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Humour and Grandiosity: A Systematic Review of Humour Experiences in Psychosis and an Empirical Preliminary Investigation of 'Theory of Mind' and 'Attributional Style' in Adults with Grandiose Delusions

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DECLARATION

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another university or institution for the award of any other degree.

STRUCTURE

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ABSTRACT

This thesis first reviews the literature on humour experiences in adults experiencing psychosis. An empirical study was next conducted to test the application of socio-cognitive models of paranoid delusions to grandiose delusions.

A systematic search of the literature was conducted on electronic academic databases between 1980 and 2012. Seventeen studies that have utilised humorous tasks within explorations of either the comprehension and/or the appreciation of humorous stimuli were found. The literature suggests difficulties comprehending humour are clear in individuals with experiences of psychosis, and that this difficulty is augmented when there is a need to infer the mental states of others to understand jokes or humorous scenarios. However, the findings with respect to appreciation are less clear. Here the evidence points to the role of co-morbid mood symptoms such as depression and mania in the attenuation of humour appreciation.

In the empirical study, a cross-sectional design was employed to compare the performance of individuals with grandiose delusions to a depressed control group on measures of Theory of Mind (ToM) and attributional style. Participants experiencing grandiose delusions performed significantly worse on both ToM tasks and produced significantly fewer references to mental states in a dialogue task. Following a symptom-based approach, the presence of a grandiose delusion was significantly associated with poorer ToM on the joke appreciation and stories task. Participants with a grandiose delusion appear to have a ToM impairment independently of the severity of a comorbid persecutory delusion. Implications for clinical practice are also noted.

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SECTION 1: LITERATURE REVIEW

Humour Experiences in Psychosis: A Systematic Literature Review and Critique

Abstract

Objectives. Poor social functioning is one of the more prominent characteristics of Schizophrenia and individuals experiencing psychosis have been reported to experience profound social impairment, social withdrawal, isolation and an inability to effectively communicate with others (Walker, Davis & Baum, 1993). This review explores humour experiences in this population.

Methods. A systematic search of the literature was conducted on the electronic academic databases MEDLINE, ISI Web of Science, CINAHL, and PsycINFO between 1980 and 2012.

Results. Seventeen studies that have utilised humorous tasks within explorations of either the comprehension and/or the appreciation of humorous stimuli were found.

Conclusions. The literature suggests difficulties comprehending humour are clear in individuals with experiences of psychosis, and that this difficulty is augmented when there is a need to infer the mental states of others to understand jokes or humorous scenarios. However, the findings with respect to appreciation are less clear. Here the evidence points to the role of co-morbid mood symptoms in the attenuation of humour appreciation. The inconsistency of the research findings in this area can be attributed to methodological differences between the studies. Several potential variables require further investigation to advance this important area. Implications for clinical practice are also noted.

Keywords: humour, schizophrenia, psychosis, theory of mind, jokes

Humour Experiences in Psychosis: A Systematic Literature Review and Critique

A good sense of humour is considered to be a positive trait bringing pleasure and enjoyment. Humour is considered to share elements with creativity (Ramachandran & Blakeslee, 1998) and enables the communication of ideas, feelings and opinions, while also enriching social relationships (Bronwell & Gardner, 1988). The ability to see the funny side of things has also been found to have measurable benefits on well-being (Martin, Phulick-Doris, Larsen, Gray & Weir, 2003) and to moderate the impact of various stressors on depression, pessimism, self-esteem and aggression (Nezu, Nezu & Blisset, 1988; Olson, Hugelshofer, Kwon & Reff, 2005; Thorson, Powell, Sarmany-Schiller, & Hampes, 1998).

The psychoanalytic perspective postulates humour consists of the sublimation of socially unacceptable themes, such as aggression and sex (Freud, 1938). Freud argued the appreciation of humour results from gratification and the release of tension and inhibited wishes which are associated with the theme of the humour. That is, hostile and sexual impulses are discharged under the socially acceptable cover of a joke. However, Freud believed that the expression of a socially disapproved view or wish is usually disguised or distorted in order to make it incongruous so that the individual does not have to take the impulse seriously. Thus, humour can serve as a mechanism for coping with adverse situations and reducing tension and anxiety caused by disturbing issues (Gelkopf & Sigal, 1995). Humour can elevate social status by expressing superiority or saving face (Polimeni & Reiss, 2006) and it has even been linked to positive physical effects, such as boosting immune function (Bennet, Zeller, Rosenberg & McCann, 2003). Hence, it is no surprise humour has been a topic for investigation by philosophers and scientists since Ancient Greece (Shelley, 2003).

In recent years, humour has been explored in a variety of clinical groups. For instance, those with intellectual disabilities (Brown, 1994; Degabriele & Walsh, 2010),

alcohol problems (Uekermann, Channon, Winkel, Schelebusch, & Daum, 2006), bipolar disorder (Bozikas et al. 2007b), and depression and anxiety (DiMaggio et al. 2011). Since the work of Bleuler (1911) and Kraeplin (1883), affect and emotional disorder have been acknowledged as a central characteristic of psychosis. This is instantiated in the reports of poor self-esteem, anxiety, depressive and suicidal thoughts, traumatic experiences, anhedonia, social alienation and internalised stigma that characterise people with psychosis (Gelkopf, 2011). Poor social functioning is another of the more prominent characteristics of schizophrenia, with extreme social impairment, social withdrawal, isolation and an inability to effectively communicate with others being commonly reported (Walker, Davis & Baum, 1993). Given that humour is related to greater sociability and extraversion (Kuiper & Martin, 1993) the social impairment of this population could be associated with lower levels of humour.

However, the literature has shown a link between creative thinking and the experience of psychosis, and a shared mechanism has been suggested. For instance, Hasenfus and Magaro (1976) and Marengo, Harrow and Edell (1993) have demonstrated associations between increased response competition and the tendency to think divergently and to generate unusual associations. Thus, it could be argued that some individuals experiencing psychosis may not show lower levels of humour than a nonclinical sample (Kuiper, Martin, Olinger, Kazarian, & Jette, 1998). Given that humour perception represents a specialised high-order cognitive ability which relies upon both intellectual and social proficiencies, Polimeni and Reiss (2006) argue humour could provide an excellent way to investigate the cognitive characteristics of schizophrenia at psychosocial, affective and neuroanatomical levels. Thus, this systematic review aims to answer the question ‘What do we know, from an evidence-based perspective, about humour experiences in adults with psychosis?’

Method

Search Procedure

A comprehensive electronic search (Figure 1) was conducted through the academic databases MEDLINE, ISI Web of Science, CINAHL, and PsycINFO. Google Scholar and the citation and reference lists from all identified studies were inspected for additional studies. Experts in the field were contacted for additional references and for any unpublished studies. The search included papers published in English between 1980 and March 2012. The MeSH key search terms within article titles, abstracts and topics were: humo*r, joke*, funn* in one search set, 'AND' with schizo*, psychos*, psychotic, bipolar disorder, manic depression in the second search set. Each term within each set was linked with the instruction 'OR'. A wildcard asterix was applied to search for related terms in some instances. Peer reviewed full text articles, reviews, and short communications were all considered for inclusion. The search was limited to articles written or translated into English, and excluded dissertation abstracts and conference presentations.

Inclusion & Exclusion Criteria

Studies were included if they: (1) adopted high level quality designs[1] (2) provided quantitative data supported by appropriate statistical analyses (3) included a direct measure of visual and/or verbal humour appreciation or comprehension[2], and (4) explored humour within participants recruited from a psychiatric population with a primary diagnosis of schizophrenia, schizoaffective disorder, bipolar disorder or other psychoses within the schizophrenia spectrum as defined by the DSM-IV-R or ICD-10.

