk factor for, and contributor to, the onset of psychosis would be useful in shedding light on these phenomena, but currently remain inadequate (Krabbendam et al., 2002). Research into this area needs to be extended.

Unfortunately the empirical investigation into delusions of reference, and particularly delusions of communication, remains relatively scant. There is a much more plentiful research base for persecutory delusions (Ben-Zeev et al., 2011). The two types of delusions differ in many ways, however both involve false beliefs that external others (or events) are in some way related to them (APA, 2007). This is not necessarily the case for all delusion types, such as for some grandiose delusions or religious delusions. A further argument for reviewing some of the findings into persecutory delusions for the current study is that single-symptom research
necessitates the investigation of the specific links, similarities, differences, and inter-
relationships between symptoms (Persons, 1986). In order to facilitate and enhance
psychological theory development using a holistic framework, it is necessary to define
both the similarities and differences between delusions of reference and other delusion
types (Ben-Zeev et al., 2011; Freeman & Garety, 2000). The refinement of
psychological treatment is likely to be progressed greatly through the identification of
such relationships and contributing factors. As persecutory delusions are heavily
researched, this is a logical place to start. The research of whether these two delusion
types are similar, and in what ways, is likely to also reveal the ways in which they
differ. For example, investigating whether a memory recall bias in people with
delusions of communication will reveal whether they show the same or different
patterns to people with persecutory delusions. Startup and Startup (2005) have already
provided an example of how useful single symptom research can be for identifying
similarities and differences between symptoms. They identified that delusions of
reference and auditory verbal hallucinations both appear to be similar in that they are
percept-like experiences that may be derived from impairments in reality
discrimination. However, the two symptoms differ in that delusions of reference
appear to be centred around non-verbal content, while auditory verbal hallucinations
are centred around verbal channels.

Further support for comparing and contrasting delusions of persecution and
delusions of reference may be found in a study by Freeman and Garety (2000). These
authors note that early clinical accounts of persecutory delusions contain descriptions
of being observed, and communications which potentially contain coded meanings.
They go on to note that these symptoms are variants of delusions of reference.
Furthermore, they cite a prominent textbook of psychiatry which describes delusions
of persecution as including delusions of reference, and that these two types of
delusions are often closely linked, although delusions of persecution centre on concerns about harm. Freeman and Garety (2000) argue that broad definitions of persecutory delusions may have led to research that has included participants with delusional symptoms which are not directly persecutory, despite this being the target group.

The term paranoia has been used to describe a number of psychotic symptoms, including different types of delusions, and predominantly to refer to persecutory delusions in recent times (Freeman & Garety, 2000). One argument for reviewing the literature on persecutory delusions and paranoia is based in the term paranoia itself. Although some researchers identify paranoia with persecutory delusions, this is not always the case, and is not always well defined. In fact, the term paranoia has been used in many different ways over the years, including as a basis for the description of delusional disorder in the DSM-III, the DSM-IV, and the ICD-10 (Munro, 1999), and to describe delusions of reference, among other delusion subtypes (Freeman & Garety, 2000). Winokur (1977) wrote that the origins of the diagnosis for delusional disorder include “many delusions of reference” (pp. 511), and that delusional disorder was previously referred to as paranoia (Munro, 1999; Winokur, 1977).

Recall biases.

We have previously discussed research in which affective processes and perceived threat have been linked to delusions (e.g., Freeman et al., 2002; Garety et al., 2001; Peralta and Cuesta, 2009). If people with delusions show a tendency to pay attention to emotionally salient and threatening stimuli, as research suggests, it is plausible that they will demonstrate a bias for recalling such information. Kaney and her colleagues (1992) used threatening and non-threatening social accounts to explore
this, and found that compared to control subjects, people with paranoia recalled less information overall but they specifically recalled threatening components of the stories. In other research, Bentall et al. (1995) used a combination of paranoia-related, depression-related, and emotionally neutral words, and demonstrated a preferential recall of paranoia-related material by people with delusions. This pattern was not found for normal controls or depressed subjects. Further evidence of a recall bias for threatening stimuli was found by Bucci and her colleagues (2008a), whose experimental task using video clips of gestures and incidental movements, revealed that participants with delusions of communication were more likely to interpret as insulting the incidental (neutral) movements than were controls. Furthermore, this outcome was almost entirely accounted for by delusions of communication. This could be taken as an indication that the person’s own negative self-beliefs or schemas lead to the misinterpretation of the content of the non-verbal communication (Startup, Bucci, & Langdon, 2009).

In order to examine the suggestion that deluded patients would selectively attend to delusion-relevant stimuli in support of their beliefs, researchers Bentall and Kaney, (1989) used the emotional Stroop effect in which colour naming of emotionally salient words was required of participants. Subjects with paranoid delusions showed a clear delay in naming paranoia-related words compared to neutral words (Bentall, 2001).

Lyon, Kaney and Bentall (1994) employed a different approach, evaluating implicit attributions. Using two different types of attributional questionnaires – a conventional and an implicit measure – they found that control participants exhibited a self-serving bias on both assessment tasks, while depressed patients nominated more internal attributions for negative events on both questionnaires. In contrast, on the conventional measure of attributional style people with delusions attributed more
negative events externally on the implicit attributional questionnaire. It was assumed 
that the disparity observed in this experimental group represented negative self- 
evaluations reflected in implicit attributions, and indicated that their explicit 
attributional style was more defensive (Lyon, Kaney, & Bentall (1994).

People with persecutory delusions exhibit a memory recall bias for 
threatening material (Bentall & Kaney, 1996; Bentall, Kaney, & Bowen-Jones, 1995; 
Freeman & Garety, 2003), which may serve as a self-protective mechanism (Bentall & 
Kaney, 1996). Individuals with delusions have also been found to preferentially attend 
to threatening stimuli which are self-referent (Bentall & Kaney, 1996; Bentall, Kaney, 
& Bowen-Jones, 1995; Fear, Sharp, & Healy, 1996; Green, Williams, & Hemsley, 
2000; Kaney et al., 1992). Furthermore, they have been found to exhibit attributional 
bias, whereby they attribute negative events to external causes (i.e. other people or 
circumstances), and see positive events as due to internal reasons (Lyon, Kaney, & 
Bentall, 1994). For example, Kaney and Bentall (1992) found that when they won 
games with predetermined outcomes, people with paranoia showed a propensity for 
attributing control to themselves, but this was not the case when they lost games.

Holt and her colleagues’ (2006) looked at the link between emotion 
perception and people’s classification of words presented as pleasant, neutral, or 
unpleasant. They compared people with schizophrenia with (predominantly 
persecutory) delusions to individuals with schizophrenia without delusions and healthy 
controls and demonstrated that people with delusions are more likely to perceive 
words as unpleasant. Furthermore, the strength of this effect correlated with the 
severity of delusions. Holt et al. (2006) proposed that their findings provided evidence 
that people with schizophrenia experiencing delusions erroneously assign affective 
meaning to neutral stimuli, describing this as a specific affective judgement bias.
Further studies were recommended by the researchers in order to clarify the relationship of this bias to the development and maintenance of delusions.

As has been discussed, previous research has shown that people with delusions exhibit a tendency to blame others for negative events (Bentall, Kinderman, & Kaney, 1994; Green, Williams, & Hemsley, 2000). The attribution of negative content to an external source in relation to the actions of others has been the focus of some investigators (Georgieff & Jeannerod, 1998). One of the aspects of consciousness that is often studied is the awareness of external reality, which focuses on the perception of where or what something in the environment is, and from whom or from where an action is generated (Georgieff & Jeannerod, 1998). In schizophrenia, often a person’s capability in correctly identifying the agent of an action, and differentiating between one’s own and others’ actions, is defective, and it has been suggested that some symptoms of this disorder are due to dysfunction in correctly attributing agency (Georgieff & Jeannerod, 1998).

The ability to correctly distinguish the agent of a physical action and understand the intended meaning are essential functions of human communication and successful social interaction (Daprati et al., 1997; Jeannerod, 1999), and the misattribution of one’s own and other’s actions by people with delusions is increasingly well-recognised (Georgieff & Jeannerod, 1998). Gestures and their correct interpretation are fundamental to this process, and are a part of the ability to correctly infer others’ intentions (Jeannerod, 1999).

Another interesting point for consideration concerns the partial overlap of cortical areas which are activated in the observation of one’s own and another’s action (Georgieff & Jeannerod, 1998). Such shared representations raise questions about how humans are able to distinguish their own actions from the actions of someone else. Georgieff & Jeannerod (1998) propose that there are a number of aspects of an action
that may not reach awareness in a person with schizophrenia, thus they have difficulty distinguishing their own actions from the actions of others, and recognising the intentions of other peoples’ actions. These aspects include limited awareness of one’s own movements, and (as in normal subjects) the dominance of visual information over kinaesthetic information in ascertaining the agent of action.

Positive symptoms such as delusions of reference and auditory verbal hallucinations are postulated to be involved in the disturbance in the ability to discriminate between oneself and the external world (Georgieff & Jeannerod, 1998), such as one’s own and others’ actions. Similarly, there is conjecture that auditory verbal hallucinations are a misinterpretation of one’s own internal dialogue, and thus can be viewed as the misattribution of agency to an external source (Georgieff & Jeannerod, 1998). It has likewise been claimed that some types of delusions (i.e. delusions of alien control) are a form of misattribution of agency.

**Investigating self-concept**

Self-discrepancies represent a conscious appraisal of oneself and one’s own attributes, however some judgements about the self are more implicit (Bentall, 2001). In an experiment employing the Stroop colour-naming task, Kinderman (1994) hypothesised that delays in colour-naming of Stroop words would indicate those which were considered self-descriptive. High self-esteem and low self-esteem words were used, and subjects with paranoia predominantly endorsed positive words, but endorsed more negative words than control subjects (i.e. with no psychiatric diagnosis) (Bentall, 2001). Upon subsequently colour-naming the endorsed words, the control group’s speed for naming neutral, and high and low self-esteem words was relatively uniform. However, subjects with paranoia showed a delay in colour-naming high self-esteem words, and additional deceleration on the task when colour naming
low self-esteem words. This was interpreted as low self-esteem words being considered self-descriptive by people with paranoia, but on an unconscious level.

**The Self-Referent Incidental Recall Task (SRIRT)**

The Self-Referent Incidental Recall Task (SRIRT) has been used to evaluate the self-schemata of people with depressive disorders and people with bipolar disorder (Bentall & Kaney, 1996; Lyon, Startup, & Bentall, 1999). The SRIRT consists of a list of 12 positive and 12 negative trait adjectives, with 3 neutral words situated at the beginning and end of the list. Respondents endorse traits as either describing themselves or not describing themselves, and are then required to complete an incidental free recall task. The underlying assumption that is made about the incidental recall task is that trait adjectives are more likely to be recalled if they are associated with the self, because self-referent material receives greater depth of processing during encoding since they are associated with underlying schemata (Rogers, Kuiper, & Kirker, 1977). Furthermore, if participants recall traits that they did not initially endorse, it is assumed that this memory bias is a measure of implicit self-views (Vasquez, Diez-Alegria, Hernandez-Lloreda, & Moreno, in press). Thus, it is anticipated that by using the SRIRT, this study will be able to identify participants’ conscious and implicit views of the self (Bentall & Kaney, 1996).

In the current study, the SRIRT was utilised with the aim of ascertaining participants’ self-perceived negative traits, or the negative traits that they fear they may have. The encoding stage of the SRIRT was employed as a direct measure of self-representation (Bentall & Kaney, 1996), while the incidental recall phase of the SRIRT was used as an indirect measure of self-concept (Bentall & Kaney, 1996).

The use of an incidental recall task in previous studies with depressed individuals has shown a tendency for recall of more negative words than normal
controls, which was also found with individuals with delusions (Bentall and Kaney, 1996). Such a pattern has been described as a self-referent encoding effect, which is a bias for recalling words that are encoded through association with one’s self-schemata (Rogers, Kuiper, & Kirker, 1977). Research provides support for the theory that people with persecutory delusions have underlying negative self-schemata that are most likely to be identified using indirect measures of self-evaluation (Bentall et al., 1994; Bentall & Kaney, 1996). However, Bentall and Kaney (1996) moderate their claim that people with delusions have implicit negative self-schemata by noting that further studies to clarify the results using the Self Referential Incidental Recall Task are required. They also state that investigations into other types of delusions to replicate findings with persecutory delusions are required. The current study is aimed in the direction of addressing both of these points to some degree.

Thought suppression

The notion that an individual’s thoughts are being externalised, and that these thoughts concern the self and originate from the self is, in some ways, consistent with the concept of projection (Freud, 1954; Freud, 1957). The dominant theory regarding the purpose of projection is that it is a form of self-protection from psychological threat (i.e. a defence mechanism) (e.g. Freud, 1957; Newman, Duff, & Baumeister, 1997; Sherwood, 1981). For example, in order to manage unpleasant or distressing thoughts, individuals may try to avoid thinking about them (Newman et al., 1997). In general, people hope to live compatibly with their ideal self, and refrain from conforming to their unwanted self-concept. If one can avoid thinking about the unwanted traits and the implications of possessing them, one may be able to more easily deny possessing them (Newman et al., 1997). Projection, then, is evoked
through attempts to suppress awareness of undesirable traits that may be self-descriptive.

The idea that self-evaluations and external attributions in psychosis are linked to a form of defensive projection is not new (Bentall & Kaney, 1996). With projection, one’s self-perceived undesirable or unwanted traits are attributed to others. That is, when trying to suppress the thought of possessing an undesirable trait, people are particularly likely to interpret another’s behaviour as exhibiting that undesirable trait (Newman et al., 1997; Wenzlaff & Wegner, 2000). Projection can occur regardless of whether the individual is aware of possessing the unwanted trait (attributive projection), or is unaware of (denies) possessing the trait (classical projection) (Newman et al, 1997; Sherwood, 1981).

Individuals experiencing symptoms of psychosis have described abnormal metacognitive beliefs which may lead to the use of strategies in an attempt to alleviate distress (Bentall & Fernyhough, 2008). Such strategies include thought suppression which, in fact, has a paradoxical effect in that the unwanted thought or concern becomes chronically accessible (Bentall & Fernyhough, 2008; Freeman & Garety, 1999; Newman et al., 1997). That is, trying to avoid the thought that one possesses a particular trait results in the person becoming much more sensitised to, and preoccupied with, that same thought than if they had not attempted to suppress it. These chronically accessible traits will then strongly influence the interpretation of others’ behaviour, resulting in undesirable traits being projected externally (Newman, Duff & Baumeister, 1997). Another interesting finding about suppression of thoughts is that when cognitive load is added the accessibility of a thought is amplified and becomes chronically accessible, or “hyperaccessible”, through post suppression rebound (Clark, Winton, & Thynn, 1993; Jones & Fernyhough, 2008; Wenzlaff & Wegner, 2000).
Newman and his colleagues (Newman et al., 1997) proposed a model which centred around threat to the ego via fear of possessing an undesirable trait, the suppression of thoughts, and the influence of accessibility of thoughts on the perception of other people. One way in which individuals respond to such ego threat can be to intentionally suppress it from their conscious awareness in order to, for example, convince themselves that the undesirable trait is not one of their own personal characteristics. The resulting chronic accessibility may then serve as a filter through which individuals may perceive such unwanted traits in others. Thus, Newman et al.’s (1997) model stipulates that defensive responses to threatening stimuli are a catalyst for projection. In examining the evidence for their model, Newman et al., (1997) looked at responses concerning self-assessed, personally threatening attributes in highly defensive participants (repressors). In six studies they found that, in comparison to non-repressors, repressors were highly defensive and threatened in relation to the possibility that they may possess undesirable traits. Repressors were also more likely to deny possessing unwanted traits, and more reluctant to write or think about events which indicated that their behaviour reflected such traits. The third study looked at the interpretation of ambiguous behaviours, and showed that repressors more often than non-repressors negatively interpreted and labelled behaviour as socially undesirable when it involved personally threatening traits. Further analysis led Newman and his colleagues (1997) to suggest that their findings were also consistent with this outcome being due to chronic accessibility. Finally, suppression of thoughts led to projection of an undesirable trait onto another person, and repressors were more prone to projection than non-repressors. Overall, the authors concluded that threat leads to defensive mechanisms, which in turn lead to chronic accessibility, which then modifies person perception. Such findings have implications for social functioning in general.
The main difference between the projection and chronic accessibility theories, and the mechanism underlying DoC proposed in the current study is that, rather than interpreting others’ behaviour as indicating that they possess a particular trait, people with DoC interpret others’ behaviour as communicating a particular accusation.

Researchers have conducted investigations exploring the course of rebound effect over a number of days, and a post-suppression rebound effect for negative self-referent thoughts has been demonstrated (Borton & Casey, 2006; Wenzlaff & Wegner, 2000). In addition, suppression of thoughts about undesirable personal characteristics has been found to lead to higher levels of anxiety and depression (Borton & Casey, 2006; Wenzlaff & Wegner, 2000).

It has been suggested that when thought suppression occurs in conjunction with psychological disorders, the symptoms of the disorder may be exacerbated (Jones & Fernyhough, 2008). For example, Freeman and Garety (1999) maintain that trying to suppress anxiety (i.e. worry) itself can increase the frequency of anxiety, thus likely feeding into a self-perpetuating cycle. Such a process would help to provide an explanation of the development or maintenance of delusions, in that a chronically accessible thought model could predict initial persecutory delusional thoughts developing into chronically hyperaccessible thoughts, therefore making an individual more prone to interpreting the events and actions as negative or persecutory (Jones & Fernyhough, 2008). Post-suppression rebound, in turn, may lead to increased intensity of negative beliefs. Jones and Fernyhough (2008) also postulated that hyperaccessibility and post-suppression rebound resulting from attempts to suppress full-blown persecutory delusions could maintain persecutory beliefs and intensify distress and conviction about the belief. Further to this, it is possible that ego-dystonic thoughts, such as “I am incompetent”, may result in hyperaccessibility and lead to a
predisposition for the individual to incorrectly perceive the associated trait in the
behaviour of other people (Jones & Fernyhough, 2008).