[1] This review sought level A or level B quality studies with regards to evidence as considered by the Oxford Centre for Evidence-Based Medicine (CEBM, 2009)

[2] Studies that explored responses to emotional stimuli that were not explicitly humorous were not included in the review.

Studies which used classification systems prior to the ICD-9 or DSMN-III (i.e. 1980) were excluded as these were considered outdated and unlikely to meet the last criterion.

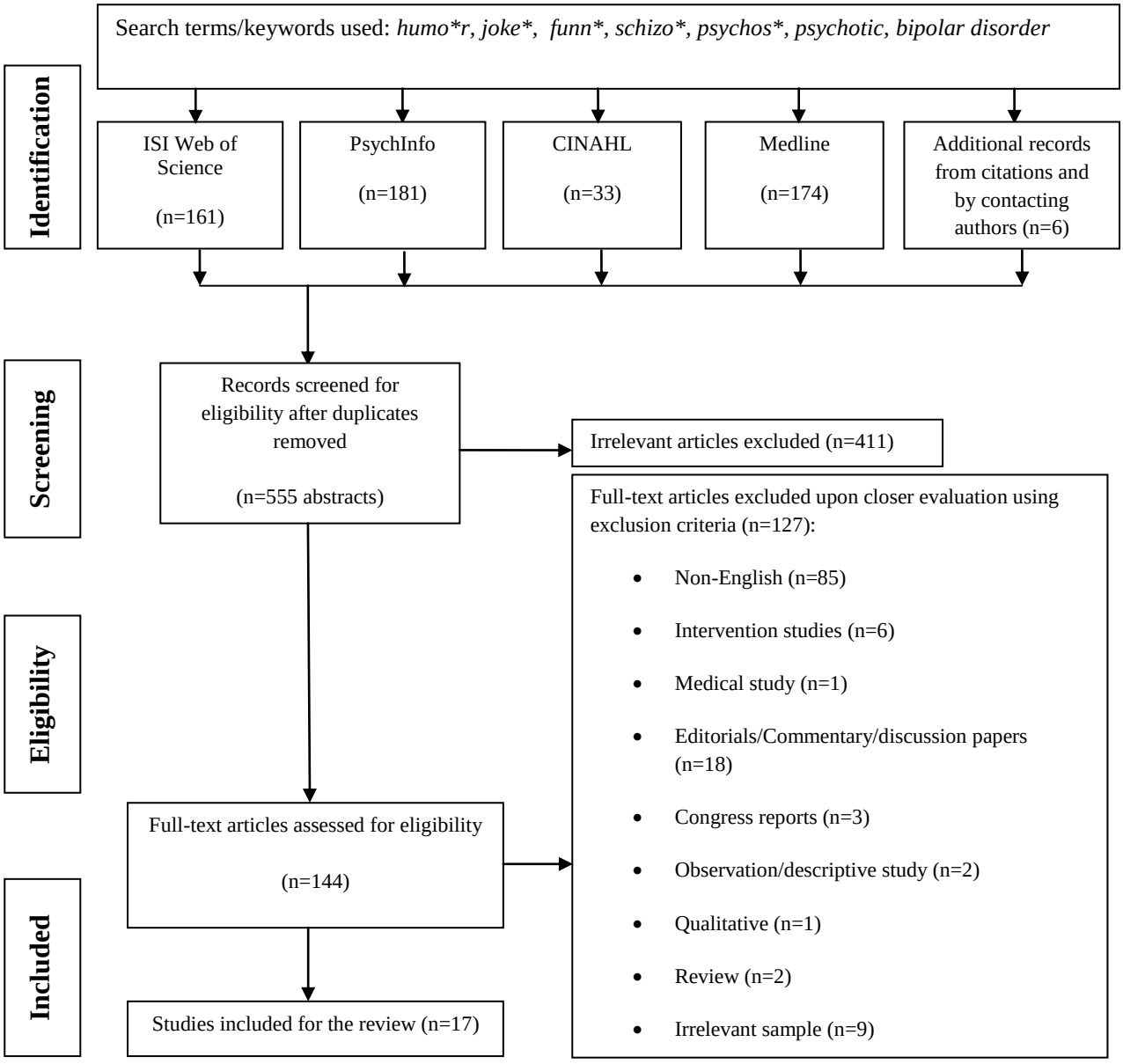

Figure 1. PRISMA flow diagram of the selection of studies for review (adapted from: Moher, Liberati, Tetzlaff, Altman & The PRISMA Group, 2010).

Quality Appraisal

Two tools were utilised and adapted to produce a quality rating form (Appendix A). The first tool was an adapted version of the Health Evidence Bulletins Wales appraisal checklist (2004) which was based on sources such as the Critical Appraisal Skills Programme (CASP, 2006) questions. As it was anticipated that there would be few (if any) randomised controlled trials in this area, a second methodological scoring system that allowed nonrandomized studies to be evaluated was necessary.

The Downs and Black tool (1998) is one of the most suitable tools for the assessment of methodological quality in cross-sectional studies (Jarde, Losilla & Vives, 2012). This tool consists of the following sub-sections: Reporting, External Validity, Internal Validity (bias and confounding). Eleven of the original questions were omitted as they were not applicable to case-control or cross-sectional designs (Appendix A). The last question was modified from a scale of 0 to 5 to a binary score of 0 or 1 where 1 was only scored if a power calculation or explanation about the number of subjects required to test the hypotheses was provided. Thus, the modified version of the tool (incorporating the Wales-Bulletin questions) ranged from 0 to 20. Studies with a Quality Rating (QR) score of 8/20 or below were considered to be of low methodological quality, 9-15 of moderate quality, and scores of 16 and above were considered good quality.

Reliability of Quality Ratings

After studies were ranked according to the above criteria, six studies were chosen at random (two from the bottom and top quartiles and two from the middle). These studies were then independently rated by a second reviewer according to the agreed criteria. The ratings were shared and where conclusions over the quality of a study differed, the study was reviewed jointly and discussed. The Intraclass Correlation Coefficient (ICC; $\rho = 0.98$) for inter-rater agreement was excellent (Fleiss, 1981).

Results

The original search strategy identified 555 papers[3]. The first author assessed every abstract identified by the electronic search for relevance to this review and excluded duplicates. Of these, 411 papers were considered irrelevant and excluded. After the first screening, the inclusion and exclusion criteria were manually applied to the remaining 144 potentially relevant papers, resulting in 127 papers being excluded and 17 papers included in this review.

Table 1 provides an overview of each study, presented in order of quality ratings derived from the appraisal tool. One study (Falkenberg, 2007) achieved a quality rating of under 9, deeming it to be of poor quality (Appendix B). This study was a brief report, and due to limited detail the study could not be critiqued or considered eligible for inclusion within this review. Three studies achieved a high quality rating (Henry et al., 2007; Gavilan & Garcia-Albea, 2011; Polimeni, Campbell, Gill, Breanna, & Reiss, 2010). Key merits of these studies included excellent reporting of detail, high internal and external validity, demonstration of a moderate to high effect size and results that can be generalised to the wider population. Furthermore, these studies recruited patients and controls from the same sample population (i.e. from one clinical service only) and took into account important confounding variables such as medication, participant symptomatology and an assessment of pre-morbid intelligence.

The structure of this review

In this review, researchers attempt to explain humour from a cognitive (comprehension and recognition of humour), affective (appreciation), and/or neurobiological (functional areas of the brain in humour processing) approach.

[3] These searches, along with a search of the Cochrane Library for Systematic Reviews using the terms ‘humour’, ‘schizophrenia’, ‘bipolar disorder’, and ‘psychosis’, revealed no similar systematic review had previously been published using these terms.