Nevertheless, some research has not supported the assumption that
defensive processes underlie paranoia and delusions (Bentall, 2001), and other factors
such as those previously discussed (e.g. self-esteem) have been implicated. Garety and
her colleagues (Garety et al. 2007; Garety & Freeman, 1999) have argued against the
opinion that delusions are linked to a defence against negative affect and low self-
worth, and view negative emotion and poor self-esteem as non-defensive and normal
in symptom development. However, it has been contended that this can be interpreted
as paranoid attributions not succeeding in protecting against low self esteem in some
cases (Bentall, 2001). Another possibility is that defensive attributional biases and
deficits in ToM operate in conjunction, resulting in delusions (Bentall, 2001).
Research to date supports the likelihood that negative self-concepts and defensive
processes may play a part in the formation and maintenance of delusions. It has been
suggested that investigating whether conscious self-perceptions are in fact more
favourable than those which are more implicit would provide a more rigorous measure
of the role of defence in delusions (Freeman, 2007). That is, it would examine whether
disparity exists between implicit self-representations or schemas, and those which are
within conscious awareness.

**Defensive Projection**

That the perception of socially relevant cues and biases has a role in
delusion formation and maintenance is well established (Monti & Fingeret, 1987). The
actual definition of delusions notes that they commonly involve errors in interpreting
one’s own experiences or perceptions (APA, 2000), and the role of self-representation
and causal attribution in individuals with psychotic disorders has been the increasing
focus of scientific investigation in recent years (Kinderman, 2001). Early psychoanalysts postulated that paranoid ideas and delusions serve a defensive function, attributing unacceptable ideas to an external source (Bentall, 2001). More recently, Colby and his colleagues’ (Colby, Weber & Hilf, 1971) model made the assumption that paranoia produces extreme sensitivity to threats to one’s self-esteem, resulting in blaming malevolent others for disappointments in order to avoid feelings of personal inadequacy. Other investigators’ theories have concurred with the sentiment that causal attributions determine the way that events in the environment are interpreted and involve assignment of blame externally (Bentall, Kaney & Dewey, 1991; Frith, 1992; Kinderman, 2001). People with paranoid delusions exhibit a bias to externalise negative events to situations, but even more so to other individuals (Kinderman, 2001). Researchers suggest that this may be an attempt to reduce discrepancies between people’s perception of their ideal self and their actual self, and this might be partially due to ToM deficits. In research exploring ToM in the general population, problems in ToM predicted external, personal attributions (Kinderman, 2001).

Zigler and Glick (1988) have proposed that paranoid patients employ a form of defence against low self-worth and depression, which has led subsequent investigators to contend that underlying self-schemata, when galvanised by threat-related events, create discrepancies between self-perception and self-ideals, thus self-protective external attributions emerge (Bentall and Kaney, 1996). This serves to reduce the individual’s self-discrepancies, but the resulting consequences are the activation of schema which present other people and events as threatening. Research that supports this theory includes findings such as Lyon et al.’s (1994) discovery of an attributional bias for negative events which suggested an implicit negative self-view. Other investigations show that patients with delusions exhibit little
discrepancy between their self-representations and self-ideals, but considerable discrepancy between their self-representations and how they think others view them (Bentall & Kaney, 1996).

In one investigation, Kinderman and Bentall (1996) looked at subjects with symptoms of paranoia, subjects with symptoms of depression, and asymptomatic subjects. They found that there were negligible discrepancies between the self-actual and self-ideal perceptions of paranoid patients, but pronounced differences between their beliefs about how their parents saw them and their self-actual concepts. Overall, people with delusions were found to often hold the belief that their parents have very negative perceptions of them. The results of this study are consistent with the hypothesis that when people with paranoia externalise attributions for negative events they are attempting to minimize discrepancies between their self-actual and self-ideal concepts. The results were taken as support for the proposition that people with paranoia externalise attributions to malevolent others in order to reduce potential discrepancies between their own ideal and actual representations (Bentall, 2001; Bentall, Kinderman, & Kaney, 1994). This effect has been described as a self-serving bias, in that it represents attempts to defend oneself against threats to one’s self-concept, and thus protect against low self-esteem (Bentall, 2001, Bentall et al., 1994; Lyon, Kaney, & Bentall, 1994). This idea is consistent with the proposal that a disturbance in self-concept is implicated in schizophrenia (Frith, 1992). In addition, it is postulated that this bias, along with negative self-schemas, are responsible for paranoid experiences (Kinderman, 2001; Lyon, Kaney, & Bentall, 1994). Colby et al (1971) went on to argue that, in paranoia, preoccupation with the self is a central feature and the individual is preoccupied with slights toward the self.

Garety et al.’s (2007) model implicates reasoning and information-processing biases, along with schematic beliefs about oneself and others, and
emotional and social characteristics, as factors which serve to produce erroneous
external personal attributions in psychosis. Garety et al. (2007) postulate that
symptoms only proceed to pathological proportions when a voice or experience is
interpreted in particular ways, such as that it is out of one’s control, is externally
generated, or it is personally significant. Such appraisal styles lead to distress and
impairment, not simply the psychotic experience alone (Chadwick & Birchwood,
1994; Garety et al., 2007).

**Social dysfunction – Justification of the study**

Social dysfunction is one of the hallmark characteristics of schizophrenia
and psychotic disorders (Addington, Saeedi, & Addington, 2006). It is apparent that
people with schizophrenia and other psychotic disorders exhibit poorer social skills
and greater impairment in nonverbal social perception than the normal population, but
the nature of the relationship between these variables has not been thoroughly
investigated (Monti & Fingeret, 1987). It has been acknowledged that cognitive
psychology has the potential to play an important role in expanding our understanding
of schizophrenia and the processing of social information (Penn, Corrigan, Bentall,
Racenstein, & Newman, 1997). Researchers in the area of cognitive and social
psychology describe schizophrenia as fundamentally an interpersonal disorder,
whereby problems arise as a result of inaccurate interpretations of the social
environment. Deficits in social skills and, subsequently, social functioning are
distinctive and often intractable features of schizophrenia and other disorders
involving various types of delusions and hallucinations (Gay & Combs, 2005; Penn,
Combs, & Mohamed, 2001). As distinctive symptoms of psychosis, hallucinations and
delusions in particular have been the focus of much research interest (Garety et al.,
2001; Garety et al., 2007). Delusions experienced by people with schizophrenia
spectrum disorders frequently contain interpersonal themes pointing to the likelihood that social cognition plays an important role in the development of delusions (Green, Williams, & Hemsley, 2000). An understanding of the nature of such symptoms, particularly delusions and their sub-types, remains elusive (Garety et al., 2001; Garety et al., 2007).

**Summary of the literature**

Previous single-symptom research has resulted in valuable contributions to our understanding of psychotic symptoms (Blakemore, 2003; David, 2004; Startup & Startup, 2005). Given that delusions of reference are highly prevalent within patients with psychosis (Boydell et al., 2007; Sartorius et al., 1986; Startup & Startup, 2005); World Health Organisation, 1973), it is bewildering as to why they yet remain largely unexplored (Startup, Bucci, & Langdon, 2009). Startup and Startup’s (2005) evidence for delusion sub-types, provided a strong impetus for delusions of reference to be specifically and closely examined, with their findings indicating seven different kinds of delusions of reference which fall along two dimensions – delusions of observation and delusions of communication. Their findings, for example that delusions of observation were associated with other positive psychotic symptoms, while delusions of communication were not, suggests that there may be different underlying processes and explanations for these symptoms. Furthermore, Startup and Startup (2005) argued that delusions of communication are derived from impairments in reality discrimination for non-verbal material.

Bucci and her colleagues (2008a) provided support for Startup and Startup’s (2005) predictions since the participants in their study who had delusions of communication exhibited a bias to report the presence of gestures. This was taken as further evidence for externalisation of self-generated internal events. Bucci (et al.,
2008b) subsequently provided further evidence for the assumption that people with DoC misinterpret gestures and externalise their thoughts (particularly negative thoughts), since their sample made more incorrect interpretations, had a higher likelihood of interpreting incidental movements as gestures, and a higher likelihood that they would interpret both of these as having a derogatory meaning than did healthy controls. However, they did not provide direct evidence that it was the participants’ unwanted thoughts about themselves that were being externalised. Consistent with this, evidence has been found that low self-esteem, negative self-schemata, and negative affect are associated with delusions (e.g. Freeman & Garety, 2003; Garety et al., 2007; Jones & Fernyhough, 2008; Penn et al., 2001; Peralta & Cuesta, 2009), and that defensive processes emerge in response to these as a self-protective mechanism (Bentall, 2001; Warman et al., 2010).

This study is significant in that it will add to single symptom research in DoR, which currently remains limited. It is anticipated that this particular study will provide more direct evidence of the non-verbal biases observed with delusions of reference, and add to our understanding of the underlying cognitive processes in referential delusions. Despite the findings that delusions, including delusions of reference, are highly prevalent in psychotic disorders and cause marked distress and disability in those who experience them, relevant treatment options remain inadequate. It is hoped that this study will add to an understanding of the processes and specific symptoms associated with delusions necessary for developing a clearer framework upon which effective treatment options can be formulated.

**General design of the study**

The current study seeks to provide support for the findings that people with delusions of communication misinterpret gestures and make more negative
interpretations of these than people who do not experience delusions of communication. Further it will examine the influence of overt and covert self-schemata in the interpretations of gestures, and whether people with delusions of communication are likely to project negative traits that they fear possessing. The primary method by which this will be done will be to utilise the SRIRT in order to identify participants’ explicit self-concept and their implicit self-concept. A gesture interpretation task offering SRIRT words within the response choices will then be employed to examine the influence of these self-schemata and whether participants tend to project them onto external others.

The current study utilised videos of a real person using gestures that are commonly encountered in everyday social interactions. Thus, it is hoped that the experimental task in this study provides a relevant and ecologically valid representation of social interaction.

Aim & Hypotheses

The main aim of the current study was to better understand the underlying mechanisms of DoC. It was anticipated that this research would provide direct evidence that people with DoC perceive their own implicit and explicit self-evaluations as being communicated to them by others. Thus, it was hypothesised that:

1. Psychiatric patients with versus without delusions of communication would be more likely to perceive a gesture as present when it is not.
2. Psychiatric patients with versus without delusions of communication would make more negative interpretations on the gesture interpretation task.
3. The negative interpretations made by psychiatric patients with versus without delusions of communication would be more likely if they have endorsed a negative trait(s) on the SRIRT.

4. Psychiatric patients with versus without delusions of communication would be even more likely to make negative interpretations on the gesture interpretation task if they have both endorsed a negative trait(s) on the SRIRT, and recalled the negative trait(s) in the free recall task.

5. Psychiatric patients with versus without delusions of communication who recalled a negative trait(s) on the free recall task, despite not having endorsed it on the SRIRT, would be the most likely to make negative interpretations on the gesture interpretation task (that is, they would be more likely to project negative traits that they do not think they have, but fear possessing).

Method

Participants

Patients from the wards of psychiatric inpatient facilities in the Newcastle and Hunter Region, NSW were recruited for the current study. They were approached to participate once their treating psychiatrist had declared that they were able to give valid informed consent, and had deemed them capable of tolerating up to one hour to complete an interview and an experimental task. Patients between the ages of 18 and 60 with a psychotic disorder or major depressive disorder with psychotic features, as defined by DSM-IV criteria and diagnosed by their treating psychiatrist, were invited to participate.

Exclusion Criteria were: (i) Those who obtained a score of 4 or 5 on the SAPS visual hallucinations item or who verbally reported visual hallucinations (mild,
moderate, or severe); (ii) the presence of visual impairment that cannot be corrected to normal; (iii) evidence of organic brain impairment; and (iv) inadequate English fluency.

It was necessary to exclude people with visual hallucinations due to the visual nature of the experimental task. The potential occurrence of visual hallucinations during the experimental task would make interpretation of the results difficult or impractical, as this could confound the research findings.

Participants were recruited between November 2008 and July 2009. In total, 113 psychiatric inpatients were approached and invited to participate in the current research project. Of those 113, thirty-nine declined the invitation, eleven were discharged prior to attending the initial meeting with the researcher, two were on overnight leave from the facility, and one had absconded (was absent without leave) from the unit.

**Characteristics of the sample**

Key characteristics of the sample ($N=60$) including gender, age, cognitive functioning, diagnosis, education, employment status, marital status, number of hospital admissions, and living arrangements can be seen in Table 1. A total of 53 men and 7 women, ranging in age from 21 to 61 years ($M = 36.93, SD = 10.54$), accepted the invitation to participate and completed the interview and the experimental task. Of the total participants, the predominant diagnosis was schizophrenia, and the majority were single and were not engaged in any type of paid employment. Half of the sample was being treated in an acute inpatient mental health facility, while the other half were being treated in a non-acute inpatient mental health facility at the time of recruitment and participation.
Table 1

*Participant demographics*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years) (SD)</td>
<td>36.93 (10.54)</td>
</tr>
<tr>
<td>Mean NART (FSIQ) (SD)</td>
<td>95.13 (12.47)</td>
</tr>
<tr>
<td>Mean age at first contact (SD)</td>
<td>22.83 (8.87)</td>
</tr>
<tr>
<td>Mean years of education (SD)</td>
<td>11.52 (2.05)</td>
</tr>
<tr>
<td>Mean No. of hospital admissions (SD)</td>
<td>10.98 (13.94)</td>
</tr>
<tr>
<td>Gender (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>88.33</td>
</tr>
<tr>
<td>Female</td>
<td>11.7</td>
</tr>
<tr>
<td>Diagnoses (%)</td>
<td></td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>73.3</td>
</tr>
<tr>
<td>Schizoaffective Disorder</td>
<td>3.3</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>18.3</td>
</tr>
<tr>
<td>Depressive Disorder with psychotic features</td>
<td>5.0</td>
</tr>
<tr>
<td>Facility (%)</td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td>50</td>
</tr>
<tr>
<td>Non Acute</td>
<td>50</td>
</tr>
<tr>
<td>Living Arrangements (%)</td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>10</td>
</tr>
<tr>
<td>Alone</td>
<td>16.7</td>
</tr>
<tr>
<td>Rehabilitation Hospital</td>
<td>50</td>
</tr>
<tr>
<td>Other</td>
<td>23.5</td>
</tr>
<tr>
<td>Employment Status (%)</td>
<td></td>
</tr>
<tr>
<td>No current employment</td>
<td>86.7</td>
</tr>
<tr>
<td>Full time employment</td>
<td>3.3</td>
</tr>
<tr>
<td>Part time employment</td>
<td>5.0</td>
</tr>
<tr>
<td>Domestic duties</td>
<td>1.7</td>
</tr>
<tr>
<td>Studying</td>
<td>1.7</td>
</tr>
<tr>
<td>Retired</td>
<td>1.7</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
</tr>
<tr>
<td>Single, never married</td>
<td>73.3</td>
</tr>
<tr>
<td>Married</td>
<td>5.0</td>
</tr>
<tr>
<td>De facto</td>
<td>1.7</td>
</tr>
<tr>
<td>Separated</td>
<td>6.7</td>
</tr>
<tr>
<td>Divorced</td>
<td>10.0</td>
</tr>
<tr>
<td>Widowed</td>
<td>3.3</td>
</tr>
</tbody>
</table>
Materials

Clinical Measures

**Demographic measures**

Demographic data regarding age, gender, marital status, country of birth, years of education, living arrangements and employment status were gathered using questions based on the Diagnostic Interview for Psychosis (DIP) (Castle et al., 2005) (see Appendix A). Research has demonstrated validity and reliability for this instrument (Castle et al., 2005).

**Cognitive functioning**

The National Adult Reading Test (NART) was administered to obtain an estimate of each participant’s premorbid global cognitive functioning (Crawford, Deary, Starr, & Whalley, 2001). The NART comprises a list of 50 phonetically irregular words which respondents are required to read aloud (see Appendix B). The words do not follow common grapheme-phoneme correspondence rules, and thus are not correctly pronounced by simply applying the general rules of phonetics (Crawford, Deary, Starr, & Whalley, 2001). Responses are scored as correct or incorrect according to whether the pronunciation reflects an accepted standard. The resulting error score provides an estimate of premorbid general cognitive functioning. The NART has often been used to estimate premorbid IQ in people with schizophrenia, and has been found to be a reliable instrument for doing so (Smith, Roberts, Brewer, & Pantelis, 1998).
Clinical measures

Questions and probes derived from items on The Brief Psychiatric Rating Scale – Extended Version (BPRS-E) (Lukoff, Neuchterlein, & Ventura, 1986) were utilised in order to assess the presence and severity of participants’ symptoms of anxiety and depression. The BPRS-E is an interview schedule aimed at assessing psychiatric symptoms. The interviewer rates the participant’s self-report responses in relation to a variety of symptoms relating to mood, perception, thought content, behaviour, motor function, and other constructs. Behaviour and speech observed by the interviewer also contribute to the ratings. The questions used in the interview schedule for the current study investigated somatic concern and general symptoms of anxiety, along with feelings of guilt and general symptoms of depression (see Appendix C).

Hallucinations

Auditory verbal hallucinations and visual hallucinations were assessed using questions and probes derived from the Scale for the Assessment of Positive Symptoms (SAPS) (Andreason, 1984) (see Appendix D). The SAPS is an interview-style instrument commonly used to assess positive symptoms in schizophrenia and other psychotic disorders (Andreason, 1984). Items are rated by the interviewer on a scale of 0 to 5, ranging from the absence of symptoms (“None”) to the presence of “Severe” symptoms (voices occur often every day). The SAPS items utilised in the current study evaluated the presence, during the past month, of auditory verbal hallucinations, voices commenting, voices conversing, and visual hallucinations. For the purpose of the current research, a score of 2 (“Mild”) or more on any of the SAPS items indicated
the presence of the symptom being assessed. A score of 2 or more on the visual hallucinations item would have resulted in exclusion from the study.

**Delusions of Communication**

The Referential Delusions Interview (RDI) comprising detailed questions and probes – developed by Startup and Startup (2005) using descriptions of delusions of reference from psychiatric text books (McKenna, 2007) – was used to identify the presence of delusions of reference. Ratings were then made on the Referential Delusions Rating Scale (RDRS; Startup & Startup, 2005). The RDI and the RDRS can be seen in Appendix E.

The researcher rated five types of referential delusions of communication (DoC): these were verbal, non verbal, public media, animals, and inanimate objects/processes (Startup & Startup, 2005). Verbal DoC refers to whether the participant believes that information is being communicated using, for example, hints or double meanings, whereas ratings of Non Verbal DoC include the participant’s belief that information is being communicated through gestures, a person’s stance, or the clothing they wear. Public media DoC indicates the participant’s perception that information containing a special and personally relevant message is being communicated through the public media such as through the television or radio, or through magazines or the newspaper. DoC involving animals describes a participant’s belief that animals are communicating an implausibly complex message for them, and DoC concerning inanimate objects/processes involves the individual perceiving that a message is being communicated to them via objects or processes such as rainbows, flickering lights, machine noises, or the arrangement of objects.
The use of the RDI also allowed the researcher to gather and record qualitative information about the delusions experienced by the participant. This included the frequency of the delusion, the level of conviction held about its occurrence, the meaning associated with the delusion, the level of distress resulting from the delusion, how recently it occurred, and the impact it had upon the individual. This information contributed to the global rating of the participant’s delusions, and allowed for reliability checks to be conducted by an independent assessor. All of the items on the RDI were pertaining to the week and month prior to the assessment.