Table 1.

Summary of the evidence for humour appreciation and comprehension deficits in psychosis in order of quality ratings

Study	Sample characteristics (n)	Humour task	Additional measures	Comprehension deficit?	Appreciation deficit?	Other findings	QR
Gavilan & Garcia-Albea (2011)	Schizophrenia (22) Non-clinical controls (22)	ToM cartoons	6 language comprehension tasks, 2 ToM tasks, PANNS, WAIS III subtests		✓	Humour task significantly correlated with basic language comprehension and comprehension of figurative language.	18
Henry et al. (2007)	Schizophrenia (29) Non-clinical controls (30)	3 humorous video clips. Participants asked to amplify or suppress their emotional responses and to rate the extent to which they experienced 10 specific emotions (including amusement)	SAPS, SANS, WASI-4 subtests		×	The experimental group demonstrated difficulties with the amplification of emotion. These difficulties were significantly correlated with emotional blunting. The subjective experience of affect did not differ for either condition.	18
Polimeni et al. (2010)	Schizophrenia (20) Psychiatric controls (30) Non-clinical controls (20)	64 cartoons with captions	Battery of cognitive tests, SASS, NART, WAIS III Comprehension, WCST-CC	✓		Humour comprehension positively correlated with IQ social reasoning, executive functioning, and social adjustment.	17

Study	Sample characteristics (n)	Humour task	Additional measures	Comprehension deficit?	Appreciation deficit?	Other findings	QR
Kuiper et al. (1998)	Non-paranoid Schizophrenia (24) Depressed sample(32) Non-clinical sample (100)	SHRQ, SHQ, CHS	Self-concept measures and 2 affect/mood measures.		✓	The schizophrenia group scored significantly lower than the nonclinical sample on the SHRQ and SHQ-LH. No relationship between humour ratings and self-concept or self-esteem in schizophrenia group.	16
Corcoran, Cahill & Frith (1997)	Schizophrenia (44) Psychiatric group (non-psychotic) (7) Non-clinical controls (40)	Two sets of 10 cartoon jokes (physical or ToM). Seven false belief jokes, and three deception-based scenarios.	Ammons & Ammons, PSE	✓		The schizophrenia group found mental state jokes significantly more difficult to understand. This effect was most marked in patients with behavioural signs. Those with paranoid delusions also struggled to appreciate mental state stimuli.	15
Langdon, Ward & Coltheart (2010)	Schizophrenia/ Schizoaffective (35) Non-clinical controls (34)	ToM cartoon joke appreciation task	PDI, PS, NART, HDS, WMS-LMI, LMII, 2 versions of the "beads task", IPSAQ and two additional ToM Tasks.	✓		Patients showed a jumping-to-conclusions bias, excessive externalising bias, and performance deficit on all three ToM tasks. Total ToM correlated with probabilistic reasoning proneness and both these correlated with delusional ideation.	15
Langdon & Ward (2009)	Schizophrenia/Schizoaffective (30) Non-clinical controls (26)	ToM joke appreciation task	NART, PANNS, verbal memory, two additional ToM tasks	✓		ToM scores from picture sequencing and joke tasks correlated significantly in schizophrenia group and predicted insight.	15

Study	Sample characteristics (n)	Humour task	Additional measures	Comprehension deficit?	Appreciation deficit?	Other findings	QR
Marjoram et al. (2005)	Schizophrenia (20) Non-clinical controls (20)	ToM and physical cartoon jokes	Krawiecka scale, Ammons & Ammons	✓	×	Individuals with Schizophrenia performed significantly worse than controls in both conditions, but most marked in ToM condition.	15
Marjoram et al. (2006)	First degree relatives of people with Schizophrenia (42) Schizophrenia (5) Non-clinical controls (13)	Three sets of cartoon jokes (ToM, scrambled or physical).	PSE, fMRI scans.	✓	×	Tasks activated the PFC, precuneus and temporal lobes. The results indicate a state effect evident in ToM processing in those at high risk of schizophrenia. Those with symptoms on testing or a diagnosis activated more frontal regions.	14
Stratta et al. (2007)	Schizophrenia (20)	32 irony visual physical jokes and 32 ToM irony jokes.	PANSS, NART (Italian version)	✓	✓	Significant relationship between ToM and PANSS positive and cognitive symptoms but not negative symptom scores. Humour significantly correlated with positive symptoms. IQ correlated with humour scores for both sets of jokes and inspection time for ToM cartoons.	14
Tsoi et al. (2008)	Schizophrenia (30) Non-clinical controls (30)	Four silent comedy film clips.	ToM, WCST, LSP, NART, BDI, CDSS, SANS, SAPS, PANAS.	✓	×	Patients with Schizophrenia were less able to detect humour but similarly able to appreciate it. The degree of humour recognition difficulty may reflect a deficit in the executive function.	14

Study	Sample characteristics (n)	Humour task	Additional measures	Comprehension deficit?	Appreciation deficit?	Other findings	QR
Bozikas et al. (2007a)	Schizophrenia (36) Non-clinical controls (31)	PHAT	PANNS, cognitive symptoms, depression, excitement, executive function, attention, working memory, verbal and visual memory, visuospatial ability, psychomotor speed, abstract/flexible thinking, verbal fluency, auditory attention, sustained attention, visual scanning.		✓	Findings suggested deficits in humour appreciation could be due to poor selective and sustained attention and word fluency.	13
Polimeni & Reiss (2006)	Schizophrenia (23) Non-clinical controls (20)	Humour perception test: 128 single-caption cartoons either original or altered to eliminate humour.	MMSE, PANSS	✓		Patients demonstrated a deficit in humour perception compared to controls	13
Bozikas et al. (2007b)	Bipolar disorder (8) Non-clinical controls (22)	PHAT	YMRS, MDRS		×	No significant differences between groups. The scores did not correlate with residual symptoms (mania or depression).	12
Juckel et al. (2008)	Schizophrenia (21) Non-clinical controls (30)	Kinematic analysis of facial movement in response to humorous film stimuli ("Mr. Bean" clips). Participants also rated funniness	SANS, BPRS, measure of voluntary facial activity		✓/×	Unmedicated patients showed a significant higher initial velocity of laughter than controls. Patients on typical neuroleptics showed lower rates of initial velocity. Positive correlations were found between severity of negative symptoms and initial velocity. No differences were found on funniness ratings compared to controls.	11

Study	Sample characteristics (n)	Humour task	Additional measures	Comprehension deficit?	Appreciation deficit?	Other findings	QR
Juckel & Polzer (1998)	Schizophrenia (7) Non-clinical controls (7)	Humorous movie			✓	Patients exhibited a faster speed of movement in the left and right corner of the mouth when starting to laugh at the stimulus.	9

Note. BDI=Beck's Depression Inventory, BPRS=Brief Psychiatric Rating Scale, CDSS=The Calgary Depression Scale for Schizophrenia, CES-D=Centre for Epidemiological Studies Depression Scale, CHS=Coping Humour Scale, fMRIi=Functional Magnetic Resonance Imaging, HDS=Hamilton Depression Scale, IPSAQ=Internal, Personal and Situational Attributions Questionnaire, LSP=Life Skills Profile, MMSE=Mini Mental State Examination, MDRS=Montgomery-Asberg Depression Rating Scale, NART=National Adult Reading Test, PANAS=The Positive and Negative Affect Scale, PDI=Peters Delusion Inventory, PSE=Present State Examination, PS=Paranoia Scale, RSEI=Rosenberg Self-Esteem Inventory, SANS=Scale for the Assessment of Negative Symptoms, SAPS=Schedule for the Assessment of Positive Symptoms, SASS=Social Adjustment Scale Self-Report, SHQ=The Sense of Humour Questionnaire, SHRQ=Situational Humour Response Questionnaire, ToM=Theory of Mind, YMRS=Young Mania Rating Scale, WAIS=Wechshler Adult Intelligence Scale, WCST=Wisconsin Card Sorting Test, WMS-LMI=Wechsler Memory Scale Logical Memories Index

Thus, after reviewing the characteristics of these studies, the review will focus on these three perspectives.

Study characteristics

The majority of studies were conducted in the UK (n = 4), Australia (n = 3) and Canada (n = 3), with the rest of the studies having been conducted in other European countries (n = 7). Thus, cultural differences must be considered carefully when comparing the results of these studies given that little is known about humour across different Western culture groups (Carbelo-Baquero, Alonso-Rodriguez, Valero-Garces, & Thorson, 2006). The total number of participants included in the studies was 930. Experimental group sample sizes ranged from n = 7 to n = 45. The majority of studies were non-randomised case-control designs (n = 16) and one study employed a cross-sectional design.

Reliability and validity. Patients may not detect humour or appreciate humour as intensely as they might because of the effects of a range of symptoms such as depression. One solution is to measure these symptoms and control for them statistically, and another is to include a non-psychotic psychiatric control group to ensure that any diminished results in people with psychosis are specific to the diagnosis or the symptoms of psychosis. Only three of the 16 studies employed a psychiatric control group in order to distinguish whether deficits in humour appreciation or expression were related to psychotic symptomatology or diagnosis alone. Several studies had small sample sizes (Stratta et al., 2007; Polimeni & Reiss, 2006; Marjoram et al., 2005) or failed to recruit a control group at all (Stratta et al., 2007). A number of studies used unstandardised measures with no psychometric details available and failed to make explicit reference to the effect size of the measures. However, to improve the reliability of these measures, researchers have ensured the use of additional raters in their design to reduce bias (Henry et al., 2007; Juckel et al., 2008).

As seen in Table 1, researchers have used a variety of methods to measure the appreciation and comprehension of humorous stimuli. Given the variation in methods employed to explore humour, it is difficult to infer whether differences in comprehension or type of response stem from the type of humour stimuli. Corcoran (2008) advocates the selection of stimuli in experiments investigating humour should attempt to maximise ecological validity while taking into account any language processing or information integrating difficulties associated with psychosis. However, while everyday experiences of mirth are characterised by the integration of verbal and visual information, thirteen studies employed a non-verbal cartoon task to portray a humorous scene or conversation between characters. This may have become the method of choice because it is a task that is short, enjoyable, and undemanding of other cognitive skills such as high levels of sustained attention and memory and is not confounded by verbal ability (Corcoran, Cahill & Frith, 1997).

Several studies (Corcoran, Cahill & Frith, 1997; Langdon & Ward, 2009; Langdon, Ward & Coltheart, 2010; Marjoram et al., 2005; 2006; Stratta et al., 2007) used cartoons requiring theory of mind (ToM) where the joke can be 'got' by inferring the mental state(s) of the character(s), which were administered alongside control cartoons of a physical/slapstick nature for improved reliability. However, the use of cartoons in any laboratory study wishing to explore cognitive and affective reactions to social scenarios is extremely limited by poor ecological validity. With these measures participants are asked to explain the joke, which the researcher subjectively assesses for level of understanding according to their own criteria. Given that it is unlikely the researcher is 'blind' to the group the participant belongs to there is a risk of bias in these measures. Bias in scoring can also work in the other direction. For example, in studies using film clips (e.g. Tsoi et al., 2008) the fact that it is generally known these are intended to be funny alert participants to the researcher's expectations (Corcoran, 2008).

This potential bias becomes particularly problematic if familiar comedy clips (such as Mr Bean) are employed or if studies adopt the use of video clips where the audience laughter has not been silenced (Henry et al., 2007; Juckel et al., 1997; Juckel & Polzer, 1998).

Humour Comprehension

Nine of the seventeen studies in this review explored the identification of humour, of which all found significant deficits in humour recognition and comprehension in individuals with a diagnosis of Schizophrenia in contrast to a non-clinical sample (Corcoran et al., 1997; Langdon & Ward, 2009; Langdon et al., 2010; Majoram et al., 2005; 2006; Polimeni & Reiss, 2006; Polimeni et al., 2010; Stratta et al., 2010; Tsoi et al., 2008).

ToM and humour. Seven of the reviewed studies utilised a ToM task which involved humorous stimuli or assessed ToM as an additional measure. The role of ToM in humour perception is based upon the work of Corcoran et al. (1997) who suggest jokes are likely to require two stages of processing before their intention becomes clear. Firstly, it must be appreciated that the joke is intended to be funny ('the general intentional inference'). This knowledge enables the individual to persevere with jokes not immediately understood. Secondly, it must be inferred from a joke what is supposed to be funny and why it is funny ('the specific intentional inference'). Corcoran et al. (1997) argue both stages require the social cognitive skill of inferring mental states (ToM). The second stage in particular requires online mentalizing in order to draw from the intention of others in humorous scenarios. However, should a failure at the stage of general intentional inference occur, appreciation at stage two is likely to be compromised and would imply a deficient store of social semantic information or a difficulty retrieving information from the social semantic store (e.g. Corcoran & Frith, 1996).

Corcoran et al. (1997) allocated those with a diagnosis of schizophrenia hierarchically to one of four groups based upon symptomatology according to Frith's (1992) metarepresentional theory of schizophrenia. Those with a diagnosis of schizophrenia performed worse on the ToM task than a non-clinical control group, with those experiencing behavioural disorders and passivity symptoms performing most poorly. However, patients with negative symptoms or disorganization symptoms demonstrated difficulty regardless of whether or not the jokes required mental inferences. No difference was found in those without symptoms, although there was a tendency for a second depressed control group to find the ToM jokes more difficult to understand, suggesting the deficit is not exclusive to schizophrenia. However, this group was small (n = 7) and replication of this finding would be necessary to support this argument further.

Using a larger battery of cartoon jokes, Marjoram et al. (2005) found similar results - but not in relation to the subjective appreciation of the jokes. They hypothesised ToM deficits may not be specific to the diagnosis of schizophrenia but rather to the positive symptoms of psychoses (delusions and hallucinations). However, this was not supported by their findings, perhaps due to a small sample size. It would have been useful to include a measure of cognitive impairment (i.e. working memory, executive functioning) to explore whether the deficit was specific or secondary to the ToM impairment. No significant differences in response time to both sets of jokes, and no differences of subjective ratings of difficulty or humour were found. Participants may therefore have found something entirely different equally as humorous within the stimuli. Alternatively, given the participants reported both sets of jokes as equally difficult, it may be that they were providing socially desirable answers for the subjective ratings of humour to the researcher, but finding they could not then explain the jokes

clearly. The latter may be the most plausible explanation, given the participants were primed by the researcher that the jokes were intended to be funny.

This study was replicated by Stratta et al. (2007) who also found patients performed more poorly on the ToM jokes than the physical jokes. Patients also reported the ToM jokes to be less funny and difficult than the physical jokes, yet gave more correct responses to these. The authors suggest the patients possibly struggled to engage the cognitive resources (such as attention) to work out the irony/incongruity behind these cartoons. However, the study did not employ a control group. The authors also found those with a higher IQ achieved a higher comprehension score yet spent more time analysing the cartoon before providing a response (again, suggesting they were engaging cognitive resources). Other findings revealed the more psychotic and cognitive symptoms (measured by the PANNS; Kay, Fizsbein & Opler, 1987) the less funny the joke was found to be. Thus, the authors concluded that compromised ToM is linked to severity of illness.