Participants’ responses to the questions and probes on the RDI provided information that the researcher then used to make an overall rating on the ‘Global Rating of Severity of Ideas and Delusions of Reference (Communication)’. This item is rated on a scale of 0 to 5, with 0 representing ‘None’, up to a score of 5 which was categorised as ‘Severe: Occurs Frequently’. For the purposes of the current study, delusions were rated as being present if the participant was convinced that they had occurred within the past month, and if the participant had experienced them anywhere from a mild (score of 2) up to a severe degree during that time.

**Self Referential Incidental Recall Task (SRIRT)**

The Self Referential Incidental Recall Task (SRIRT), is a list of 24 mixed positive (12) and negative (12) trait adjectives, which respondents nominate as self-descriptive or not self-descriptive (Bentall & Kaney, 1996). This instrument was administered in order to identify negative traits that participants either perceived as applying to themselves, or feared could apply to them. Three neutral adjectives are positioned at the beginning and end of the list in order to control for primacy and
recency effects (Bentall & Kaney, 1996). Upon completion of the SRIRT list, without prior warning, respondents are then asked to recall as many of the words from the list as possible (an immediate free recall task), and responses are recorded by the researcher (Bentall & Kaney, 1996; Lyon, Startup, & Bentall, 1999).

**Gesture interpretation task – pilot testing: stimulus selection**

It was not possible to utilise the video clips employed by Bucci et al. (2008a; 2008b) as there were not a sufficient number of clips for the purposes of the current study. Therefore, similar video clips for the gesture interpretation task were developed and piloted by Sakrouge (2010). Each clip was approximately two seconds in duration, and showed an actor making a movement which was either a gesture (e.g. waving to communicate “hello”) or an incidental movement (which was not intended to communicate any message). A pilot study was conducted using 24 of these clips selected by the researchers for potential use in an experimental task. The purpose of the pilot study was to validate the use of the clips, and ensure that gestures would be satisfactorily distinguished from incidental movements in the clips selected. The experimental task entailed 24 video clips being presented on a laptop computer, in random order. The video clips were developed and utilised in previous research by the chief investigator of the current project, Professor Mike Startup, and his previous Doctorate of Clinical Psychology student (Sakrouge, 2010), and permission was granted to use them in the current study. Twelve of the clips contained an actor making a movement which was a gesture (which was intended to communicate a specific meaning) while in twelve of the clips the actor made an incidental movement (which was not intended to communicate any specific meaning). The clips were presented on a laptop computer in a randomised order, and for each clip, participants
were required to rate the likelihood that the actor had made a gesture. Ratings were made on a 10 point Likert scale, ranging from Very Unlikely to Very Likely (see Appendix F).

The participants for the pilot study were 20 staff members (10 male and 10 female) between the ages of 19 and 58 (Mean age = 37, SD = 12.96) from the non-acute inpatient service at Morisset Hospital. Staff members were approached by the researcher and asked to participate on a voluntary basis. A brief verbal description of the task and an explanation of the purpose of the task was given to potential participants. Those who agreed to participate then arranged a time with the researcher to complete the task in a private room on the hospital ward. The participants in the pilot study were instructed on the task in the following way:

*I will be showing you some brief video clips today. Some of the clips will show an actor making a gesture, which is intended to convey a specific meaning, and some of the clips will show an actor making an incidental movement, which is not intended to convey a specific meaning.*

*I would like you to watch each clip, and then rate the likelihood that the actor made a gesture (to convey a specific meaning). The rating scale will be from 1 to 10, with 1 representing “Very Unlikely”, 5 representing “Can’t Be Sure”, and 10 representing “Very Likely”.*

The instructions were repeated for the participant if requested.

Mean scores and the standard deviations of the participants’ responses indicating the likelihood that each clip contained a gesture were calculated and can be seen in Table 2.

Overall, the results indicated that the gestures and the incidental movements were perceived by participants as the researcher had anticipated.

All twelve movements that were intended as gestures had a mean score of 9.5
or more out of 10 on the gesture likelihood scale, which was considered strong evidence that the participants perceived them as a gesture. Similarly, all twelve of the clips containing intended incidental movements had a mean score of 3.7 or below, which was considered as strong evidence that participants perceived these as incidental movements. Thus, the pilot study validated the use of the 24 chosen clips, with the results indicating that the gestures chosen were satisfactorily distinguishable from incidental movements in the videos selected.

**Gesture interpretation task – Main study**

For each of the 24 clips presented there were four interpretations provided as response choices, which included, in random order, (i) a true interpretation of the movement (if a gesture was shown), or an incorrect interpretation (if an incidental movement was shown); (ii) an alternative, incorrect interpretation of the gesture (a different gesture); (iii) one of the positive or negative traits listed on the SRIRT (randomised, never correct) (iv) not a gesture at all (true if an incidental movement). No audio content was present in the clips.
Table 2

Pilot data: participants’ gesture likelihood scores on the trial gestures and incidental movements.

<table>
<thead>
<tr>
<th>Gestures (G)</th>
<th>Gesture likelihood score</th>
<th>Incidental Movements</th>
<th>Gesture likelihood score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two thumbs up to indicate “That’s great”</td>
<td>9.9 (0.2)</td>
<td>Scratch neck 1.6 (1.0)</td>
<td></td>
</tr>
<tr>
<td>Shake head from side to side to indicate “No”</td>
<td>9.8 (0.5)</td>
<td>Check fingernails 2.2 (1.6)</td>
<td></td>
</tr>
<tr>
<td>Shrug shoulders to indicate “I don’t know”</td>
<td>9.7 (0.7)</td>
<td>Crack knuckles 2.2 (1.6)</td>
<td></td>
</tr>
<tr>
<td>Hand to ear to indicate “I can’t hear you”</td>
<td>9.8 (0.6)</td>
<td>Sneeze 1.5 (1.0)</td>
<td></td>
</tr>
<tr>
<td>Hand in front to indicate “Stop”</td>
<td>9.8 (0.4)</td>
<td>Unbutton shirt 2.9 (1.7)</td>
<td></td>
</tr>
<tr>
<td>Point towards self to indicate “I’m referring to me”</td>
<td>9.5 (0.8)</td>
<td>Tug on ear 2.6 (1.8)</td>
<td></td>
</tr>
<tr>
<td>Point in participant’s direction to indicate “I’m referring to you”</td>
<td>9.8 (0.6)</td>
<td>Play with ring 3.0 (2.9)</td>
<td></td>
</tr>
<tr>
<td>Nod head up and down to indicate “Yes, okay”</td>
<td>9.8 (0.5)</td>
<td>Rub eyes 2.9 (2.2)</td>
<td></td>
</tr>
<tr>
<td>Wave raised hand side to side to indicate “Hello”</td>
<td>9.8 (1.1)</td>
<td>Smooth eyebrows 3.7 (2.9)</td>
<td></td>
</tr>
<tr>
<td>Finger to lips to indicate “Shhh”</td>
<td>9.9 (0.4)</td>
<td>Brush hair with hand 2.3 (1.7)</td>
<td></td>
</tr>
<tr>
<td>Hand to lips and blow kiss to indicate “Love to you”</td>
<td>9.7 (1.2)</td>
<td>Roll neck and shoulders 2.4 (2.1)</td>
<td></td>
</tr>
<tr>
<td>Hand in front beckoning to indicate “Come here”</td>
<td>9.8 (0.7)</td>
<td>Stretch arms 2.4 (2.5)</td>
<td></td>
</tr>
</tbody>
</table>
Procedure

Participants were initially approached by their case manager (a nurse or occupational therapist) or treating psychiatrist and invited to participate in the study. A brief verbal description of the study and a copy of the information sheet (Appendix G) was provided to the individual at that time. If the individual agreed to meet with the researcher, an appointment was arranged for them to meet in a private room in the hospital ward. The researcher then provided written and verbal information outlining the aims, purpose and requirements of the study, and the potential risks and benefits. Limits of confidentiality, the use and storage of information, and avenues for complaint were also explained, and any questions that arose were addressed. Particular care was taken to communicate to each individual what was involved in participating in the research, that participation was voluntary, and that participation – or declining the invitation to participate – was not linked to their treatment as an inpatient. A consent form was then discussed and signed if the individual agreed to participate (Appendix H).

Altogether, the structured clinical interview and the gesture interpretation task took up to one hour to complete. All research tasks were administered over a single session, and were administered in a private room on the inpatient ward. All components of the interview and research task were presented in identical order for each participant: The NART, demographic questions, assessment of symptoms of anxiety and depression from the BPRS-E, SAPS questions, the RDI and, finally, the experimental task. All participants were offered a 5 minute break approximately half way through the session.
**Task description**

All participants were given the same instructions for the experimental task.

These instructions were as follows:

*There are times when people deliberately communicate some meaning to you with gestures. For example, if you were on the other side of the room and I wanted to speak with you, I might wave my hand like this (demonstrate beckoning) rather than yell across the room. However, there are also times when people make movements that are not meant to communicate anything at all (demonstrate smoothing hair). These are not gestures. What I would like you to do now is watch the clips on the computer screen and tell me what you think the actor’s movements mean. You will be given four possible interpretations of the movements to choose from. Does that make sense?*

The instructions were repeated for the participant if required.

**Equipment**

The stimuli (video clips) for the experimental task were presented using Presentation software, which is a stimulus delivery and experimental control program for the neurosciences. The stimuli were presented to the participant using a laptop computer with a 15” colour monitor which was transported to the hospital ward. The computer monitor was positioned 60cm in front of the participant at a right angle to the participant’s line of sight in order to provide optimal viewing. Participants responded to the stimuli by pressing their selected response number, from 1 to 4, on the keyboard of the laptop with their preferred hand. The data resulting from participants’ responses was then stored in a separate Microsoft Excel file on the laptop.
**Statistical analysis**

Following the clinical interview, statistical analyses were conducted on the data using the statistical software package SPSS 17.0. The results were analysed with generalised linear models with a binomial distribution and a logit link function. That is, they were analysed with logistic regression analyses with error scores as the dependent variable and the following variables as covariates: Global severity ratings of delusions of communication, global severity ratings of auditory verbal hallucinations, and their interaction, along with demographic characteristics (age, gender, age at onset (of illness), number of hospital admissions, acuity, diagnoses (anxiety, depression), and IQ.

The covariates listed above were selected as they were considered potential confounders. That is, a significant effect may have been possible with delusions of communication, however this could have been confounded by these covariates. For the purposes of the current study, the term acuity was used to describe whether the participant was in a ward (mental health unit) that is classified as an acute psychiatric inpatient ward, or in a psychiatric rehabilitation unit. Participants in the acute psychiatric inpatient ward were considered to have higher levels of acuity, and had been classified by their treating psychiatrist as “acutely” unwell. The client population of the (non-acute) psychiatric rehabilitation unit consists of people who have generally experienced long-term, chronic mental health problems and require longer-term hospital admissions and rehabilitation treatment options. The duration and chronicity of serious mental illness, along with longer hospitalisations has been linked to negative self-esteem and poorer levels of functioning including limited social skills and social networks (Anthony, 1993; Barrowclough et al., 2003; Rosenfield &
As such, it was considered possible that since the current study recruited participants from acute and from non-acute, longer-term inpatient facilities, the level of acuity may have had an influence on the misinterpretation of gestures.

Similarly, the number of hospital admissions, and the age at onset of the illness may have indicated factors which interfered with social functioning and development, or been linked to higher levels of negative self-esteem, thus these were also considered as potential confounders in the current study. A further justification for the inclusion of hospital admissions as a covariate, was that this variable has been shown to indicate a greater severity of mental illness (Australian Medical Association, 2011; Hofman, 1992).

Age was included as a potential confounding variable given that older age may be indicative of increased chronicity, poorer levels of general functioning, or higher levels of antipsychotic medication and associated cognitive impairment (Moncrieff & Leo, 2010).

Gender differences are commonly found in schizophrenia and other psychotic disorders, including in relation to symptom manifestation, and treatment outcomes (Groleger & Novak-Grubic, 2010; McGlashan & Bardenstein, 1990; Szymanski et al., 1995). Symptom differences can include emotional and affective aspects, social interaction, and aspects of executive functioning (Groleger & Novak-Grubic, 2010). It was in light of such findings that gender was included as a covariate in the current study.

As has been discussed earlier in the current paper, anxiety has been linked closely to the development and expression of delusions, along with the level of
persistence, conviction, and distress and functional limitations associated with delusions (e.g. Achim et al. 2009; Freeman, 2007; Garety et al., 2007; Jones & Fernyhough, 2008; Peralta & Cuesta, 2009; Startup, Freeman, & Garety, 2007). With research evidence demonstrating such associations, it was considered important to include anxiety as a covariate in the current investigation.

Similar to anxiety, depression-related material has been found to result in a recall bias in people with delusions (Bentall et al., 1995). Furthermore, findings by Bucci and her colleagues (2008a) may point to negative self-beliefs (which are often associated with depression) as an influence to the misinterpretation of non-verbal communication (Startup, Bucci, & Langdon, 2009).

With respect to the inclusion of IQ as a potential confounder, the cognitive impairments commonly found in people with psychotic disorders have been associated with a range of functional deficits, as well as greater symptom severity (Bouras et al., 2004; Harvey & Geyer, 2003; Harvey et al., 2006; Kitamura et al., 2007; Stefanopoulou, et al., 2009; Wolwer et al., 2008). This leads to consideration of IQ as a potential confounder for the current study.

Startup and Startup (2005) found differences between delusions of reference and auditory verbal hallucinations, in particular, auditory verbal hallucinations appear to operate through verbal channels, while delusions of communication operate through non-verbal channels. However, as evidence suggests that it is possible that both of symptoms indicate a difficulty in discriminating between one’s own internal thoughts and actions and the external world (Georgieff & Jeannerod, 1998), potentially leading to attribution of agency (e.g. one’s own intentions or actions) to an external source, the inclusion of auditory verbal hallucinations was warranted. Similarly, inclusion of the
interaction between delusions of communication and auditory verbal hallucinations as a potential confounder was warranted.

In order to identify the most parsimonious model, as covariates were added in, those that did not reach significance were removed from the model. The number of trials per participant in these analyses was 24 or 12, depending on the stimuli used for each particular analysis. For example, when investigating negative SRIRT words, the number of trials was reduced to 12.

Results

Assessor agreement

Prior to conducting analyses on the data, the reliability of the primary researcher’s ratings was investigated. During the clinical interviews, the primary researcher recorded participants’ verbal responses verbatim. To evaluate reliability, approximately one third ($N = 19$) of the response sheets were randomly selected and independently scored by the research supervisor. Intraclass correlations were calculated on the scores in order to establish the level of agreement between the primary researcher’s scores and the research supervisor’s scores of participants’ symptoms. The results of these analyses can be seen in Table 3.
Table 3

_Intraclass correlations between assessor ratings for individual SAPS, RDRS, and BPRS-E items (N = 19)_

<table>
<thead>
<tr>
<th>Items</th>
<th>Assessor Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Auditory Verbal Hallucinations (during the past month)</strong></td>
<td></td>
</tr>
<tr>
<td>Severity of auditory verbal hallucinations</td>
<td>0.95**</td>
</tr>
<tr>
<td>Severity of voices commenting</td>
<td>1.00**</td>
</tr>
<tr>
<td>Severity of voices conversing</td>
<td>0.93**</td>
</tr>
<tr>
<td>SAPS Global severity rating of auditory verbal hallucinations</td>
<td>0.95**</td>
</tr>
<tr>
<td><strong>RDRS (Delusions of communication)</strong></td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>1.00**</td>
</tr>
<tr>
<td>Non-verbal</td>
<td>0.78**</td>
</tr>
<tr>
<td>Public media</td>
<td>1.00**</td>
</tr>
<tr>
<td>Animals</td>
<td>0.86**</td>
</tr>
<tr>
<td>Inanimate objects/processes</td>
<td>0.00</td>
</tr>
<tr>
<td>Global severity rating of delusions of communication</td>
<td>0.85**</td>
</tr>
<tr>
<td><strong>BPRS-E items</strong></td>
<td></td>
</tr>
<tr>
<td>Somatic concern</td>
<td>0.86**</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.92**</td>
</tr>
<tr>
<td>Anxiety + somatic concern</td>
<td>0.93**</td>
</tr>
<tr>
<td>Depression</td>
<td>0.85**</td>
</tr>
<tr>
<td>Guilt</td>
<td>0.96**</td>
</tr>
<tr>
<td>Depression + guilt</td>
<td>0.91**</td>
</tr>
</tbody>
</table>

*Note: SAPS = Scale for the Assessment of Positive Symptoms (Andreason, 1984)  
RDRS = Referential Delusions Rating Scale (Startup & Startup, 2005)  
BPRS-E = The Brief Psychiatric Rating Scale – Extended Version  
** *p < 0.01*
There were strong positive correlations for all of the items except inanimate objects/processes, all of which were highly significant and indicated high levels of agreement between the two raters. Correlation coefficients for the items ranged from 0.85 to 1.00. Zero variance was found for inanimate objects. This was due to the fact that none of the participants who were independently rated reported any symptoms in this category.