More recently, Gavilan and Garcia-Albea (2011) found patients performed significantly worse on understanding cartoon jokes, but no significant differences were found between the false-belief (those requiring mental states) and non-false belief (FB) cartoons. The patients' performance on the cartoons (followed by two other FB ToM tasks, ironies, metaphors and a proverbs task) was found to be the best predictor in discriminating patients from controls. Although the small sample size did not allow for investigation of schizophrenia subtypes, these findings suggest the ToM element of the jokes task presented particular difficulties for the people with schizophrenia. Langdon and Ward (2008) also found differences between patients with schizophrenia and controls on the comprehension of ToM (but not physical) jokes. However, they argue not all ToM tasks tap the unitary underlying concept to the same extent. They found patients performed significantly poorer on three different ToM tasks compared to

controls, regardless of IQ or memory scores. Only the joke and picture sequencing ToM tasks (not the story comprehension task) scores moderately intercorrelated reliably in patients and predicted levels of insight. The authors argue this may be down to whether direct instructions are given, which cue awareness of the relevance of mental states. Thus, better ToM may enable the individual to imagine what it would be like to think what another person is thinking, but these patients would then need to accept that the other perspective is the more accurate representation of a true state of affairs – a cognitive step which could be difficult for people who are motivated to avoid negative self-reflection. Unfortunately however, this study did not explore symptomology (e.g. delusional beliefs) to support this argument further.

Recognition. Where several studies explored the role of ToM in humour comprehension, another set of studies investigated the ability to recognise humour in patients experiencing psychosis. Polimeni and Reiss (2006) argue that one can get a joke without being able to explain it. In other words, consistent with Corcoran et al.'s (1997) general intentional inference, even without a laughter response, people are generally aware when others are attempting to be funny. To test the recognition of humour, they devised a verbal humour perception test which asked participants to identify which of 128 cartoons were shown with their original caption, and which were shown with a caption that belonged to a different cartoon and did not make sense. Significant deficits were found in patients compared to a matched control group. Polimeni and colleagues (2010) replicated their findings in a later study using the same humour task. They also administered a battery of wide-ranging cognitive tests and social functioning scales to identify any salient cognitive components underlying this impairment. Significant deficits in humour recognition were again shown by people with schizophrenia compared to psychiatric and non-clinical controls. The deficits were positively correlated with general intellectual functioning, executive functioning, social

reasoning and social adjustment ratings. Although this was a novel test of the general versus the specific intentional inference as identified by Corcoran et al. (1997), the study would have been improved if the potential effects of other covariates such as symptomology, cognitive ability, medication, mood, or language skills had been accounted for in the analysis.

Tsoi et al. (2008) employed a different modality of humorous stimuli (Mr Bean video clips), and hypothesized the ability to experience humour would be associated with patients' social functioning and executive function. Compared to controls, the patients were less sensitive at detecting humour after controlling for baseline performance on a recognition task. There were significant, although moderate, negative associations between recognition and delusions, depression, apathy and avolition. The ability to identify humour correlated negatively with delusion and depression scores, and with the preservative error score of the Wisconsin Card Sorting Test (WCST; Heaton, Chelune, Talley, Kay & Curtiss, 1993) which suggests a role for executive functions. Similarly to the findings of Polimeni et al. (2010), the authors suggest this may contribute to psychosocial impairment, as shown by the negative correlation with the total scores of the Life Skills Profile (LSP; Rosen, Hadzi-Pavlovic, & Parker., 1989). However, the selection of only one ToM and one executive functioning task (WCST) did not allow for a deeper understanding of their investigation of Martin's (2006) theory, who posits mental schemas enable us to make sense of incoming information from humorous situations. However, should the information from the situation not fit with this schema, we search for an alternative schema that matches, allowing for an alternative interpretation of the situation. If this second schema is invoked simultaneously with the initial schema, then humour results. Therefore, simultaneous activation of two incompatible schemata is the essence of incongruity in humour. Corcoran (2008) argues additional measures of working memory would have

strengthened their argument as Martin's (2006) schema theory would imply a direct correlation between ToM performance and humour appreciation as the need to hold two things in mind are a common feature of ToM tests. Given the understanding these were intended to be funny, the video clips required little cognitive processing and, as argued by Corcoran (2008), they are not best suited to establish a relationship between ToM and the nature of humour appreciation as they invoked slapstick humour. Tsoi et al. (2008) did however ensure that the clips were played in silence to hide the canned laughter which may have indicated a moment was experienced as funny by others. They also asked participants to indicate whether they had seen the clips before, finding their results remained the same after controlling for differences in familiarity. As these clips did not include speech these stimuli did not allow for an exploration of language, thereby reducing ecological validity (Lee, Tsoi & Woodruff, 2009).

Bozikas et al. (2007a) administered the PHAT, a computerised task depicting 20 captionless identical pairs of cartoons. Participants identified which of the pair was intended to be funny or to indicate if both were equally funny. Significant differences in PHAT scores were found between the groups. After applying a Bonferri correction, significant associations were found between these scores and performance on word fluency and selective and sustained attention. This association was considered to reflect the need to process anomalous detail in order to detect the intended humour. Similar to Corcoran et al. (1997), they also found an association with symptomology. The authors replicated this study with patients with a diagnosis of bipolar disorder in remission (Bozikas et al., 2007b). Although the patients performed poorly in comparison to controls, the difference was not significant. The patients' performance did not relate to either mania or depression. However, it is possible the results would have reached significance had the patients been symptomatic.

Humour appreciation

This review demonstrates that there are clear difficulties in the comprehension and recognition of humour in patients with psychosis. However, it appears the results for humour appreciation in adults experiencing psychosis are less equivocal. The ability to enjoy humorous stimuli is not necessarily the same as the ability to comprehend the point of the joke. In fact, what can differ is the emotional impact that the theme of the humorous stimulus has upon the individual. Given that mood and emotional disturbances are common characteristics in adults with schizophrenia (Juckel & Polzer, 1998) this is a key area of interest for researchers who wish to explore affective differences within the context of psychotic experiences. Out of the ten studies which included a measurement of humour appreciation, six studies found significant differences between the experimental sample and non-clinical controls (Gavilan & Garcia-Albea, 2011; Kuiper et al., 1998; Bozikas et al., 2007a; Juckel & Polzer, 1998; Juckel et al., 2008; Stratta et al., 2007) whereas four did not (Bozikas et al., 2007b; Henry et al., 2007; Marjoram et al., 2005; 2006; Tsoi et al., 2007).

Kuiper et al. (1998) found those with a diagnosis of Schizophrenia and those with depression performed significantly worse than a nonclinical group on four measures[4] of humour. The schizophrenic inpatients showed only slightly lower levels of humour than the nonclinical comparison group, but failed to show a relationship between sense of humour, self-concept and psychological well-being. Furthermore, participants with schizophrenia scored significantly lower on the Situational Humour Response Questionnaire (Lefcourt & Martin, 1986) and the personal liking of humour

[4] Sense of Humor Questionnaire (SHQ; Sveback, 1974), Positive and Negative Affect Scale (PANAS; Watson, Clark & Tellegren, 1988), Rosenberg Self-Esteem Inventory (Rosenberg, 1979), an adjective self-rating task (Kuiper & Martin, 1993) and the Centre for Epidemiological Studies Depression Scale (CEDS; Radloff, 1977).

subscale of the SHQ which assesses the degree to which an individual values the humorous role.

Facial activity has been reported to be reduced in schizophrenia and depression with or without medication (Schneider et al., 1992). However, Henry et al. (2007) found both patients and non-clinical controls can effectively implement the strategy of suppressing emotional behavior in response to three amusing film clips. However, only the control group was able to exaggerate their behavioural response. Behavioural expression was significantly correlated with the degree of emotional blunting; supporting the hypothesis that emotional dysregulation may be a potential mechanism underpinning this common characteristic of schizophrenia.

Juckel and Polzer (1998) found significant differences in the speed of facial movement when beginning to laugh at a humorous film. Unfortunately, the authors recruited only seven participants in both the experimental and control groups, and did not explore IQ, symptomatology, or neuroleptic medication as potential confounding explanations for these differences. However, in a later study, Juckel et al. (2008) used kinematic facial behaviour analysis using a short Mr Bean film to induce amusement. Patients were found to react with laughter significantly later, and they reached maximum laughing behaviour another 0.7 seconds later. They were also observed to laugh significantly less than controls. The researchers also explored differences between unmedicated patients and those in receipt of neuroleptics, finding those taking antipsychotics and Biperiden for extra pyramidal symptoms showed a distinctly slower initial laughing speed than controls, whereas those on atypical antipsychotics showed a similar initial velocity (IV) of laughing. Significant correlations between IV and anxiety, depression and the brief psychiatric rating score (BPRS; Overall & Gorham, 1962) were observed. Positive correlations were also found between IV and affect scores and to a lesser extent with poverty of speech and attention. Interestingly,

emotional reaction time and IV were found to be independent and the patients showed an abnormally low laughing frequency and delay in facial reaction to the clips. Yet, their facial reactions were significantly faster than controls, and when asked to evaluate how funny the sketch was on a visual analogue scale, patients rated the film as having the same emotional impact as the controls. This highlights facial expressions do not necessarily implicate a diminished affective response to humour.

The neurobiological perspective

Neuroimaging studies have been conducted with a variety of clinical groups, which have found supportive evidence that the frontal lobes and limbic system structures are important parts of humour appreciation (Gallagher et al., 2000). Patients with a diagnosis of schizophrenia have shown deficits in the neuroanatomical areas (Walter et al., 2003) and multiple domains of cognition involved with humour appreciation (Palmer & Heaton, 2000; Pantelis & Maruff, 2002). However, to date only one study has explored the activations of neural circuits in the brain in response to humorous stimuli in people at risk of schizophrenia. Marjoram et al. (2006) conducted an fMRI study with relatives at either low or high risk of schizophrenia (depending on whether they had first or second degree relatives with the diagnosis), non-clinical controls, and a small group of participants who were given a diagnosis of schizophrenia during the timespan of the study. Those who were at high risk of developing schizophrenia were also analysed in two groups; those who had never previously reported symptoms, and those who had reported psychotic symptoms at least once before during a larger study they were recruited from. These participants (n = 12) were further divided in two halves based on past or present psychotic symptoms.

The study found robust activations across the groups in the areas previously associated with mentalising abilities (PFC, precuneus and temporal lobes). Participants without symptoms showed significantly more activation in the frontal lobe areas than

those with symptoms or a diagnosis of schizophrenia. No differences in difficulty ratings or the comprehension of the jokes were found which may have been due to the relatives being more at risk but not currently experiencing the array of symptoms commonly found with schizophrenia. However, those with previous symptoms were significantly quicker at understanding the joke than those with a diagnosis of schizophrenia and those with symptoms on the day of testing, suggesting that cognitive skills were involved here. However, given the areas involved in mentalising were activated as well as those involved in humour processing, it is difficult to conclude that the ToM activations were due to the individual's attempt to understand the character in the cartoons or due to the attempt to get at what the artist was trying to portray as a joke. Furthermore, the researchers did not investigate the appreciation of these jokes (funniness ratings) which would have allowed for interesting correlational analyses. The secondary analyses of this study must also be interpreted with caution given the small sample sizes within each subgroup.

The majority of studies included in this review measured estimates of IQ to ensure humour recognition deficits were not attributable to overall neurocognitive functioning (Corcoran et al., 1997; Langdon et al., 2010; Langdon & Ward, 2009; Tsoi et al., 2008; Marjoram et al., 2005). These studies found the performance of the patient groups was independent of intelligence, whereas Henry et al. (2007) failed to control for IQ in their statistical analysis. Only one study found a significant positive correlation between humour recognition and general intelligence (Polimeni et al., 2010). Interestingly, Stratta et al. (2007) found that patients displaying more cognitive symptoms found ToM jokes less difficult. The authors query whether this unexpected finding was caused by patients not spending the time to recruit cognitive resources to comprehend the jokes as measured by the time spent exploring the pictures presented.

Similar results were found by Marjoram et al. (2005a), where controls spent more time on the ToM cartoons than patients.

From the studies included in this review, it certainly appears that performance on humour recognition tasks have shown associations with a range of neurocognitive skills, such as selective and sustained attention (Bozikas et al., 2007a), executive functioning, social reasoning and social adjustment (Polimeni et al., 2010), working memory (Tsoi et al., 2008), verbal memory and inhibitory control (Langdon & Ward, 2009) and in some cases, general intellectual functioning (Polimeni et al., 2009). A number of studies in this review have explored the relationship between language and humour comprehension and appreciation, revealing limited and mixed evidence that people with psychosis have difficulties in comprehending jokes due to language difficulties. Patients with psychosis have been shown to have diminished ability to understand language (Stephane, Pellizzer, Fletcher, & McClannahan, 2007), particularly pragmatic language like metaphors and irony which are commonly used in language-based humour. Several studies administered a quick IQ test (e.g. NART; Nelson, 1982) which are beneficial because they measure verbal extraction abilities. Bozikas et al. (2007a) included phonemic and semantic language fluency as covariates within their analysis, finding only phonemic language was related to humour appreciation.

Galivan and Garcia-Albea (2011) found ToM impairments seem to be mainly associated with language comprehension at the semantic-pragmatic processing level, and that this ToM association with language comprehension was for the most part independent of IQ. In Langdon and Ward's study (2008), the number of words produced proved to be a clear significant predictor of ToM. They found patients with schizophrenia had greater difficulty in explaining the humour behind the ToM jokes, which may suggest they have difficulty verbalising the mental states of others. The authors also reported that the more words generated in their explanations of jokes and

the better the patients' verbal comprehension and memory, the higher the joke appreciation score tended to be. However, as the ToM difficulty remained even when verbal comprehension scores were controlled for, this argument is not strong. With these types of measures it is difficult to know whether participants did not recognise the mental state of characters or chose not to explain the joke in more detail. Nonetheless, the purpose of these tasks is to see whether participants can voluntarily make inference in social situations where there is no prompt to examine the mental states of others.

Discussion

There is a growing consensus that psychosis can be more gainfully studied by exploring the meaning of its individual symptoms (Bentall, 2003). This symptom focused approach has included an exploration of social skills, such as humour, associated with symptoms of schizophrenia. The balance of the current evidence suggests there are difficulties in the comprehension of humour in adults with psychosis. Nine studies explored the identification of humour, of which all found significant deficits in humour recognition and comprehension. Corcoran et al. (1997), Marjoram et al. (2005), Gavilan and Garcia-Albea (2011) and Langdon and colleagues (2008; 2010) conclude patients with a diagnosis of schizophrenia generally have difficulty appreciating humour in cartoons, but this problem is augmented when they must first infer the mental state of another person. The studies that focused on mental state versus physical cartoon jokes all achieved a high quality rating of over 14, suggesting these findings are reliable.

For appreciation however, the results are less clear. Of the ten studies that investigated humour appreciation, six found significant differences between the experimental sample and non-clinical controls. Studies exploring mirth were much more varied in terms of both the conclusions given regarding humour appreciation, and in the ratings achieved for their methodological quality. The causes of a deficit in humour

appreciation are not known but the literature makes a number of suggestions. For instance, it is possible that these patients with psychosis are prone to depression, which in turn may increase feelings of anhedonia. Additional symptoms that may relate to humour in these patients include blunting of affect, inappropriate or flat affect (Kuiper et al., 1998) and cognitive deficits which impact heavily upon the individual's ability to recognize and understand humour.