The mean and standard deviation for words that were and were not endorsed, and that were and were not recalled were calculated and can be seen in Table 4. In this table it can be seen that more than twice as many positive words were endorsed ($M = 7.73, SD = 3.21$) than negative words ($M = 3.43, SD = 3.61$). A similar pattern was found with the positive endorsed and recalled words ($M = 1.72, SD = 1.44$) which were more than double the negative endorsed and recalled words ($M = 0.57, SD = 0.91$). More negative words that had not been endorsed ($M = 1.48, SD = 1.66$) were recalled by participants than positive words that had not been endorsed ($M = .58, SD = .77$) during the initial phase of the SRIRT. Overall, few words were recalled in any of the categories. Among the negative words, the mean number of non-endorsed words that were recalled ($M = 1.48, SD = 1.66$) was more than double the mean number of the words that were endorsed and recalled ($M = 0.57, SD = 0.91$). The mean total of positive words recalled (regardless of whether or not they had been endorsed) ($M = 1.15, SD = 1.28$) and the mean number of negative words recalled ($M = 1.03, SD = 1.41$) was approximately one.
Table 4

Mean (M) and Standard Deviation (SD) for endorsed, non-endorsed, and recalled SRIRT words

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive endorsed</td>
<td>7.73</td>
<td>3.21</td>
</tr>
<tr>
<td>Negative endorsed</td>
<td>3.43</td>
<td>3.61</td>
</tr>
<tr>
<td>Positive endorsed and recalled</td>
<td>1.72</td>
<td>1.44</td>
</tr>
<tr>
<td>Negative endorsed and recalled</td>
<td>0.57</td>
<td>0.91</td>
</tr>
<tr>
<td>Positive non-endorsed and recalled</td>
<td>0.58</td>
<td>0.77</td>
</tr>
<tr>
<td>Negative non-endorsed and recalled</td>
<td>1.48</td>
<td>1.66</td>
</tr>
<tr>
<td>Total positive recalled</td>
<td>1.15</td>
<td>1.28</td>
</tr>
<tr>
<td>Total negative recalled</td>
<td>1.03</td>
<td>1.41</td>
</tr>
</tbody>
</table>

The mean and standard deviation of the errors made on the gesture interpretation task were also calculated (see Table 5). The mean number of total errors made by participants was 3.28 (SD = 4.40), and the mean number of errors made that were either positive or negative SRIRT words was 1.37 (SD = 2.20). There were more negative SRIRT word errors (M = .82, SD = 1.31) made than errors that were positive SRIRT words (M = .55, SD = 1.06)
### Table 5

*Mean (M) and Standard Deviation (SD) of errors on the Gesture Interpretation Task (GIT)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total errors</td>
<td>3.28</td>
<td>4.40</td>
</tr>
<tr>
<td>Total SRIRT word errors</td>
<td>1.37</td>
<td>2.20</td>
</tr>
<tr>
<td>Negative SRIRT word errors</td>
<td>0.82</td>
<td>1.31</td>
</tr>
<tr>
<td>Positive SRIRT word errors</td>
<td>0.55</td>
<td>1.06</td>
</tr>
</tbody>
</table>

### Logistic Regression Analyses

Following the reliability check, statistical analyses were undertaken using generalised linear models based on the binomial distribution with log link function and 24 trials per participant. Separate analyses were conducted for each of the dependent variables in turn. In each analysis, the severity of delusions of communication was entered in a first step, followed by the severity of auditory verbal hallucinations in a second step, and the covariates in a third step. Finally, variables which were non-significant in the third step were excluded. The aim of this exercise was to develop the most parsimonious models, thus creating models which included only the variables which made significant independent contributions in predicting the outcome. Wald $\chi^2$ was utilised to ascertain the statistical significance, and the relative strength, of each coefficient in the model.
Negative self-esteem: Endorsed negative SRIRT words

An examination of the negative SRIRT words that had been endorsed was undertaken, and it was found that these accounted for 28.6% of responses. The covariate of delusions of communication were entered into the model alone, and this model was found to be significant (Likelihood Ratio $\chi^2(1) = 30.35, p < .001$), as were delusions of communication as a predictor variable ($\chi^2(1, N = 60) = 30.66, p < .001$).

The next step was to add in auditory verbal hallucinations, a model which was also significant (Likelihood Ratio $\chi^2(2) = 37.26, p < .001$). Both delusions of communication ($\chi^2(1, N = 60) = 23.32, p < .001$) and auditory verbal hallucinations ($\chi^2(1, N = 60) = 7.11, p < .01$) were individually significant.

The interaction between delusions of communication and auditory verbal hallucinations was then added to delusions of communication and auditory verbal hallucinations in the model (Likelihood Ratio $\chi^2(3) = 34.49, p < .001$), and delusions of communication were the sole significant predictor ($\chi^2(1, N = 60) = 12.35, p < .001$).

Further development of the model led to removal of the interaction between delusions of communication and auditory verbal hallucinations, and the addition of acuity, gender, IQ, age, age at onset, number of admissions, and anxiety and depression. This model was significant (Likelihood Ratio $\chi^2(10) = 81.16, p < .001$), and the predictor variables that were individually significant were delusions of communication ($\chi^2(1, N = 60) = 7.20, p < .01$), auditory verbal hallucinations ($\chi^2(1, N = 60) = 5.72, p < .05$), and depression ($\chi^2(1, N = 60) = 11.60, p < .01$).

In the final model for this analysis, the predictor variables of delusions of communication, auditory verbal hallucinations, acuity, anxiety, and depression were
entered, and the model was significant (Likelihood Ratio $\chi^2(5) = 75.70, p < .001$). Delusions of communication ($\chi^2(1, N = 60) = 7.68, p < .01$), auditory verbal hallucinations ($\chi^2(1, N = 60) = 4.08, p < .05$), acuity ($\chi^2(1, N = 60) = 9.77, p < .01$) and depression ($\chi^2(1, N = 60) = 12.90, p < .001$) were all found to be individually significant predictors in this model (see Table 6). The strongest predictor of endorsed negative SRIRT words was depression, followed by acuity, delusions of communication, and then auditory verbal hallucinations. Depression ($B = .13, SE = .04$), acuity ($B = .60, SE = .19$), delusions of communication ($B = .15, SE = .05$), and auditory verbal hallucinations ($B = .10, SE = .05$) all had a positive relationship with endorsed negative SRIRT words. These results demonstrate that delusions of communication and auditory verbal hallucinations were related to negative self-esteem independent of depression.

Table 6

Final model for endorsed negative SRIRT words on the gesture interpretation task

<table>
<thead>
<tr>
<th>Significant Covariates</th>
<th>$B$</th>
<th>Std Error</th>
<th>Wald Chi-Square (df = 1)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>.13</td>
<td>.04</td>
<td>12.90</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Acuity</td>
<td>.60</td>
<td>.19</td>
<td>9.77</td>
<td>&lt;.01**</td>
</tr>
<tr>
<td>Delusions (DoC)</td>
<td>.15</td>
<td>.05</td>
<td>7.68</td>
<td>.006**</td>
</tr>
<tr>
<td>Hallucinations (AVH)</td>
<td>.10</td>
<td>.05</td>
<td>4.08</td>
<td>.04</td>
</tr>
</tbody>
</table>

Note: ** $p < 0.01$
Acuity refers to whether the patient was classified as acutely unwell at the time of participation in the experimental task.
Gesture interpretation errors: Total errors on the gesture interpretation task

The analyses then focused on total errors made by participants on the gesture interpretation task. Analysis revealed that 13.7% of the responses were erroneous. When the global severity rating of delusions of communication (DoC) was entered into the model alone (Likelihood Ratio $\chi^2 (1) = 6.92, p < .01$), it was found to be significant ($\chi^2 (1, N = 60) = 7.35, p < .01$).

When the global severity rating of auditory verbal hallucinations (AVH) was added to delusions of communication in the model, the Omnibus test showed that the model was significant (Likelihood Ratio $\chi^2 (2) = 29.22, p < .001$), and that auditory verbal hallucinations were a significant predictor of errors ($\chi^2 (1, N = 60) = 23.88, p < .001$). However, with the addition of auditory verbal hallucinations, delusions of communication were reduced to non-significance.

The interaction between delusions of communication and auditory verbal hallucinations was then added, and this model was also significant (Likelihood Ratio $\chi^2 (3) = 36.75, p < .001$). Auditory verbal hallucinations ($\chi^2 (1, N = 60) = 4.62, p < .05$), and the interaction between auditory verbal hallucinations and delusions of communication ($\chi^2 (1, N = 60) = 7.31, p < .01$) were found to be individually significant.

The covariates of gender, acuity, FSIQ (IQ), age, anxiety, depression, age at onset (AAO), and number of admissions (admissions) were then added in. It was found that the model as a whole was significant (Likelihood Ratio $\chi^2 (11) = 130.60, p < .001$). Delusions of communication ($\chi^2 (1, N = 60) = 4.47, p < .05$), Auditory verbal hallucinations ($\chi^2 (1, N = 60) = 4.64, p < .05$), the interaction between auditory verbal
hallucinations and delusions of communication ($\chi^2(1, N = 60) = 9.53, p < .01$), IQ ($\chi^2(1, N = 60) = 28.83, p < .001$), depression ($\chi^2(1, N = 60) = 11.49, p < .01$), anxiety ($\chi^2(1, N = 60) = 44.11, p < .001$), and number of admissions ($\chi^2(1, N = 60) = 10.18, p < .01$) were all found to be significant.

The model was then adjusted to remove the non-significant covariates, thus it contained auditory verbal hallucinations and delusions of communication, along with their interaction and the covariates IQ, anxiety, depression, and number of admissions. This was found to be the most parsimonious model for total errors on the gesture interpretation task, and the model was significant (Likelihood Ratio $\chi^2(7) = 124.33, p < .001$). The results of this analysis can be seen in Table 7. In this model, the interaction between auditory verbal hallucinations and delusions of communication ($\chi^2(1, N = 60) = 12.70, p < .001$), IQ ($\chi^2(1, N = 60) = 24.62, p < .001$), depression ($\chi^2(1, N = 60) = 10.70, p < .01$), anxiety ($\chi^2(1, N = 60) = 48.32, p < .001$), and number of admissions ($\chi^2(1, N = 60) = 14.02, p < .001$) were all found to be significant.

Table 7

*Final model for total errors on the gesture interpretation task*

<table>
<thead>
<tr>
<th>Significant Covariates</th>
<th>B</th>
<th>Std Error</th>
<th>Wald Chi-Square (df = 1)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>.22</td>
<td>.03</td>
<td>48.32</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>IQ</td>
<td>-.04</td>
<td>.01</td>
<td>24.62</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>No of Admissions</td>
<td>.02</td>
<td>.01</td>
<td>14.02</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Hallucinations (AVH) * Delusions (DoC)</td>
<td>.09</td>
<td>.03</td>
<td>12.7</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Depression</td>
<td>-.12</td>
<td>.04</td>
<td>10.70</td>
<td>.001**</td>
</tr>
</tbody>
</table>

Note: ** p <0.01
As can be seen from Table 7, the interaction between auditory verbal hallucinations and delusions of communication was significant. For every increase of one in the interaction, there was an increase of .09 in total errors ($B = .09, SE = .03$). It was also found that increases (of one) in anxiety ($B = .22, SE = .03$) and number of admissions ($B = .02, SE = .01$) were associated with increases of .22 and .02 respectively in errors. Lower IQ resulted in increased errors on the task ($B = -.04, SE = .01$), and unexpectedly, lower depression scores were associated with more errors ($B = -.12, SE = .04$).

There was a positive association between the total number of errors and anxiety, the interaction between auditory verbal hallucinations and delusions, of communication and the number of admissions. That is, as each of these covariates increased, the number of errors also increased. Judging by the relative sizes of Wald $\chi^2$, anxiety was the strongest predictor of total errors, with a positive association, followed by number of admissions, and then the interaction between auditory verbal hallucinations and delusions of communication. Negative associations between total errors and IQ and, unexpectedly, depression were found, with IQ being the second strongest predictor of errors overall, and depression accounting for approximately the smallest proportion of the effect. The number of admissions was the third strongest predictor overall, followed by the interaction between auditory verbal hallucinations and delusions of communication and depression respectively. Each of these predictors was highly significant.

The interaction effect for total errors can be seen in Figure 1. The significant interaction was chiefly due to a disproportionate number of errors committed by participants who scored high on both DoC and AVH.
Non-gestures that were interpreted as gestures or that were interpreted as SIRIT words were then examined in order to test the hypothesis that people with delusions of communication would be more likely to perceive a gesture as present when it is not. This analysis also allowed for comparison with Bucci et al.’s (2008) findings that there was a bias for perceiving a gesture when it was not present, due to the presence of delusions of communication. It was found that non-gestures interpreted as SIRIT words or gestures accounted for 22.1% of the total responses. Initially, delusions of communication were entered as a predictor variable and the model was found to be significant (Likelihood Ratio $\chi^2(1) = 3.95, p < .05$), Delusions of communication were found to be significant in predicting these errors ($\chi^2(1, N = 60) = 4.09, p < .05$).
Auditory verbal hallucinations were then added to delusions of communication in the analysis, and the model was found to be significant (Likelihood Ratio $\chi^2(2) = 27.92, p < .001$). In this model, delusions of communication did not reach significance, however auditory verbal hallucinations were found to be a significant predictor or errors ($\chi^2(1, N = 60) = 24.98, p < .001$).

The next step in the analysis consisted of the addition of the interaction between delusions of communication and auditory verbal hallucinations (Likelihood Ratio $\chi^2(3) = 33.62, p < .001$). Auditory verbal hallucinations ($\chi^2(1, N = 60) = 6.71, p < .05$) and the interaction between delusions of communication and auditory verbal hallucinations ($\chi^2(1, N = 60) = 5.41, p < .05$) were significant predictors.

Delusions of communication, auditory verbal hallucinations, the interaction between the two, gender, acuity, IQ, age, age at onset, number of admissions, anxiety, and depression were then entered as the predictor variables. This model was significant (Likelihood Ratio $\chi^2(11) = 102.49, p < .001$). In this model, delusions of communication, auditory verbal hallucinations, the interaction between delusions of communication and auditory verbal hallucinations, IQ, age, number of admissions, anxiety, and depression were significant. The strongest significant predictor was anxiety ($\chi^2(1, N = 60) = 31.27, p < .001$), followed by IQ ($\chi^2(1, N = 60) = 17.69, p < .001$), number of admissions ($\chi^2(1, N = 60) = 11.98, p < .01$), depression ($\chi^2(1, N = 60) = 9.85, p < .01$), auditory verbal hallucinations ($\chi^2(1, N = 60) = 8.91, p < .01$), the interaction between delusions of communication and auditory verbal hallucinations ($\chi^2(1, N = 60) = 7.17, p < .01$), age ($\chi^2(1, N = 60) = 5.60, p < .05$), and delusions of communication ($\chi^2(1, N = 60) = 5.30, p < .05$).
In order to develop the final model, the next step involved the removal of the non-significant predictor variables of gender, acuity, and age at onset from the previous model. In this form, the model was found to be significant (Likelihood Ratio $\chi^2(8) = 99.11, p < .001$). Again, delusions of communication were not found to be a significant predictor of errors in this model. The variables which were significant predictors in this final model can be seen in Table 8. The strongest significant predictor of errors was anxiety ($\chi^2(1, N = 60) = 35.23, p < .001$), followed by IQ ($\chi^2(1, N = 60) = 17.41, p < .001$), number of admissions ($\chi^2(1, N = 60) = 13.48, p < .001$), auditory verbal hallucinations ($\chi^2(1, N = 60) = 10.11, p < .01$), depression ($\chi^2(1, N = 60) = 8.77, p < .01$), age ($\chi^2(1, N = 60) = 7.66, p < .01$), and the interaction between delusions of communication and auditory verbal hallucinations ($\chi^2(1, N = 60) = 6.99, p < .01$). Positive relationships were found between errors and anxiety ($B = .26, SE = .04$), auditory verbal hallucinations ($B = .23, SE = .07$), number of admissions ($B = .03, SE = .01$), the interaction between delusions of communication and auditory verbal hallucinations ($B = .09, SE = .03$), and age ($B = .03, SE = .01$), while IQ ($B = -.04, SE = .01$), and depression ($B = -.13, SE = .05$) were again found to have a negative relationship with errors.
Table 8

*Final model for errors whereby non-gestures were interpreted as gestures or SRIRT words on the gesture interpretation task.*

<table>
<thead>
<tr>
<th>Significant Covariates</th>
<th>B</th>
<th>Std Error</th>
<th>Wald Chi-Square (df = 1)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>.26</td>
<td>.04</td>
<td>35.23</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>IQ</td>
<td>-.04</td>
<td>.01</td>
<td>17.41</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>No of Admissions</td>
<td>.03</td>
<td>.01</td>
<td>13.48</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Hallucinations (AVH)</td>
<td>.23</td>
<td>.07</td>
<td>10.12</td>
<td>.001**</td>
</tr>
<tr>
<td>Depression</td>
<td>-.13</td>
<td>.05</td>
<td>8.77</td>
<td>.003**</td>
</tr>
<tr>
<td>Age</td>
<td>.03</td>
<td>.01</td>
<td>7.66</td>
<td>.006**</td>
</tr>
<tr>
<td>Hallucinations (AVH) * Delusions (DoC)</td>
<td>.09</td>
<td>.03</td>
<td>6.99</td>
<td>.008*</td>
</tr>
</tbody>
</table>

Note: ** p <0.01

The interaction effect for non-gestures seen as gestures or seen as SRIRT words can be seen in Figure 2. Similar to total errors, the significant interaction was primarily due to a disproportionate number of errors committed by participants who scored high on both DoC and AVH.
Figure 2. Non-gestures seen as gestures or SRIRT words and the interaction between DoC and AVH

**Negative interpretations**

Total errors with negative SRIRT words as the response were analysed in order to test the hypothesis that people with delusions of communication would make more negative interpretations on the gesture interpretation task. It was found that 6.8% of responses were negative SRIRT words among the 12 trials that included such words among the response options. The model with the predictor variable of delusions of communication initially included in this investigation did not yield a significant result. When auditory verbal hallucinations were added to delusions of communication (Likelihood Ratio $\chi^2(2) = 7.28, p = .026$), auditory verbal hallucinations were found to be significant ($\chi^2(1, N = 60) = 6.93, p < .01$). When the interaction between delusions of communication and auditory verbal hallucinations was added, the model was not significant.
Further development of the model consisted of the predictor variables of delusions of communication, auditory verbal hallucinations, acuity, IQ, age, gender, age at onset, anxiety, depression, and number of admissions (Likelihood Ratio $\chi^2(10) = 20.63, p = <.05$). It was found that auditory verbal hallucinations ($\chi^2(1, N = 60) = 7.71, p < .01$) and anxiety ($\chi^2(1, N = 60) = 6.81, p < .01$) were significant predictors in this model.

Analysis of the final model for total errors as negative SRIRT words (Likelihood Ratio $\chi^2(3) = 11.27, p < .05$), which included only auditory verbal hallucinations, delusions of communication, and anxiety can be seen in Table 9. In this model, both auditory verbal hallucinations and anxiety remained significant predictors of errors. Of the two, auditory verbal hallucinations ($\chi^2(1, N = 60) = 5.96, p < .05$) were the strongest predictor of negative SRIRT word errors over anxiety ($\chi^2(1, N = 60) = 4.06, p < .05$), and both had a positive relationship with negative SRIRT word errors. That is, increases in auditory verbal hallucinations ($B = .19, SE = .08$) and increases in anxiety ($B = .11, SE = .05$) were both associated with increased errors as negative SRIRT words.