Only one study has explored the neuroanatomy of humour processing in the context of psychosis (Marjoram et al. 2005). However, this study primarily focused on relatives of individuals with a diagnosis of schizophrenia. Nonetheless, individuals with previous symptoms were significantly quicker to understand the joke than those with a diagnosis of schizophrenia and those with symptoms on the day of testing, suggesting there may be a state effect mediated by traits in ToM processing in those at high risk of schizophrenia. However, additional studies with larger samples of adults' currently experiencing psychosis are necessary to provide further clarification of these findings.

Implications for Future Research

Only four studies in this review measured both comprehension and appreciation, of which three (Marjoram et al. 2005; 2006, Tsoi et al., 2008) found deficits in comprehension but not in appreciation. Although it seems that humour comprehension impairment is apparent in psychosis, regardless of ToM performance, there appears to be something specific about these tasks that patients with psychosis struggle to comprehend. There are three possible responses that any individual could show when processing stimuli which have the intention to give rise to mirth. The first is understanding a joke in the way it was intended to be understood and consequently rating it as funny. The second, is not understanding the intention behind the joke, and therefore not rating it as particularly humorous. The third response, which may be more specific to individuals experiencing psychotic symptoms, is to find the joke funny but

for reasons not considered 'typical' or do not reflect the true intention of the cartoonist. Such an idiosyncratic response could be attributed to a misconception of the aims behind the joke, a defensive strategy (i.e. keeping face) or could perhaps be put down to a creative alternative explanation for the joke. Corcoran's (2008) commentary on Tsoi et al's (2008) study suggests an interesting aspect; if the patients and controls do not recognise similar aspects of the stimuli as humorous, it may be they find different aspects funny to the same degree. Thus, qualitative explanations of a joke are of interest when conducting this type of research, for instance qualitative differences between the groups that are attributable to unusual beliefs or auditory, delusional or hallucinatory symptoms. With this in mind, the inclusion of mental state terminology within a quantitative analysis of joke interpretation is valuable here. Although there is not one correct answer, participants do usually draw on the same elements of the joke to arrive at the conclusion as to why the joke is funny. Asking patients to explain the joke allows an evaluation of the extent to which they generate 'typical explanations'.

It would also be interesting to study humour in varying mood states. Fifteen of the participants with schizophrenia in Langdon et al.'s study (2008) reported experiencing persecutory delusions, of which 13 also reported grandiose delusions. Mania and/or high levels of grandiosity are commonly reported by individuals with psychosis and bipolar disorder, but only one study has explored the humour experience of people with this diagnosis (Bozikas et al., 2007b). Thus, it would be of interest to investigate further how these groups may differ to those experiencing schizophrenia, including patients with bipolar disorder who are currently symptomatic.

Research in this field would improve if the same paradigms, stimuli and measurement scales were used consistently, and if these measures were selected to ensure the greatest ecologically validity. If humour is explored because of the potential clinical implications a deficient humour response may affect social impairment it would

be favourable to investigate humour within a realistic social situation. Future studies should select novel stimuli that will be equally unfamiliar to all groups in order to reduce the potential impact of previous exposure to and memory of the stimuli (Corcoran, 2008). Controlling for IQ enables a firmer argument that differences between clinical patients and controls cannot be attributed to differences of cognitive functioning. However, this alone is not enough, since working memory, executive function, attention, processing speed, abstract thinking are also useful variables to account for as they are potentially all involved in humour comprehension depending on the paradigm used. It is also important to measure both verbal and non verbal joke comprehension. There is a growing number of studies exploring language, irony and metaphors (e.g. Langdon, Colthart, Ward & Catts, 2002), but no studies that ask patients to explain verbal jokes they have just heard. This would enable the exploration of the differences between the modalities, whilst also adding to the understanding of language impairments associated with psychosis.

Medication and symptoms such as delusions, hallucinations, and mood (particularly, anxiety and anhedonia) are all important variables for researchers to consider in relation to humour experiences in this clinical group. In addition, studies should improve the specificity of their findings by including a non-psychotic psychiatric control group. Furthermore, larger samples exploring a more homogeneous representation of patients (first episode versus chronic patients) who are in different stages of illness (acute, stable and remission) would help hone conclusions about deficits in the appreciation or comprehension of humour.

Implications for Clinical Practice

Research into humour experiences in the context of psychosis could hold numerous valuable implications which may supplement established psychological interventions. The use of humour as an intervention for patients with psychosis is

slowly developing (Gelkopf, 2011) and there have been some empirical investigations into the effect of humour-centred activities on the behaviour of inpatients experiencing psychosis. For instance, Gelkopf, Gonen, Kurs, Melemad and Bleich (2006) showed films on two inpatient wards five days a week for three months. One group were shown only humorous movies, and the other a mixture of movies of which only 15% were humorous. A significant reduction in clinically rated negative symptoms, anxiety and depression was observed in those who watched the humorous movies. Furthermore, self-reported anger decreased and social competence improved. Thus, more research is needed to investigate the use of humour as a coping mechanism for individuals experiencing psychosis in order to inform psychological interventions and clinical assessments.

Conclusions

While to date there seems to be support for a deficit in the comprehension of humour, it is less equivocal whether adults with psychosis experiencing current symptoms, particularly negative symptoms, have reduced humour appreciation capacity. The highest quality studies have yielded different patterns of results, yet despite the high comorbidity of depression and anxiety in adults experiencing paranoia (Freeman, 2007) not all studies controlled for mood. Not only would the replication of the significant findings to date add weight to these lines of inquiry, these studies would enhance the argument that individual differences in the cognitive and affective underpinnings of psychosis could be better understood in general, proving of more value than a diagnostic label often applied today.

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SECTION 2: EMPIRICAL RESEARCH REPORT

A Preliminary Investigation into 'Theory of Mind' and 'Attributional Style' in Adults with Grandiose Delusions

Abstract

Objectives. This study tests the application of socio-cognitive models of paranoid delusions to grandiose delusions.

Design. A cross-sectional design was employed to compare the performance of individuals with psychosis with grandiose delusions to a depressed control group on measures of Theory of Mind (ToM) and attributional style. A symptom approach was also taken to investigate the association between persecutory delusions and grandiose delusions in terms of cognitive style.

Method. 18 participants with psychosis and 14 participants with depression were recruited. ToM was measured using a non-verbal joke appreciation task and a verbal stories task. Attributional style was measured using the Internal, Personal and Situational Attributions Questionnaire (Kinderman & Bentall, 1996). An innovative dialogue task exploring autobiographical memories was also employed to investigate ToM and attributional style.

Results. Participants experiencing grandiose delusions performed significantly worse on both ToM tasks and produced significantly fewer references to mental states in the dialogue task. Furthermore, these participants made significantly more atypical answers when explaining the joke behind the ToM cartoons. No differences for subjective funniness ratings or attributional style were found. Following a symptom-based approach, the presence of a grandiose delusion was significantly associated with poorer ToM on the joke appreciation and stories task.

Conclusions. Participants with a grandiose delusion appear to have a ToM impairment independently of the severity of a comorbid persecutory delusion. These findings could stimulate further research into cognitive styles and a specific symptom investigation.