Table 9

*Final model for total errors as negative SRIRT words on the gesture interpretation task*

<table>
<thead>
<tr>
<th>Significant Covariates</th>
<th>$B$</th>
<th>Std Error</th>
<th>Wald Chi-Square (df = 1)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hallucinations (AVH)</td>
<td>.19</td>
<td>.08</td>
<td>5.96</td>
<td>.02</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.11</td>
<td>.05</td>
<td>4.06</td>
<td>.04</td>
</tr>
</tbody>
</table>

Note: ** $p < .01$
The influence of endorsed negative traits on errors

Total errors with negative SRIRT words as the response were then analysed further to test the hypothesis that negative interpretations made by people with delusions of communication would be more likely if they have endorsed a negative trait(s) on the SRIRT. The predictor variables of delusions of communication, and negative SRIRT words that had previously been endorsed were entered into the model. This model was significant (Likelihood Ratio $\chi^2(2) = 7.83, p < .05$), and endorsed negative SRIRT words were found to be significant ($\chi^2(1, N = 60) = 7.05, p < .01$). The interaction between delusions of communication and negative SRIRT words that had been endorsed were then entered into the model. The model was significant (Likelihood Ratio $\chi^2(3) = 10.31, p < .05$), however none of the predictor variables yielded a significant result. When auditory verbal hallucinations were added into this model (Likelihood Ratio $\chi^2(4) = 14.93, p < .01$), auditory verbal hallucinations were found to be significant ($\chi^2(1, N = 60) = 5.00, p < .05$). The interaction between auditory verbal hallucinations and endorsed negative SRIRT words was then added in, and analysis indicated that this model was significant (Likelihood Ratio $\chi^2(5) = 16.48, p < .01$). In this form of the model, auditory verbal hallucinations were significant ($\chi^2(1, N = 60) = 6.22, p < .05$).

Further development of the model consisted of the addition of IQ, age, gender, acuity, age at onset, anxiety, depression, and number of admissions (Likelihood Ratio $\chi^2(13) = 26.92, p < .05$). It was found that auditory verbal hallucinations ($\chi^2(1, N = 60) = 6.60, p < .05$) and anxiety ($\chi^2(1, N = 60) = 4.46, p < .05$) were significant predictors in this model.
Analysis of the final model for total errors as negative SRIRT words (Likelihood Ratio $\chi^2(3) = 12.46, p < .01$), which included auditory verbal hallucinations, delusions of communication, and anxiety, can be seen in Table 10. In this model, only auditory verbal hallucinations ($\chi^2(1, N = 60) = 6.67, p < .05$) remained a significant predictor of negative SRIRT word errors. Auditory verbal hallucinations had a positive relationship with negative SRIRT word errors. That is, increases in auditory verbal hallucinations ($B = .16, SE = .06$) were associated with increased errors that were negative SRIRT words.

Table 10

*Final model for total errors as negative SRIRT words on the gesture interpretation task with the addition of the interaction between delusions of communication and endorsed negative SRIRT words.*

<table>
<thead>
<tr>
<th>Significant Covariates</th>
<th>B</th>
<th>Std Error</th>
<th>Wald Chi-Square (df = 1)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hallucinations (AVH)</td>
<td>.16</td>
<td>.06</td>
<td>6.67</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note: ** $p < 0.01$

**Suppressor effects**

As there were somewhat unexpected results in regard to depression as a predictor as errors, there was a possibility that suppressor effects were occurring. As such, further logistic regression analyses were conducted in order to compare the results of analyses with and without anxiety. The results of these analyses can be seen in Table 11. This table shows that for total errors, total errors as SRIRT words, total errors as positive SRIRT words, and non gestures interpreted as gestures or SRIRT
words, the addition of anxiety resulted in a change in the depression regression coefficient from negligible and non-significant to significant. In addition, the regression coefficients become more negative when anxiety is added to the model. Such findings suggest that a suppressor effect is occurring with these dependent variables.

As the total errors as negative SRIRT words remained non-significant, it appears that the suppressor effect occurred primarily with positive interpretations. In regard to negative self-esteem (i.e. endorsed negative SRIRT words), there was no evidence that a suppressor effect was occurring.

Table 11

*Analyses comparing the inclusion of anxiety to analyses without anxiety*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Depression: Without Anxiety as a Covariate</th>
<th>Depression: With Anxiety added as a Covariate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Errors</td>
<td>-.012</td>
<td>-.088</td>
</tr>
<tr>
<td>Total SRIRT Errors</td>
<td>-.055</td>
<td>-.115</td>
</tr>
<tr>
<td>Total Negative SRIRT Errors</td>
<td>-.026</td>
<td>-.075</td>
</tr>
<tr>
<td>Total Positive SRIRT Errors</td>
<td>-.113</td>
<td>-.155</td>
</tr>
<tr>
<td>Non Gestures as Gestures and as SRIRT words</td>
<td>-.023</td>
<td>-1.07</td>
</tr>
<tr>
<td>Endorsed Negative SRIRT words</td>
<td>.156</td>
<td>.132</td>
</tr>
</tbody>
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Note: **p <0.01  
NS = Non significant
Discussion

Previous research has provided important discoveries in relation to the individual symptoms of mental health disorders (e.g. Blakemore, 2003; Persons, 1986; Startup & Startup, 2005). The heterogeneity of symptom presentation found with individuals with schizophrenia and other psychotic disorders (Garety et al., 2007; Persons, 1986) provides a strong rationale for examining individual symptoms and for the pursuit of relevant and efficacious treatment for such symptoms. Startup and Startup (2005) were able to expand current knowledge of delusions of reference by identifying two subtypes of these delusions – delusions of communication and delusions of observation. Startup and his colleagues (Bucci et al., 2008a; Bucci et al., 2008b; Startup et al., 2009) have subsequently expanded upon the findings from the study by Startup and Startup (2005) that proposed that delusions of communication are a result of impaired reality discrimination in non-verbal communication channels. These subsequent investigations have led to the proposal that negative thoughts about the self result in misattribution to an external source, for example, the perception that such thoughts are being communicated by others. However, to date there has been no direct evidence provided that an individual believes that it is their own thoughts being communicated.

Given the high prevalence of delusions of reference (Sartorius et al., 1986; Startup & Startup, 2005; WHO, 1973), and the important yet limited investigations into the processes and underlying mechanisms associated with them, the pursuit of further knowledge in this area is imperative. The primary aim of the current study was to increase our understanding of the mechanisms underlying delusions of communication and the misinterpretation of gestures by people with a psychotic
disorder. This research sought to provide direct evidence that people experiencing delusions of communication perceive their own implicit and explicit self-evaluations as being communicated to them through other people’s gestures or incidental movements.

Results from the SRIRT

The mean number of positive words recalled on the SRIRT by the current sample was lower than the number recalled by depressed and manic individuals with bipolar disorder in Lyon, Startup and Bentall’s (1999) study which utilised the SRIRT. The mean number of negative words recalled on the SRIRT by the current sample was substantially lower than the number of negative words recalled in Lyon et al.’s (1999) study by both depressed and manic subjects. Similarly, the mean number of positive and negative words recalled on the SRIRT in the current sample was lower than the mean number recalled by depressed, persecutory deluded, and depressed deluded subjects in a study conducted by Bentall and Kaney (1996).

These findings are consistent with evidence which indicates that the self-referent encoding effect, whereby information and events interpreted as relevant to the self are preferentially processed and remembered, does not benefit people with schizophrenia (Harvey, Lee, Horan, Ochsner, & Green, 2011). Harvey and his colleagues (2011) employed an encoding and recognition memory task using self-referent personality trait adjectives – half positive and half negative. They found that with a self-referential memory task people with schizophrenia failed to show improved recognition with self-referent adjectives. Similar to these findings, Fisher and her
colleagues (Fisher, McCoy, Poole, & Vinogradov, 2008) conducted a study using a different self-referential memory task in which people with schizophrenia showed a significant impairment compared to normal controls. There are a number of implications for such findings. Firstly, this evidence is in direct conflict with the proposal in the current study that self-referent material is more likely to be deeply processed and recalled by participants. In a more general sense, self-referent processing is believed to be an important element of social functioning, contributing to such abilities as emotion recognition, self-reflection, and social cognition including interpersonal evaluation and comparison (Harvey et al., 2011). If people with schizophrenia have deficits in a self-referential task, it is likely to have broader social consequences.

**Negative self-schemas: Number of endorsed negative SRIRT words**

The number of negative words endorsed on the SRIRT has previously been used in research as a measure of negative self-schemas (Bentall & Kaney, 1996; Lyon, Startup, & Bentall, 1998; Williams, Healy, Teasdale, White, & Paykel, 1990). It was found in the present investigation that negative self-schemas as measured by endorsed negative SRIRT words were predicted by depression, acuity, delusions of communication and auditory verbal hallucinations. The analysis showed that delusions of communication and auditory verbal hallucinations were related to negative self-esteem, independent of depression. Similarly, in previous research Smith et al. (2006) looked at depression and negative self-evaluations and found that negative self-concept and persecutory delusions were associated, independently from depressed mood. Barrowclough et al. (2003) also found support for an independent association
between positive symptoms of psychosis and negative self-evaluations. However, it appears that this association specifically between negative self-evaluations and delusions of reference has not previously been identified.

Such independent links between self-schemas and positive symptoms have also been found by other researchers (e.g. Fowler et al., 2006; Kinderman, 2001; Krabbendam et al., 2002), and suggest that the relationship between negative beliefs and psychotic symptoms is bidirectional, in that delusional content and negative self-schemas reinforce and maintain each other (Barrowclough et al. 2003; Kinderman, 2001).

Barrowclough et al. (2003) noted that both positive and negative self-evaluations can be held concurrently, but the influence of positive self-evaluations in future outcome is yet to be investigated. The influence of positive self-beliefs warrants further investigation, given, for example, that some research into chronic depression indicates benefits for future outcomes and recovery (Brown et al., 1990). Thus, this is one potential direction for future research.

It will be important to establish whether directing therapeutic interventions towards self-esteem will effectively lessen or modify psychotic symptoms, or whether an improvement in self-esteem would occur when specific psychotic symptoms are targeted (Warman et al., 2010). It appears that either way, consideration of low self-esteem in treatment and interventions directed towards self-concept is likely to be clinically beneficial (Barrowclough et al., 2003; Warman et al., 2010).

There is a substantial body of research to support the link between depression and negative self-esteem, (e.g. Borton & Casey, 2006; Wenzlaff & Wegner, 2000;
Smith et al., 2006), and it stands to reason that depression and negative self-esteem would be associated. However, there was also an association found between acuity and negative self-esteem in the current study, in that non-acute participants had greater negative self-esteem than acute subjects. The duration of serious mental illness has been identified as potentially having an effect on self-esteem (Barrowclough et al., 2003). Factors that may impact upon self-esteem in a more chronic, longer-term population of people with severe mental illness include longer periods of hospitalisation, more severe functional limitations, poorer social skills and social supports (Anthony, 1993; Rosenfield & Wenzel, 1997), and greater rates of homelessness and role disruption. Such patients are likely to have been in inpatient facilities for greater periods of time or on multiple occasions and may have spent less time in independent living and employment. Acuity, however, was not a predictor of any type of error on the GIT.

Total errors: The interpretation of gestures

In regard to the proportion of responses that were errors, the patients in the Bucci et al. (2008) study interpreted 6.7% of gestures incorrectly, whereby in the current study, patients interpreted 5.3% of gestures incorrectly. Non-gestures were erroneously interpreted by 15.2% of Bucci et al.’s patient sample, while 22.1% of non-gestures were erroneously interpreted by participants in the current study. The proportion of errors made by people with delusions of communication in Bucci et al.’s study was 14.7% ($M = 2.94, SD = 0.57$), compared to 17.8% ($M = 4.27, SD = 5.54$) of errors made by people with delusions of communication in the current study. In Bucci et al.’s sample of people without delusions of communication, the proportion of errors
made was 4.7% ($M = 0.94, SD = 0.65$), while in the current study, people without delusions of communication made 12.31% errors ($M = 2.96, SD = 3.97$). From these comparisons it can be seen that, overall, participants in the current research project who reported delusions of communication made more errors than the participants who reported delusions of communication in the Bucci et al. (2008) study. This difference is likely to be due to the difference in the response options given on the interpretation task. In the current study, the response options included a non-gesture, a gesture, a negative SRIRT word, and a positive SRIRT word. In contrast, the response options offered in the Bucci et al study included two different gestures, a non-gesture, and an insulting interpretation. Thus, the participants in the current research project may have been more likely to choose an interpretation that was a SRIRT word, especially considering that half of the SRIRT words were positive.

Similar to Bucci et al.’s (2008a) hypothesis, the current study investigated whether the presence of delusions of communication would lead to an increased likelihood of a gesture being perceived as present when it is not. Delusions of communication were initially found to predict errors, which is consistent with Bucci et al.’s (2008) findings. However, when auditory verbal hallucinations were added to the model, delusions of communication were not found to independently contribute to errors. This result was contrary to Bucci et al.’s findings that auditory verbal hallucinations did not predict errors.

The interaction between delusions of communication and auditory verbal hallucinations was highly significant with regard to both total errors, and errors whereby non-gestures were seen as gestures or SRIRT words. That is, in both of these error categories, delusions of communication alone were not predictive of errors,
however auditory verbal hallucinations were, and when high levels of both auditory verbal hallucinations and delusions of communication were present, the error rate increased. It is possible that those participants with high scores on both auditory verbal hallucinations and delusions of communication have more severe and enduring forms of psychosis. These scores may be indicative of a diagnosis of schizophrenia in particular, as all individuals in the sample with both of these positive symptoms had a diagnosis of schizophrenia.

Unfortunately, the results of the current study did not reveal the relationships between delusions of communication and errors interpreting gestures that were expected. The findings included that a greater severity of anxiety and larger number of hospital admissions predicted a higher error rate, while lower levels of depression (an unexpected result) and lower IQ scores were found to result in a higher proportion of errors.

**Negative interpretations**

In relation to the prediction that people with delusions of communication would make more negative interpretations on the gesture interpretation task, the analysis revealed that it was, instead, auditory verbal hallucinations and anxiety that predicted negative interpretations made by participants. The analysis for the hypothesis that negative interpretations made by people with delusions of communication would be more likely if they had endorsed a negative trait(s) on the SRIRT, showed that it was auditory verbal hallucinations, rather than delusions of
communication or any other variable, which predicted negative interpretations under this condition.

It was not possible to conduct meaningful analyses to test the hypothesis that people with delusions of communication would be even more likely to make negative interpretations on the gesture interpretation task if they had both endorsed a negative trait(s) on the SRIRT, and recalled the negative trait(s) in the free recall task. This was due to the fact that there were not enough participants in this condition with delusions of communication to carry out the analyses, with a total of only two participants in this group.

Similarly, the lack of participants with delusions of communication prevented analyses being conducted to test the hypothesis that people with delusions of communication who recalled a negative trait(s) on the free recall task, despite not having endorsed it on the SRIRT, would be the most likely to make negative interpretations on the gesture interpretation task (that is, they would be more likely to project negative traits that they don’t think they have, but fear possessing). Although the main effects for delusions of communication were not a significant predictor for any of the error types, delusions of communication did enter into two significant interactions, and various other covariates significantly predicted a number of error types on the experimental task.

**Auditory verbal hallucinations**

The severity of auditory verbal hallucinations (AVH) was a significant predictor of total errors that were SRIRT words, and total errors that were negative
SRIRT words. It has been suggested that, in relation to the inability to correctly identify the agent of an action, people experiencing AVH may be inclined to interpret external cues as explicitly aimed towards themselves (Georgieff & Jeannerod, 1998) and incorporate external, environmental events to fit with their own personal experiences (Jeannerod, 1999). Consequently, they may incorrectly ascribe their own intentions and actions to others. This is similar to the type of process we would have expected in people with delusions of communication with our hypotheses, and may go some way to explaining the influence of AVH. That is, it may be that patients who were experiencing auditory verbal hallucinations interpreted the gestures and non-gestures as holding some meaning congruent with their auditory verbal hallucinations.

It is important to note that the findings that auditory verbal hallucinations predicted the misinterpretation of gestures in the current study are inconsistent with previous findings by Bucci and her colleagues (2008a; 2008b), which showed that AVH were not associated with errors on the gesture interpretation task. Furthermore, these results do not support the idea originating from research by Startup and Startup (2005) that delusions of reference are like auditory verbal hallucinations in that they arise from impairments in self-monitoring, but through non-verbal channels (Bucci et al., 2008a; Bucci et al., 2008b; Startup & Startup, 2005). However, Startup and Startup’s (2005) findings that auditory verbal hallucinations and delusions of reference were not associated was supported by the findings in the current study that the correlation between these two positive symptom groups was non-significant.

The recruitment pool included a range of psychotic disorders, with participants presenting with diagnoses that included schizophrenia, bipolar disorder, major depressive disorder with psychotic features, and schizoaffective disorder. From within
these diagnoses, people with auditory verbal hallucinations are more likely to have schizophrenia, and in fact only those in the current study with a diagnosis of schizophrenia reported auditory verbal hallucinations. Thus, it is possible that the auditory verbal hallucinations variable was differentiating people with schizophrenia.

Many theories regarding AVH propose that they reflect self-generated mental events (including one’s thoughts or inner speech) that are mistakenly attributed to external causes, and in fact it has been proposed that hallucinations arise from an inability to correctly discriminate between internally and externally generated stimuli (e.g. Behrendt, 1998; Bentall, 1990; Ditman & Kuperberg, 2005; Levine, Jonas, & Serper, 2004; Morrison, 2001; Stephane, Kuskowski, McClannahan, Surerus, & Nelson, 2010). Research into auditory verbal hallucinations and reality (source) monitoring has demonstrated that patients with AVH are more likely to show a misattribution bias whereby unpleasant thoughts are erroneously attributed to an external source (Ditman & Kuperberg, 2005; Morrison, 2001). In particular, such a bias is more pronounced when the material presented is emotionally valenced.

Poor social judgement has been associated with schizophrenia in general (Morrison, 2001). More specifically, as noted by Behrendt (1998), hallucinated voices may occur in the context of an individual noticing external factors which are related to their social fears and hopes, and it has been suggested that ongoing social stress associated with a psychotic disorder may result in increased likelihood that events will be perceived as communicating a social message to the individual. Social misinterpretations have also been attributed, at least in part, to poor self- and social knowledge, while a past history of traumatic experience may lead to faulty self-image and poor social knowledge, thus inaccurate interpretative patterns (Morrison, 2001).
Morrison (2001) reported that it has been postulated that, for some people, auditory hallucinations may play a role of defending against self-blame, thereby protecting one’s own self-concept, or at least assisting the person to cope with aspects of their negative self-concept.

Other support for an attributional bias was reported in a study with undergraduates predisposed to hallucinations (e.g. hallucinatory experiences) (Levine, Jonas, & Serper, 2004). Levine and her colleagues (2004) found support for an attributional bias for private events to be externally attributed to interpersonal events. In another study, Blakemore and associates (Blakemore, Smith, Steel, Johnstone, & Frith, 2000) found that people experiencing auditory hallucinations had difficulty in distinguishing between sensory experiences that were produced externally and those that were produced by themselves. They propose that self-produced and externally produced tactile stimulation are perceived differently in individuals with auditory hallucinations compared to those who are not experiencing auditory hallucinations.

The findings regarding auditory verbal hallucinations, deficits in reality monitoring, and the likely influence of self-concept and social factors provides the possibility that participants in the current study may have projected their own thoughts onto the actor in the videos in the experimental task. That is, they perceive their internally generated thoughts and thoughts about themselves as being expressed by the actor in the videos.

**Anxiety**

The severity of anxiety significantly predicted total errors, total errors that were SRIRT words, and total errors that were negative SRIRT words. Anxiety and
other emotional problems such as depression have been linked to social dysfunction and problems with interpersonal interactions such as misinterpretations of social cues and information, and problems identifying the emotions of other people (Demenescu, Kortekaas, den Boer, & Aleman, 2010; Koizumi et al., 2011). Anxiety and associated social interaction problems have a variety of interpersonal consequences, including emotional, behavioural, and perceptual difficulties (Heerey & Kring, 2007).

Anxiety in particular has been linked to a bias for selectively attending to threat-related information and an interpretive bias by which threatening or negative meanings of ambiguous information or stimuli are preferentially selected when multiple interpretations are available (Bar-Haim, Lamy, Pergamim, Bakermans-Kranenburg, & van IJzendoorn, 2007; Demenescu, Kortekas, den Boer, & Aleman, 2010; Koizumi et al., 2011; MacLeod & Cohen, 1993; Ouimet, Gawronski, & Dozois, 2009). People with social and other types of anxiety have been found to have a tendency to interpret social information, including other peoples’ reactions, voice, and facial expressions, more negatively than non-anxious individuals (Amir, Beard, & Bower, 2005; Coles, Heimberg, & Schofield, 2008; Cooney, Atlas, Joormann, Eugene, & Gotlib, 2006; Demenescu et al., 2010; Koizumi et al., 2001; Yoon & Zinbarg, 2008). Anxiety has been linked to a tendency for misinterpretation in a number of areas (Morrison, 2001). For example, anxious people tend to misinterpret physical sensations as signs that a heart attack or other catastrophe is imminent. Similarly, anxiety can result in people misinterpreting social cues as having meanings such as that others think poorly of them, when in fact this is not the case. These biases have been found across a range of anxiety disorders and age groups (Bar-Haim, et al., 2007).
Individuals with heightened anxiety are likely to hold schemas that are primed towards threat-related information. In addition, the perception of threat can be either conscious, or sub-conscious. It is possible that such threat includes threats to one’s self-esteem or self-concept. Research indicates that anxiety influences the processes of both attending to and interpreting social information, and one hypothesis for the attentional bias towards threat-related material in people with high levels of anxiety is that it is a reflection of their orientation towards identifying and addressing potential threats. Furthermore, in their meta-analysis, Bar-Haim et al. (2007) found that people with clinical anxiety and those with high self-reported levels of anxiety had equivalent threat-related bias, and that the magnitude of the bias was similar across different types of anxiety disorders. They further note that research has shown that successful treatment of anxiety has resulted in remission or extinction of the threat-related bias in patients.

A robust bias toward threat-related material has been identified in the literature and, at least social anxiety, is largely and frequently based on fear of negative evaluation by others (Yoon & Zinbarg, 2008). People with high levels of social anxiety have also been found to be more prone to interpreting others’ reactions towards them as negative (Pozo, Carver, Weflens, & Scheier, 1991). Given this, it would stand to reason that an experimental task that provides multiple interpretations of another person’s non-verbal behaviour, including a negative evaluation (e.g. “You are inferior” or “You are useless”) may result in an increased likelihood that anxious participants will choose negative responses.

Psychosis and related symptoms, including delusions, are frequently found to coexist with anxiety and other affective disorders (Jablensky et al., 1999). However,
it has been suggested that, because psychosis is typically identified as the severe and predominant problem, the importance of emotional factors are seen as comparatively inconsequential and therefore their role and influence are neglected (Freeman & Garety, 2003). In addition, historically, diagnostic principles regarding comorbid anxiety disorders and schizophrenia spectrum disorders often resulted in inadequate diagnosis and treatment of anxiety in people with schizophrenia (Achim et al., 2006). Changes to these principles over time, and a wider acceptance that anxiety and affective disorders are part of the schizophrenia and psychosis presentation (Keef, Poe, McEvoy, & Vaughan, 2003), have led to an increasing awareness that improvements in functioning and outcomes are achievable (Achim et al., 2006), and that treatments may be more efficacious with increased recognition of and focus on the presence of affective components.

**The influence of IQ**

IQ was found to be a predictor of total errors and total errors whereby incidental movements were interpreted as gestures or SRIRT words on the gesture interpretation task. This relationship was such that poorer IQ predicted a greater proportion of errors made by participants.

Cognitive impairment is commonly found in people with schizophrenia (e.g. Kenny et al., 1997; MacCabe & Murray, 2004; Wilk et al., 2005) and other psychotic disorders (e.g. Basant et al., 2008; Harvey et al., 2010). The current sample had a mean IQ \( (M = 95.13) \), which is lower than the average of the general population \( (M = 100) \). It is now generally accepted that the functional deficits observed in people with
schizophrenia and other psychotic disorders are largely determined by cognitive impairment (Harvey & Geyer, 2003; Harvey et al., 2006; Kitamura et al., 2007; Stefanopoulou et al., 2009; Wolwer et al., 2008). Studies have found that in people with schizophrenia spectrum disorders, poor intellectual functioning is associated with higher symptom severity and decreased functional abilities (Bouras et al., 2004) compared with those with a higher IQ. Pertinent to the current investigation, Bouras and colleagues (2004) suggest that lower IQ scores and incorrect social assumptions may be linked in people with schizophrenia spectrum disorders.

Other studies also indicate that problems in social perception are associated with decreased social functioning and cognitive and neuropsychological impairment (Addington, Saeedi & Addington, 2006b; Stefanopoulou et al., 2009). This is consistent with evidence that shows social functioning involves social cognition, in which people are required to process and interpret social information presented through social interaction (Addington, Saeedi & Addington, 2006b). Cognitive deficits and dysfunction in people with schizophrenia are believed to account for a large proportion of psychosocial impairment (Marder, Fenton, & Youens, 2004), including in the areas of communication, speech and language, affect recognition, and social interaction (Docherty, 2005; Docherty et al., 2006). In addition, researchers have provided evidence consistent with the theory that cognitive deficits may be responsible, at least in part, for difficulties in identifying self-generated internal mental events (e.g. thoughts), leading to the conclusion that these events are attributable to an external source (Keef et al., 2003). Furthermore, reality monitoring, (whereby individuals distinguish whether stimuli are self-generated or generated by an external source) has been found to be deficient in patients with cognitive impairment and positive symptoms (Keef et al., 2003; Turken et al., 2003).
Given the findings regarding cognitive function and schizophrenia spectrum disorders, it is not surprising that lower IQ scores were found to be a predictor of errors.

**Number of Admissions**

Number of admissions to psychiatric hospital was found to be a significant predictor on the analyses of total errors, errors where non-gestures were interpreted as gestures or SRIRT words and total errors as SRIRT words. Number of admissions has been found to be an indicator of greater severity of illness (Australian Medical Association, 2011; Hofman, 1992), and has been associated with deficits in a number of areas of functioning, including social functioning. It is also possible that those who have had a higher number of inpatient hospital admissions were taking higher doses of antipsychotic medication, and/or that the side effects of their medication may have contributed to impairments in areas of functioning relevant to the experimental task (Jablensky et al., 1999). Such side-effects may include sedation, cognitive impairment such as difficulty concentrating and mental slowing, and lack of motivation (Moncrieff, Cohen, & Mason, 2009).

**Age**

Age was a significant predictor of errors where non-gestures were interpreted as gestures or SRIRT words, and total errors as SRIRT words. It is possible that, as schizophrenia and other psychotic disorders commonly emerge between late adolescence and late 20s (APA, 2000), older age may indicate a more chronic and
long-standing course of the illness and greater levels of general dysfunction. Furthermore, duration and dosage of medication may be higher in older adults, thus as mentioned previously, medication side effects such as cognitive problems and sedation may have been a factor in errors on the experimental task. In addition, antipsychotic drug effects have been linked to reduced brain volume and poorer cognitive function (Moncrieff & Leo, 2010).

**Depression**

Depression significantly predicted total errors, total errors as negative SRIRT words, and errors whereby non-gestures were interpreted as gestures or SRIRT words. However, the association between depression and errors in all of these categories was unexpectedly that higher levels of depression predicted fewer errors.

In relation to depression, the analyses for the current research project also showed that it was likely that a suppressor effect was occurring with anxiety and depression. A suppressor effect occurs when the inclusion of a covariate results in a larger magnitude of relationship between another covariate and the dependent variable (MacKinnon, Krull, & Lockwood, 2000). The suppressor variable serves to suppress irrelevant variance in other predictor variables, allowing for a more precise estimate of the criterion-predictor relationship (Lancaster, 1999). In the current investigation, when depression was entered into the model in the absence of anxiety, the coefficients did not reach significance. However, when anxiety was added into the equation, increased levels of depression had a significant negative association with errors. That
is, the inclusion of anxiety appears to have increased the effect of depression in the model.

This occurred because the measure of depression initially consisted of a combination of both anxiety and depression, thus the addition of anxiety to the model resulted in a more pure measure of depression because it allowed for the anxiety component of the depression measure to be controlled for, and revealed the true nature of the relationship between depression and errors on the GIT.

One potential explanation for such a relationship – whereby increased levels of depression predicted fewer errors – may be linked to the concept of depressive realism (Dobson & Franche, 1989). Depressive realism refers to the findings that normal human thought processes often include the ‘illusion’ or false, unrealistically positive interpretations of reality (Taylor & Brown, 1988). With depressive realism, people are likely to be overly positive in their evaluations of themselves and the world, exaggerate their estimated level of personal control, and be unrealistically optimistic. These illusions have found to be even more likely if a threat to the self is perceived, and may function as an effective adaptive strategy for protecting against stress, psychological distress, depression, and threats to one’s self-esteem. Such illusions have been linked to increased levels of happiness, improved mood, lower levels of distress, and self-serving causal attributions. Conversely, people with poor self-esteem and/or people who are depressed tend to hold more realistic self-perceptions, including perceptions of personal control. Furthermore, normal social interactions and connections serve to positively reinforce favourable self-views. As people with depression or low self-esteem may have poorer social skills and networks to provide the level of positive feedback and refute negative self-impression, they may be less
likely to develop some of the overly positive self-evaluative tendencies (illusions). People with depression then, are more likely to make more accurate appraisals under some circumstances (Dobson & Franche, 1989). Thus, in the current study a more realistic process of interpretation and a lower likelihood that reality distortion will occur in an attempt to maintain self-esteem and optimism (Taylor & Brown, 1988) may, at least in part, account for the finding that those with higher levels of depression were associated with fewer errors.

**Projection of unwanted thoughts**

Research indicates that anxiety and psychological distress are associated with thought suppression (Jones & Fernyhough, 2008). Furthermore, attempts to suppress anxious thoughts and feelings are likely to paradoxically increase the frequency of the thoughts. Thus, according to these findings, if participants were attempting to suppress thoughts that were anxiety-provoking, this could result in increased levels of anxiety.

Newman et al. (1997) maintained that suppressing thoughts of negative personal traits increases the perception of those traits in others. It is possible that this resulting hyper-accessibility may then lead the individual to perceive those particular traits in the behaviour of other people. In line with the current study, Newman et al. (1997) suggest that it would be a worthwhile endeavour to further investigate whether suppressing thoughts about one’s own negative traits results in increased attributions to the ambiguous behaviour of external others. Similarly, we suggest that it may be useful for future research to continue to examine the role of thought suppression in delusions of reference, in particular delusions of communication, depression, anxiety, auditory verbal hallucinations, and related anomalous perceptual experiences (Jones &
Fernyhough, 2008). Such research might compare people with delusions of communication to people with generalised anxiety disorder, or other mood disorders. Likewise, investigations may focus on potential similarities or differences between delusions of reference or delusions of communication, affective disorders, and auditory verbal hallucinations.

If further research implicates thought suppression in the formation and persistence of particular symptoms, and subsequently problems with the correct interpretations of gestures and other non-verbal behaviour, this would be important in informing future treatment protocols (Jones & Fernyhough, 2008). For example, encouraging people with psychotic or affective symptoms to express their thoughts and beliefs may address some of the problems associated with suppression. According to Sparrow and Wegner’s (2006) research findings, this could, in itself, lead to the deactivation of intrusive thoughts. It may also inform cognitive models about the role that thought suppression has in symptoms formation and maintenance (Jones & Fernyhough, 2008).

**Defence**

Similar to the concept of suppression, the small size of the current sample who reported delusions of communication prevented testing of defence processes. As previously discussed, one of the predominant theories regarding auditory verbal hallucinations and delusions is that they act as a defence against negative emotion (Freeman & Garety, 2003). However, debate regarding this theory continues (Warman et al., 2010). One particularly interesting proposal has been put forward by Warman et al. (2010) which suggests that at sub-clinical levels of delusions (or unusual beliefs)
self-esteem can be compromised, however when the severity of the delusional ideation reaches clinical significance, it begins to function as a defence mechanism. Further research into this theory, and whether such a process occurs with misattribution and auditory verbal hallucinations, may provide important insights into the relationship between delusions and self-esteem.

**Startup et al. 2009 theoretical model**

As previously outlined, Startup et al. (2009) introduced an innovative model aimed at providing an account of the four elements central to the phenomenology of delusions of communication. Their model offers a framework for investigating the underlying processes of these delusions, and they have found preliminary support for the model in the literature. However, the results of the current study do not support the model put forward by Startup, Langdon, and Bucci (2009). For example, the results do not provide evidence that erroneous processing of gestures are occurring for people with delusions of communication, nor is there support for the proposal that people with delusions of communication perceive that they have identified a self-referent or overly negative non-verbal communication.

**Strengths**

The current study attempted to build upon previous research (Startup & Startup, 2005; Bucci et al., 2008a; Bucci et al., 2008b) that has provided important advances in our understanding of delusions of reference. One of the strengths of the
current study is the focus on individual symptoms for investigation. This is particularly useful given the heterogeneity of symptom presentation in schizophrenia and other psychotic disorders (Garety et al., 2007), and the progress achieved in our understanding of symptoms and disorders using a single symptom approach to research (e.g. Blakemore, 2003; Persons, 1986; Startup & Startup, 2005).

A second strength in the current study was the use of an experimental task designed to measure both overt and covert self-evaluations (Smith et al., 2006). It may be beneficial in future research to measure these constructs across time (Bentall et al., 1994) and before and after treatment.

A further strength of the study was the investigation and identification of the influence of individual covariates upon the errors made by participants. This allowed for comparison of the relative influence of each covariate, and comparison across different error types. Furthermore, the use of an actor in the videos provided a task which is likely to be more ecologically valid than, for example, written tasks.

**Limitations**

*Under-representation of delusions of communication*

One of the main limitations in this study was the small number of participants who reported delusions of communication, particularly as this prevented the last two hypotheses being tested. Despite a number of studies identifying a high prevalence of delusions of reference (e.g. Sartorius et al., 1986; Startup & Startup, 2005; WHO, 1973), only a small proportion of the current sample reported delusions of reference. It is possible that, as the experimental task was administered to inpatient participants in
both acute and non-acute settings, there may have been different factors that affected which individuals in these settings consented to participate in the research project. In addition, the perceived consequences for reporting of symptoms or their severity by patients in acute versus non-acute settings may similarly have influenced the reporting of symptoms. In some instances in acute inpatient units, the impetus upon staff is to free up beds for the most acute and risky patients. Thus, patients who pose the greatest risk of harm to themselves or others, or those with the highest level of dysfunction are kept for longer periods in inpatient facilities. Such patients may have been more likely to have persecutory delusions or predominant positive symptoms other than delusions of reference, and may be more likely to decline to participate in the project or be ineligible to participate (Freeman, 2007). In addition, those whose symptoms remit rapidly may not remain in inpatient wards long enough to be approached and asked to participate.

Conversely, the reporting of psychotic symptoms in non-acute inpatient units, may be seen by patients as carrying punitive consequences (such as increases in medication or a longer duration of stay in hospital), thus decreasing the likelihood that patients would feel confident to freely report such symptoms despite assurances of confidentiality.

In addition, as with most studies, participants were included in the research only if they had given informed consent to do so, which in itself may limit how representative the sample is of people with psychosis (Smith et al., 2006). For example, people who hold the strongest delusional beliefs, are most preoccupied, are more paranoid, and experience the most distress may be the least likely to participate (Freeman, 2007). The most anxious patients are less likely to participate, and those
who have the most severe symptom presentation may be deemed unable to give informed consent. Furthermore, recruitment can be largely dependent upon staffing levels, the degree of cooperation from medical staff and case managers, and the way research participation is presented to potential participants.

A further consideration in the interpretation of the results is that the sample was comprised predominantly of males. Give that females with schizophrenia have been found in general to have better premorbid functioning, higher levels of cognitive functioning, and the age of onset of the illness is later than for males, (Leung & Chue, 2000), the smaller representation of females within the inpatient units in the current sample is unsurprising. Furthermore, females with schizophrenia and other psychotic disorders are likely to experience fewer negative symptoms, respond more successfully to antipsychotic medication (at least, prior to menopause), and generally experience short to medium-term illness effects that carry fewer negative impacts than for males (Leung & Chue, 2000).

**Single symptom research**

There is discrepancy across studies regarding research into psychotic disorders in general, which also goes for research investigating delusions, with some studies including delusions of reference with persecutory delusions, while other studies separate these in their investigations. Such variability in the research provides an impetus for more single symptom research in order to elucidate the nature of specific delusions and the variables that contribute to their development and maintenance (Persons, 1986).
Research that is specific to a particular symptom or construct is more likely to produce information that informs our knowledge of psychosis and interpersonal dysfunction in psychotic disorders (Penn et al., 2001). Such research can elucidate how and what processes underlie psychosis. The clinical implications for single symptom research include the development of targeted interventions that focus on ameliorating specific problems (such as the misinterpretation of gestures / body language) (Bentall, 1990; Garety et al., 2001). This is likely to be particularly beneficial given the heterogeneity of symptom presentation in schizophrenia and other psychotic illnesses (Garety et al., 2007), which if treated too broadly, may not address an individual’s needs.

**Implications**

The current research findings raise a variety of potential implications across a range of areas. In particular, the low levels of delusions of communication identified and the poor recall for negative SRIRT words across the sample leads the researchers to view the current results as tentative. The results as interpreted may be useful for consideration and the development of future research, which it is hoped can clarify and expand on the current findings.

**Anxiety**

There is a growing interest in the ways in which psychosis and emotion interact (e.g. Chadwick & Birchwood, 1994; Frith, 1992). Previously, diagnostic principles regarding comorbid anxiety disorders and schizophrenia often resulted in inadequate diagnosis and treatment of anxiety in people with schizophrenia (Achim et
al. 2009). Although the findings in this study did not link delusions of communication to erroneous interpretations of gestures, anxiety commonly co-occurs with psychotic symptoms, and the presence of anxiety was found to negatively impact participants’ ability to correctly interpret gestures. As has already been shown in research and clinical practice, cognitive behaviour therapy (CBT) has been effective in the treatment of delusions and hallucinations as well as the treatment of affective disorders (Freeman & Garety, 2003). Given that emotional processes are involved in the development and maintenance of delusions and hallucinations, treating the affective component of an individual’s presentation may also alleviate positive psychotic symptoms and the distress associated with them. It is suggested that increased focus on the associations between emotion and psychotic symptoms in clinical research and practice may result in more beneficial theoretical and clinical conceptualisation.

Another area for consideration is the use of medication (Garety et al., 2007). Kinderman (2001), for example, postulated that if worry processes contribute substantially to dysfunctional attributions, medication such as selective serotonin reuptake inhibitors (SSRIs) may be indicated. That is, SSRIs may assist in the reduction of anxiety, which subsequently could decrease dysfunctional attributions. Findings from the current study raise the question as to whether, or to what extent, pharmacological treatment of anxiety and/or specialised treatment approaches to address anxiety can assist in concurrently alleviating dysfunctional attribution patterns.
Previous researchers have advocated for further investigations into social functioning and specific perceptual disturbances in people with schizophrenia which influence causal attributions about other people’s intentions and actions (Green, Williams, & Hemsley, 2000). The ability to correctly interpret gestures may have direct relevance for social functioning, such as interpersonal communication, and social learning and development. The findings in the current study provide some direction for future investigation and intervention, such as further exploration of how and to what extent auditory verbal hallucinations, the interaction between auditory verbal hallucinations and delusions of communication, anxiety, acuity, and depression interrupt the ability to correctly interpret other people’s non-verbal behaviour. It would be of interest for future research to investigate whether, or how, gesture interpretation generalises to broader measures of social functioning and social skills.

CBT has been found to be effective for reducing negative self-attributions and subsequently improving symptoms of depression (Kinderman, 2001). These findings may indicate a number of avenues for consideration. Promoting changes to attributional style may improve therapeutic outcome in depression, and may also generalise to other conditions. As CBT has been shown to be successful in the treatment of dysfunctional attributional styles, delusions, hallucinations, and emotional dysfunction, including altering patients’ explanation of the causes of personal events and experiences, and improving self-concept, its use holds promise as a viable treatment option to address complex and multifactorial psychotic and affective
disorders and associated deficits. However, a better understanding of the processes that help improve dysfunctional attributions is required.

**Future directions**

Although there were a number of limitations to the current study, it has led to a number of potential directions for future empirical enquiry. In regard to further research, it may be valuable to investigate whether the associations found in the current study are stable across the course of the psychotic illness, by utilising a longitudinal design. Such an approach could provide increased understanding of how negative beliefs, anxiety, depression, the interpretation of gestures, and delusions of communication and auditory verbal hallucinations are linked to psychosis and to each other. That is, for example, whether they remain stable or whether changes occur due to changes in psychosis or individual variables, or vice versa (Smith et al., 2006). It could also be useful to look at the efficacy of simultaneously treating the affective and psychotic components of schizophrenia spectrum disorders compared to targeting psychotic or affective components alone.

**Attribution**

It is increasingly being accepted by researchers and clinicians that therapy, and particularly CBT, can result in changes and improvements for people with dysfunctional attributional patterns (Kinderman, 2001). However, further research is required to elucidate the processes involved in how causal attributions are made and improved.
In one study by Bentall and Kinderman (1999), positive feedback was found to increase internal attributions for positive outcomes in anxious subjects. Bentall and Kinderman (1999) have subsequently hypothesised that this indicates changes in self-representations, which increases the likelihood that a person will experience themselves as successful, and increases the probability that they will make internal positive attributions. Perhaps the current study could be extended to provide positive feedback (e.g. such as verbal prompts like “correct”, “yes”, “good” on a task) to begin exploring this and the effect on anxious participants. In addition, Bentall and Kinderman’s (1999) proposal may have implications for treatment. For example, it may be beneficial to provide opportunities in which a person is more likely to experience success, which may lead to increased flexibility in explanatory frameworks, thus an increased likelihood that the person can access positive self-representations. As has been noted by Bentall and Kinderman (1999), experiencing success usually leads to a more positive mood and increased motivation, and possibly allows positive self-representations to become more accessible. These factors in themselves may make it more likely that an individual will engage in and persist with therapy.

**Self-concept**

Self-perception and the perception of social stimuli are important factors in social functioning for people with schizophrenia (Penn et al., 2001). However, studies in these areas are relatively few in number, and the nature of the relationships between such variables remains somewhat neglected. In addition, investigations into whether particular subgroups of symptoms are linked to different elements of social
functioning are lacking. As such, it is hoped that this single-symptom study contributes to the stimulation of research focusing on specific symptoms, the factors that influence them, and their role in social dysfunction.

Social

It is largely accepted that social dysfunction contributes to social disadvantage and poor social support experienced by people with psychotic disorders (Penn et al., 2001). Social functioning can, in part, be negatively influenced by an inability to correctly interpret social cues including non-verbal behaviour. This can potentially lead to many negative and detrimental flow-on effects and subsequently poorer outcomes for these populations. Given that psychotic and affective disorders are commonly associated with significant social impairment, it is important that any attempts to develop therapeutic treatments consider the need for skills to generalise to the community and to an individual’s daily social functioning, in ways that can be maintained by the individual (Penn et al., 2001). In particular, it is likely that improving a person’s ability to understand others’ intentions (e.g. through gestures and other non-verbal forms of language, as well as through verbal interaction) across a variety of contexts and situations will provide generalisable skills and promote the maintenance of such skills.

Conclusion

In the current study, a number of factors contributed to the misinterpretation of gestures. These were anxiety, auditory verbal hallucinations, the interaction between
auditory verbal hallucinations and delusions of communication, IQ, acuity, and depression. Unfortunately, the results did not support the predictions that people with delusions of communication would make more errors when interpreting gestures, and were not consistent with conjectures by Startup and others (Startup & Startup, 2005; Bucci et al., 2008a; Bucci et al., 2008b) that delusions of communication arise from impairments in self-monitoring through non-verbal channels. The results also did not support Startup and his colleagues’ (Startup, Langdon, & Bucci, 2009) proposed model of delusions of communications. However, these studies combined with the current research implicate psychotic symptoms and affective disorders, particularly anxiety, in problems with gesture interpretation, which subsequently impacts upon social functioning.

Although the current research did not identify a link between gesture interpretation and delusions of communication, previous research into these symptoms has provided important new information for people experiencing delusions. This provides impetus for ongoing research into the processes and consequences associated with delusions of reference to develop a clearer framework upon which effective treatment options can be formulated. The use of more complex and experiential interpersonal and emotional experimental tasks (Green, Williams, & Hemsley, 2000), and longitudinal research designs, may help to further elucidate the mechanisms underlying the interpretation of gestures in people with psychotic disorders and the associated social consequences.

An additional research question for future investigation may be ‘How can the developments in the understanding of the relationship between problems with gesture interpretation and individual symptoms be used most effectively to improve
psychological treatments?’. Furthermore, what is the best way forward with such investigations?

Despite limitations, the current study has provided some preliminary information about some of the factors involved in gesture interpretation in people with psychosis. It is hoped that this study will generate interest in, and add to an understanding of, the processes and specific symptoms associated with gesture interpretation necessary for developing a clearer framework upon which effective treatment options can be formulated. It is also hoped that the findings in this study can, in some way, contribute to the knowledge of social, emotional, and psychological processes experienced by those with delusions of communication.
References


Lenzenweger, M., Bennett, M., & Lilenfield, L. (1997). The referential thinking scale as a measure of schizotypy: Scale development and initial construct validation. *Psychological Assessment, 9,* 452-463.


Sartorius, N., Jablensky, A., Korten, A, Emberg, G., Anker, M., Cooper, J. E., et al. (1986). Early manifestations and first-contact incidence of schizophrenia in different cultures. Psychological Medicine, 16, 909-928.


impairments predict the clinical course in schizophrenia. *European Archives of Psychiatry and Clinical Neuroscience, 258 [Suppl 5]*, 28–34.


Appendices

Appendix A: Demographic questions from the Diagnostic Interview for Psychosis (DIP)

Appendix B: National Adult Reading Test (NART)

Appendix C: Questions and probes from The Brief Psychiatric Rating Scale – Extended Version (BPRS-E)

Appendix D: Items from the Scale for the Assessment of Positive Symptoms (SAPS)

Appendix E: Referential Delusions Interview (RDI); Referential Delusions Rating Scale (RDRS)

Appendix F: Gesture interpretation task pilot response sheet

Appendix G: Information sheet

Appendix H: Consent form
Appendix A

Demographic questions from the Diagnostic Interview for

Psychosis (DIP)
Referential experiences of communication

Identification Number: 

Date of Initial Assessment: 

Location of Interview: ____________________________

1 = Acute 2 = Non-acute

Demographic Information

1. What is your date of birth? 

2. Age (years) 

3. Gender 1=Male 2=Female

4. Where were you born? (Country of birth)
   1=Australia 2=UK and Ireland 3=Europe (including former USSR) 4=Central and South America 5=NZ, Pacific islands, PNG 6=South East Asia 7=Indian subcontinent and other Asia 8=Middle East 9=North Africa 10=Central and Southern Africa 11=other

5. Are you of ATSI descent? 0=No 1=Yes

6. What is your marital status?
   0=Single, never married 1=Married 2=Defacto 3=Separated 4=Divorced 5=Widowed

7. Who do you live with?
   1=Parent(s) 6=Children without partner 2=Spouse +/- children 7=Relatives 3=Defacto partner +/- children 8=Other (specify__________________) 4=Friend(s) 9=No fixed address 5=Alone 10=Institution
8. How many years of education have you completed?

________________________________________

9. Are you employed?

0=No job at present
1=Employment outside the home (full time job)
2=Employment outside the home (part time job)
3=Household
4=Studying
5=Retired

10. How old were you when you first had contact with psychiatric/psychology services?

_______________

11. How many admissions to hospital have you had, including this one?

___________________________

12. What is your diagnosis?

________________________________________

13. Are you currently on any medication?

0=No
1=Yes
Appendix B

National Adult Reading Test (NART)
**National Adult Reading Test (NART)**

Now I am going to show you some words. I want you to read each word out loud as best you can. There are probably many words you won’t recognise, in fact, most people don’t know them, so just guess at these. OK? Go ahead.

*Discontinue when 14 incorrect in 15 consecutive response*

<table>
<thead>
<tr>
<th>WORD</th>
<th>SCORE</th>
<th>WORD</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHORD</td>
<td>0 1</td>
<td>SUPERFLUOUS</td>
<td>0 1</td>
</tr>
<tr>
<td>ACHE</td>
<td>0 1</td>
<td>SIMILE</td>
<td>0 1</td>
</tr>
<tr>
<td>DEPOT</td>
<td>0 1</td>
<td>BANAL</td>
<td>0 1</td>
</tr>
<tr>
<td>AISLE</td>
<td>0 1</td>
<td>QUADRUPED</td>
<td>0 1</td>
</tr>
<tr>
<td>BOUQUET</td>
<td>0 1</td>
<td>CELLIST</td>
<td>0 1</td>
</tr>
<tr>
<td>PSALM</td>
<td>0 1</td>
<td>FAÇADE</td>
<td>0 1</td>
</tr>
<tr>
<td>CAPON</td>
<td>0 1</td>
<td>ZEALOT</td>
<td>0 1</td>
</tr>
<tr>
<td>DENY</td>
<td>0 1</td>
<td>DRACHM</td>
<td>0 1</td>
</tr>
<tr>
<td>NAUSEA</td>
<td>0 1</td>
<td>AEON</td>
<td>0 1</td>
</tr>
<tr>
<td>DEBT</td>
<td>0 1</td>
<td>PLACEBO</td>
<td>0 1</td>
</tr>
<tr>
<td>COURTEOUS</td>
<td>0 1</td>
<td>ABSTEMIOUS</td>
<td>0 1</td>
</tr>
<tr>
<td>RAREFY</td>
<td>0 1</td>
<td>DÉTENTE</td>
<td>0 1</td>
</tr>
<tr>
<td>EQUIVOCAL</td>
<td>0 1</td>
<td>IDYLL</td>
<td>0 1</td>
</tr>
<tr>
<td>NAÏVE</td>
<td>0 1</td>
<td>PUERPERAL</td>
<td>0 1</td>
</tr>
<tr>
<td>CATACOMB</td>
<td>0 1</td>
<td>AVER</td>
<td>0 1</td>
</tr>
<tr>
<td>GAOLED</td>
<td>0 1</td>
<td>GAUCHE</td>
<td>0 1</td>
</tr>
<tr>
<td>THYME</td>
<td>0 1</td>
<td>TOPIARY</td>
<td>0 1</td>
</tr>
<tr>
<td>HEIR</td>
<td>0 1</td>
<td>LEVIATHAN</td>
<td>0 1</td>
</tr>
<tr>
<td>RADIX</td>
<td>0 1</td>
<td>BEATIFY</td>
<td>0 1</td>
</tr>
<tr>
<td>ASSIGNATE</td>
<td>0 1</td>
<td>PRELATE</td>
<td>0 1</td>
</tr>
<tr>
<td>HIATUS</td>
<td>0 1</td>
<td>SIDEREAL</td>
<td>0 1</td>
</tr>
<tr>
<td>SUBTLE</td>
<td>0 1</td>
<td>DEMESNE</td>
<td>0 1</td>
</tr>
<tr>
<td>PROCREATE</td>
<td>0 1</td>
<td>SYNCOPE</td>
<td>0 1</td>
</tr>
<tr>
<td>GIST</td>
<td>0 1</td>
<td>LABILE</td>
<td>0 1</td>
</tr>
<tr>
<td>GOUGE</td>
<td>0 1</td>
<td>CAMPANILE</td>
<td>0 1</td>
</tr>
</tbody>
</table>

**Total error score:**
Appendix C

Questions and probes from The Brief Psychiatric Rating Scale
– Extended Version (BPRS-E)
For all questions, the time frame to be used is the past month

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 bases or not.

   Have you been concerned about your physical health recently? Have you had any physical illness or seen a medical doctor?

   2-3 Mild: Occasional complaint or expression of concern;
   4-5 Moderate: Frequent expressions of concern or exaggerations of existing ills. Some preoccupation. Not delusional;
   6-7 Severe: Preoccupied with physical complaints or somatic delusions

2. Anxiety: Reported apprehension, tension, fear, panic or worry. Rate only the patient’s statements – not observed anxiety.

   Have you been worrying about things in general? (Have you been worrying about a lot of things? e.g., money, friends) (Are you a worrier?) (Does this occupy your mind most of the time?) (Can you control your worry?) (Are you able to think of other things or does this occupy your mind most of the time?) (When you worry, do you get symptoms like trembling, heart pounding, numbness or tingling, sweating or feeling hot, difficulty breathing, dizziness or faintness?)

   2 Very mild: Reports feeling worried more than usual or some discomfort due to worry;
   3 Mild: Worried frequently but can turn attention to other things;
   4 Moderate: Worried most of the time and cannot turn attention to other things easily but no impairment of functioning OR occasional anxiety with autonomic accompaniment but no impairment in functioning;
   5 Moderately severe: Frequent periods of anxiety with autonomic accompaniment OR some areas of functioning are disrupted by anxiety or constant worry;
   6 Severe: Anxiety with autonomic accompaniment most of the time OR many areas of functioning are disrupted by anxiety or constant worry;
   7 Extremely severe: Constantly anxious with autonomic accompaniment OR most areas of functioning are disrupted by anxiety or constant worry]
3. **Depression**: Include mood – sadness, unhappiness, anhedonia; and cognitions – preoccupations with depressing topics (can’t switch attention to TV, conversations), hopelessness, loss of self-esteem (dissatisfied or disgusted with self). Do not include vegetative symptoms, e.g. motor retardation, early waking.

**Have you been feeling unhappy or depressed?** How much of the time? (Are you able to turn your attention to more pleasant topics when you want to?) (Have your interests in work, hobbies, social or recreational activities changed?) (Has it interfered with your ability to perform your usual activities/work?)

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very mild:</td>
<td>Reports feeling sad/unhappy/depressed more than usual.</td>
</tr>
<tr>
<td>Mild:</td>
<td>Same as 2 but can’t snap out of it easily</td>
</tr>
<tr>
<td>Moderate:</td>
<td>Frequent periods of feeling very sad, unhappy, moderately depressed, but able to function with extra effort.</td>
</tr>
<tr>
<td>Moderately severe:</td>
<td>Frequent periods of deep depression OR some areas of functioning are disrupted by depression.</td>
</tr>
<tr>
<td>Severe:</td>
<td>Deeply depressed most of the time OR many areas of functioning are disrupted by depression.</td>
</tr>
<tr>
<td>Extremely severe:</td>
<td>Constantly deeply depressed OR most areas of functioning are disrupted by delusional thinking.</td>
</tr>
</tbody>
</table>

4. **Guilt**: Overconcern or remorse for past behaviour. Rate only the patient’s statements – do not infer guilt feelings from depression, anxiety, or neurotic defences.

**Have you been thinking about past problems?** Do you tend to blame yourself for things that have happened? Have you done anything you’re still ashamed of?

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild:</td>
<td>Worries about having failed someone or at something. Wishes to have done things differently.</td>
</tr>
<tr>
<td>Moderate:</td>
<td>Preoccupied about having done wrong or injured others by doing, or failing to do, something.</td>
</tr>
<tr>
<td>Severe:</td>
<td>Delusional guilt OR obviously unreasonable self-reproach.</td>
</tr>
</tbody>
</table>
Appendix D

Items from the Scale for the Assessment of Positive Symptoms

(SAPS)
SAPS Items

**HALLUCINATIONS**

The following questions refer to the past month.

1. **Auditory Hallucinations**

   *In the past month, have you ever heard voices or other sounds when no one was around?*  
   *What did they say?*  
   *If yes, what about in the past week?*

   0  None  
   1  Questionable  
   2  Mild: Participant hears noise or single words; they occur only occasionally  
   3  Moderate: Clear evidence of voices; they have occurred at least weekly  
   4  Marked: Clear evidence of voices which occur almost every day  
   5  Severe: Voices occur often every day

   PM _____  
   PW _____


1.1 **Voices Commenting**

   *In the past month, have you heard voices commenting on what you were thinking or doing?*  
   *What did they say?*  
   *If yes, has this occurred in the past week?*

   0  None  
   1  Questionable  
   2  Mild: Participant hears noises or single words; they occur occasionally  
   3  Moderate: Clear evidence of voices; they have occurred at least weekly  
   4  Marked: Clear evidence of voices which occur almost every day  
   5  Severe: Voices occur often every day

   PM _____  
   PW _____
1.2 Voices Conversing

*In the past month, have you heard two or more voices talking with each other? What did they say?*  
*If yes, what about in the past week?*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PM</th>
<th>PW</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Questionable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mild: Participant hears noises or single words; they occur occasionally</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Moderate: Clear evidence of voices; they have occurred at least weekly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Marked: Clear evidence of voices which occur almost every day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Severe: Voices occur often every day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Visual Hallucinations

*In the past month, have you had visions or seen things that other people cannot? What did you see? Did this occur when you were falling asleep or waking up?*  
*If yes, what about in the past week?*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PM</th>
<th>PW</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Questionable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mild: Participant experiences visual hallucinations; they occur only occasionally</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Moderate: Clear evidence of visual hallucinations; they have occurred at least weekly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Marked: Clear evidence of visual hallucinations which occur almost every day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Severe: Hallucinations occur often every day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IF VISUAL HALLUCINATIONS PRESENT, DISCONTINUE INTERVIEW**

<table>
<thead>
<tr>
<th>Global Rating of Severity of Auditory Hallucinations</th>
<th>PM</th>
<th>PW</th>
</tr>
</thead>
<tbody>
<tr>
<td>This global rating should be based on the duration and severity of hallucinations, the extent of the participant’s preoccupation with the hallucinations, the degree of conviction, and their effect on actions. Also consider the extent to which the hallucinations might be considered bizarre or unusual. Hallucinations not mentioned above, such as those involving taste, should be included in this rating.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Questionable</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mild: Hallucinations definitely present, but occur infrequently; at times the participant may question their existence</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Moderate: Hallucinations are vivid and occur occasionally; they may bother the person to some extent</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Marked: Hallucinations are quite vivid, occur frequently, and pervade his/her life</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Severe: Hallucinations occur almost daily and are sometimes unusual or bizarre; they are vivid and extremely troubling</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E

Referential Delusions Interview (RDI); Referential Delusions Rating Scale (RDRS)
Referential Delusions Interview
Record the participant’s experiences and rate symptoms on the Referential Delusions Rating Scale (RDRS) at the completion of the assessment interview.

Referential Delusions of Communication

People could be in contact with – VERBAL
(a) Description
In the past month, have you been feeling that people are dropping hints meant for you or communicating with you in subtle or mysterious ways? Do people say things with double meanings? Can you give me an example?

People could be in contact with – NON VERBAL
In the past month, do people make gestures that suggest they know things about you? Does the way people stand or the clothing they wear have a special meaning for you? Can you give me an example?

Are you sure this is happening or is there a chance you’re making a mistake?

(b) Meaning
What does it mean when x is dropping hints/communicating with you?
What does x seem to be communicating to you?

(c) Frequency
How often has this happened in the past month?
1 = Once
2 = 2-3 times per week
3 = 4-5 times per week
4 = Daily/almost daily
(d) Level of Distress

When x happens, how does this make you feel?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td></td>
<td>Very Happy</td>
<td>Happy</td>
<td>Neutral</td>
<td>Upset</td>
<td>Very Upset</td>
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</tbody>
</table>

(e) Impact

Does this make you do something you normally wouldn’t do?

Has this been happening in the past week?

Public Media (e.g. TV, radio, magazines)

(a) Description

In the past month, have you been seeing things in magazines or newspapers, on TV or the radio that seem to refer to you or contain a special message for you?

Are you sure this is happening or is there a chance you’re making a mistake?

(b) Meaning

What does the special message mean for you?

What does x seem to be communicating to you?

What did the newspaper article seem to be saying about/to you?
(c) Frequency: How often has this happened in the past month?
   1 = Once
   2 = 2-3 times per week
   3 = 4-5 times per week
   4 = Daily/almost daily

(d) Level of Distress
   When x happens, how does this make you feel?

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(e) Impact
   Does this make you do something you normally wouldn’t do?

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Has this been happening in the past week?

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Animals
   (a) Description: In the past month, have you been noticing any other things that seem to refer to you or contain a special message for you? For example, do animals seem to be communicating to you?

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Inanimate objects/processes (e.g. rainbows, lights flickering, machine noises)
   Do you see coded messages or special significance in the way objects are arranged?
   Do you see special significance in other things like rainbows, lights flickering, machine noises?

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Are you sure this is happening or is there a chance you’re making a mistake?

___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
(b) Meaning
What is so significant about these experiences? What does it all mean?
___________________________________________________________________________________
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___________________________________________________________________________________
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___________________________________________________________________________________

(c) Frequency
How often has this happened in the past month?
1 = Once
2 = 2-3 times per week
3 = 4-5 times per week
4 = Daily/almost daily

(d) Level of Distress
When x happens, how does this make you feel?

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<td>Happy</td>
<td>Neutral</td>
<td>Upset</td>
<td>Very Upset</td>
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</table>

(e) Impact
Does this make you do something you normally wouldn’t do?

___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________

Has this been happening in the past week?
___________________________________________________________________________________
Referential Delusions Rating Scale (Office Use Only)

Referential Delusions of Communications

Does the participant believe that information is being communicated:

(a) By people with whom s/he is, or could be, in contact (e.g. people seen in the street)
   • Verbal (e.g. hints, double meanings)

0 None
1 Questionable
2 Mild: Occasional ideas of reference
3 Moderate: have occurred at least weekly
4 Marked: occurs at last two to four times weekly
5 Severe: Occurs frequently

• Non Verbal (e.g. gestures, stance, clothing)

(b) By the public media (e.g. TV, radio, magazines) where there is no reason to think that the communicators are even aware of the participant’s existence

0 None
1 Questionable
2 Mild: Occasional ideas of reference
3 Moderate: have occurred at least weekly
4 Marked: occurs at last two to four times weekly
5 Severe: Occurs frequently

(c) By animals

0 None
1 Questionable
2 Mild: Occasional ideas of reference
3 Moderate: have occurred at least weekly
4 Marked: occurs at last two to four times weekly
5 Severe: Occurs frequently

(d) By inanimate objects/processes (e.g. rainbows, lights flickering, machine noises)

0 None
1 Questionable
2 Mild: Occasional ideas of reference
3 Moderate: have occurred at least weekly
4 Marked: occurs at last two to four times weekly
5 Severe: Occurs frequently
(Office Use Only) Themes – Referential Delusions of Communication

Are the delusions of reference based upon, or do they reflect…

(a) Guilt (include ‘bad me’ persecution)

0 None of the time
1 A little of the time
2 A lot of the time
3 Every time

(b) Grandiosity / elation / erotomania

0 None of the time
1 A little of the time
2 A lot of the time
3 Every time

(c) Persecution (‘poor me’ persecution)

0 None of the time
1 A little of the time
2 A lot of the time
3 Every time

Global Rating of Severity of Delusions of Reference (Communication)
The participant believes that insignificant remarks, statements, or events refer to him/her or have some special meaning for him/her. For example, the participant walks into a room, sees people laughing, and suspects that they were just talking about him/her and laughing at him/her. Sometimes items read in the paper, heard on the radio, or seen on television are considered to be special messages to the participant. In the case of ideas of reference, the participant is suspicious, but recognizes his/her idea is erroneous. When the participant actually believes that the statements or events refer to him/her, then this is considered a delusion of reference.

PM _____
PW _____

0 None
1 Questionable
2 Mild: Occasional ideas of reference
3 Moderate: have occurred at least weekly
4 Marked: Occurs at least 2 to 4 times weekly
5 Severe: Occurs frequently
Referential Delusions of Observation

**Gossiping or Spreading Rumors**

(a) **Description**

*In the past month, have you been getting the feeling that people are gossiping about you or spreading rumors about you? Can you give me an example?*

*Are these people you know or are they strangers?*

*How often do you have this experience?*

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Are you sure this is happening or is there a chance you’re making a mistake?

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(b) **Meaning**

*What do you think people are saying about you?*

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___________________________________________________________________________________

(c) **Frequency**

*How often has this happened in the past month?*

1 = Once

2 = 2-3 times per week

3 = 4-5 times per week

4 = Daily/almost daily

(d) **Level of Distress**

*When this happens, how does this make you feel?*

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<tr>
<td>Very Happy</td>
<td>Happy</td>
<td>Neutral</td>
<td>Upset</td>
<td>Very Upset</td>
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</table>

(e) **Impact**

*Does this make you do something you normally wouldn’t do?*

___________________________________________________________________________________

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Has this been happening in the past week?

___________________________________________________________________________________
Keeping him/her under surveillance, following him/her

(a) Description
In the past month, have you been getting the feeling that you are secretly being watched or kept under surveillance? Can you give me an example?
How often do you have this experience?

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Do you think people have been deliberately following you or is there a chance you're making a mistake?

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(b) Meaning
Why do you think people are watching you? What do you think people are saying about you?

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(c) Frequency
How often has this happened in the past month?
1 = Once
2 = 2-3 times per week
3 = 4-5 times per week
4 = Daily/almost daily

(d) Level of Distress
When x happens, how does this make you feel?

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<td>Neutral</td>
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</table>

(e) Impact
Does this make you do something you normally wouldn’t do?

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Has this been happening in the past week?
Referential Delusions Rating Scale (Office Use Only)

Referential Delusions of Observation

Does the participant believe people are secretly observing him/her…

(a) Gossiping or spreading rumors

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<td>Severe: Occurs frequently</td>
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(b) Keeping him/her under surveillance, following him/her

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(Office Use Only) Themes – Referential Delusions of Observation

Are the delusions of reference based upon, or do they reflect…

(a) Guilt (include ‘bad me’ persecution)

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<td>A little of the time</td>
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(b) Grandiosity / elation / erotomania

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(c) Persecution (‘poor me’ persecution)

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Appendix F

Gesture interpretation task pilot response sheet
I will be showing you some brief video clips today. Some of the clips will show an actor making a gesture, which is intended to convey a specific meaning, and some of the clips will show an actor making an incidental movement, which is not intended to convey a specific meaning.

I would like you to watch each clip, and then rate the likelihood that the actor made a gesture (to convey a specific meaning). The rating scale will be from 1 to 10, with 1 representing “Very Unlikely”, 5 representing “Can’t Be Sure”, and 10 representing “Very Likely”.

Date: _____________  Participant Details: Male □  Female □  Date of Birth: ________

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<thead>
<tr>
<th>Clip 1:</th>
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Can’t be sure

Clip 21:

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Can’t be sure

Clip 22:

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Can’t be sure

Clip 23:

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Can’t be sure

Clip 24:

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Can’t be sure
Appendix G

Information sheet
You are being invited to take part in the research project identified above. It is being conducted by Ms Lisa Millar who is doing the research as part of her Doctorate of Clinical Psychology at the University of Newcastle. She is being supervised by Professor Mike Startup from the School of Psychology at the University of Newcastle.

**What is the purpose of the research?**
The purpose of the research is to gain a more thorough understanding of how people with a psychotic disorder such as schizophrenia interpret non-verbal information. Anyone between the ages of 18 and 65 years who is an inpatient on the psychiatric wards of the James Fletcher Hospital, Maitland Hospital or Morisset Hospital, and who has a diagnosis of a psychotic disorder, may participate in the research.

**What will it involve?**
If you agree to take part, we would like you to come for an interview, which will take approximately 30 minutes to complete. This will take place in a private and quiet place within the hospital. We will ask to complete a number of tasks, such as answering some questions about any symptoms you may have experienced recently. To give two examples we will ask you:

- *In the past month, have you ever heard voices or other sounds when no one was around? What did they say?*
- *In the past month, have you been seeing things in magazines or newspapers, on TV or on the radio that seem to refer to you or contain a special message for you?*

We will also ask you to complete a questionnaire, a reading task, and a task on the computer which involves giving your opinion on some gestures shown in video clips. All of it together, including the interview, will take about an hour to complete.

**Are there any benefits or risks?**
The research is not designed to be of direct benefit to participants. Longer-term benefits will be provided to those individuals with a psychotic disorder who are affected by specific symptoms of their illness (delusions). The risks are minimal. Similar procedures have been used before with people on the James Fletcher Hospital and Maitland Hospital wards and no harm has been reported. However, if you experience any concerns or distress during the research task and would like support, you can let Lisa know and she can discuss this with you. If you require further support, Lisa can inform your case manager and psychiatrist, who can discuss this further with you and/or make an appointment for you to speak with a psychologist on the ward.

**Participation is voluntary.**
Participation in this study is entirely voluntary. If you agree to take part, you will be able to withdraw at any time. You need not give a reason. If you decide to stop at any time, you may do so by telling Lisa who will be conducting the research. You will be able to withdraw all the information relating to you. If you do withdraw from the study or decide not to take part in the first place, this will not affect your care in the community or in hospital in any way, nor your relationship with the Hunter New England Area Health Service or the University of Newcastle.
Is the study confidential?
The study is confidential. Nothing you tell us will be repeated to anyone else without your permission unless required by law. If during the interview, we become concerned that you might harm yourself or others, we may need to take action. This could include informing the psychiatric service. If you give specific details about any illegal behaviour the researcher may be obliged to report the information to the Police as required by law.

If you would like feedback about the findings of the study, you will be able to find a summary of the results at the following website:

http://psych.newcastle.edu.au/gestures/

This information will be available on the website as of June 2010.

If you would prefer to receive feedback about the findings of the study in the mail, please provide your postal address below and we will forward you a written summary of the findings when the study is completed.

Postal Address: ____________________________________________________________

How will my information be stored?
Your personal information will be marked with an identification number only. It will be stored in a locked filing cabinet in a locked office at the University of Newcastle. Only Lisa and Professor Startup will see it. The information will be stored for five years and will then be destroyed.

How will the information be used?
When all the information has been collected, it will then be analysed. The results will then be published in scientific journals and presented at conferences. The results will also be used in a thesis submitted to the University of Newcastle for Lisa’s degree. However, you will not be referred to by name in any report on the research, nor will it be possible to identify you.

What should you do now?
Please be sure you understand this information sheet. Your Case Manager will give us your name only if you agree to meet us. If you do agree to meet, Lisa will go through the information carefully to make sure you understand it. If you then decide to participate in the research we will ask you to sign the attached Consent Form, which Lisa will also go through with you. After signing the consent form, Lisa will take you through the interview and the reading and computer tasks. If you have any questions, you can contact Professor Startup on 4921 5979 or Lisa on 4973 0274. At present we do not know who you are and we will never know if you decide not to participate.

Thank you for considering this invitation.

Ms Lisa Millar
Registered Psychologist/Student

Professor Mike Startup
Professor of Clinical Psychology
Complaints
This project has been approved by the Hunter New England Area Research Ethics Committee, Reference No. 08/09/175.05, and the University of Newcastle Research Ethics Committee, Reference No. H-2008-0397. Should you have any concerns about your rights as a participant in this research, or have any complaint about the manner in which the research is conducted, it may be given to the researcher or, if an independent person is preferred, to the following:

Human Research Ethics Officer
Research Office, The Chancellery
University of Newcastle, University Drive
Callaghan NSW 2308
Tel: (02) 4921 6333
E-mail: Human-Ethics@newcastle.edu.au

Dr Nicole Gerrand
Professional Officer (Research Ethics)
Hunter New England Human Research Ethics Committee
Tel: (02) 4921 4950
Appendix H
Consent form
CONSENT FORM

RESEARCHERS: Ms Lisa Millar & Professor Mike Startup

- I agree to participate in the above research project and give my consent freely.
- I understand that the study will be conducted as described in the Information Sheet, which I have read, understood and a copy of which I have kept.
- I understand that I can withdraw from the study at any time without providing a reason, and that I have the option of withdrawing all data relating to me.
- I agree that the information collected during this study may be published and presented at conferences providing that identifying information is not used.
- I consent to participate in an interview that consists of completing an interview, a reading task, and a computer task.
- I understand that any personal information I give to the researchers will be completely confidential and will not be passed onto others without my permission, unless required by law.
- I have had the opportunity to ask questions and have received satisfactory answers. I am aware that I may not personally benefit from participation in this study.

Psychiatrist: I am a [insert position title] __________________________ and this individual is currently in my care. In my opinion, s/he is at present able to comprehend the invitation to participate in the research and to give valid informed consent.

Print name: ______________________ Signature: ______________ Date: ______

Consent by participant:
I hereby certify that I have read and understood all the information provided, and that I have been allowed to ask questions. I agree to take part in the study described above.

Print name: ______________________ Signature: ______________ Date: ______

Case Manager:
I have observed this individual and their understanding of what has been asked of him/her and I am satisfied that she/he is giving informed consent.

Print name: ______________________ Signature: ______________ Date: ______