Keywords: Theory of Mind, Attributional Style, Grandiosity, Delusions, Mania

A Preliminary Investigation into 'Theory of Mind' and 'Attributional Style' in Adults with Grandiose Delusions

Recent research has demonstrated that delusions are complex and multi-factorial in origin, resulting from a combination of biological, psychological and social factors (Freeman, Garety, Kuipers, Fowler & Bebbington, 2002). They also vary in content, with prevalence studies demonstrating persecutory delusions to be the most common in schizophrenia spectrum disorders. Thus it is no surprise that these have received the most theoretical and empirical attention. After persecutory delusions, grandiose delusions are reported to be one of the most common types of delusion in psychosis (Applebaum, Robins, & Roth, 1999) and the most common symptom in bipolar mania (Dunayevich & Keck, 2000; Goodwin & Jamison, 1990; Turkington & Kingdon, 1996). Grandiose delusions are defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as "delusions of inflated worth, power, knowledge, identity, or special relationship to a deity or famous person" (American Psychological Association, 2000). They are found across a wide range of psychiatric conditions, such as schizophrenia, bipolar disorder, and patients with substance abuse disorders (Applebaum et al., 1999).

Socio-cognitive studies investigate the perception, processing and interpretation of social information to explore the way that people think about themselves and others (Newman, 2001). People experiencing psychosis have difficulties identifying social cues, conveying their feelings to others, identifying affect in themselves and in others, and with the appropriate attribution of causes of important life events (Garety & Freeman, 1999). Furthermore, the ability to correctly interpret and predict the mental states of other people, known as theory of mind (ToM; Premack & Woodruff, 1978), has been the subject of much research. This ability is central to Frith's (1992) neuropsychological theory of schizophrenia. These patients have been shown to have difficulties with ToM tasks whether it be during a first episode of psychosis (Bertrand,

Sutton, Achim, Malla & Lepage, 2007) or with a long term chronic duration (Corcoran 2003; Corcoran & Frith, 2003). Furthermore, the ToM deficits in acutely psychotic patients can be as severe as those seen in the context of Asperger's syndrome (Craig, Hatton, Craig, & Bentall, 2004). In particular, Frith proposed that people reporting persecutory and referential delusions develop ToM as normal but lose the ability during acute psychotic episodes. In a critical review by Bentall, Corcoran, Howard, Blackwood and Kinderman (2001), it was concluded that individuals with persecutory delusions perform more poorly than both psychiatric and non-psychiatric comparison groups on ToM tasks. Some studies have also found ToM deficits in participants whose persecutory delusions are in remission (e.g. Randall, Corcoran, Day, & Bentall, 2003). More recently, Harrington, Langdon, Seigert, and McClure (2005a) found that the ToM deficit was only observed in those participants with schizophrenia who also had persecutory delusions. Thus, several studies have since taken a transdiagnostic symptom-focused approach to exploring ToM performance. Corcoran et al. (2008) found poor performance on ToM tasks in adults with persecutory delusions irrespective of diagnosis and found that participants' performance was correlated with the degree of distress caused by this symptom.

Although the literature indicates that ToM problems may be present in people with persecutory delusions, it is clear that they are not seen exclusively in the context of this symptom. Freeman (2007) concluded that ToM deficits are clearly present in patients with predominantly paranoid symptoms but advocates that studies are needed to examine ToM abilities in relation to dimensional measures of delusional ideation or paranoia. The failure to consistently replicate the specific relationship between ToM impairment and paranoia may lie in the nature of the tasks employed to assess ToM, as some studies have shown that ToM impairments in the context of positive psychotic symptoms are less prevalent when IQ is controlled for (Harrington et al., 2005a).

Furthermore, it is possible that the use of medication could impair cognitive performance. However, the longitudinal evidence for an association between cognitive performance due to atypical antipsychotics, neuroleptics or antidepressants is complex (Bilder et al., 2002; Biringer, Rongve & Lund, 2009). Atypical antipsychotics have been shown to either improve (e.g. Keefe, Silva, Perkins & Lieberman, 1999) or have detrimental effects (e.g. Frangou, Donaldson, Hajdulis, Landau & Goldstein, 2005) on cognitive performance. One way to attempt to control for the effects of medication on cognition in research studies is to convert the participants prescribed medication into Chlorpromazine equivalents or dosage effects. However, according to Rijcken, Monster, Brouwers and de Jong-van den Berg (2003), the use of these is extremely ambiguous with discrepancies arising across studies.

Cartoon jokes are one of the frequently used measures of ToM. However, Harrington and colleagues suggest that any ToM difficulty associated with persecutory delusions may be subtle in nature and not easily demonstrated by the tasks currently available, and thus more sophisticated symptom-focused research into ToM is needed (Harrington, Siegert & McClure, 2005b). Other reasons why previous findings in this area have been so inconsistent could be related to small sample sizes and the variable methods to group symptoms.

More recently, a preliminary cognitive model of grandiose delusions has been put forward, suggesting that persecutory and grandiose delusions shared distinct, yet overlapping psychological processes (Knowles, McCarthy-Jones & Rowse, 2011). This study aims to test this model, and hypothesises that grandiose delusions may be associated to ToM impairment to the same degree as persecutory delusions.

Attributional style

Another factor that is pertinent to the relationship between ToM and delusions is the role of attributional style. Attributions are the causal explanations that individuals

give for their own behaviour and that of others (Fiske & Taylor, 1991). In a non-clinical population, the default tendency is to attribute negative events to external factors and positive events to the self, a pattern known as the self-serving bias (Mezulis, Abramson, Hyde & Hankin, 2004). Individuals with psychosis show these biases to an even greater extent. Bentall and Kinderman's (1998) model of paranoia proposes that persecutory delusions are the product of two mechanisms: a tendency to avoid internal (self-blaming) attributions for negative events, and an inability to take into account the complexities of the situation-person interaction, a skill that is likely to be honed through ToM skills. These mechanisms give rise to an 'externalising bias'; an exaggerated tendency to assign blame outside of the self for negative events, and the 'personalising bias'; an exaggerated tendency to blame other people rather than chance (Craig et al., 2004; Janssen et al., 2006). The paranoid person's avoidance of internal attributions for negative events may reflect a dysfunctional strategy for regulating self-esteem (Kaney & Bentall, 1989; Bentall, Kaney & Dewey, 1991; Candido & Romney, 1990; Lyon, Kaney & Bentall, 1994; Fear, Sharp & Healy, 1996; Sharp, Fear & Healy, 1997; Young & Bentall, 1997). This theory has been labelled the delusions-as-defence theory (Bentall, Kinderman & Kaney, 1994), suggesting that this mechanism is an extreme form of the self-serving bias found in the general population (Kinderman, Dunbar & Bentall, 1998). On the whole, the evidence for attributional biases (particularly the personalising bias) and ToM impairments in people experiencing psychosis is fairly consistent (Freeman, 2007; Harrington et al., 2005b).

In contrast to those with persecutory ideation, participants with depression have been shown to display excessively internal attributions for negative events (Sharp et al. 1997). The existing research suggests that individuals with psychosis and concurrent depression display a tendency to make internal attributions for negative events (Candido & Romney, 1990; Krstev, Jackson & Maude, 1999). Given that depression and

psychosis have high rates of comorbidity, this complicates the research field further. The mood of patients with a diagnosis of Bipolar Disorder for example fluctuates between severe depression and mania with psychotic features.

The measurement of attributional style typically relies on self-report measures such as the Attributional Style Questionnaire (Peterson et al., 1982). These measures are easy to administer but participants report that they are difficult to complete (Freeman, 2007). Furthermore, the ASQ, designed to be administered to college students and depressed patients, has been reported to have low internal reliability (Reivich, 1995). Thus, the Internal, Personal and Situational Attributions Questionnaire (IPSAQ; Kinderman & Bentall, 1996) was developed to investigate the personal/universal dimension with psychotic samples specifically. Like the ASQ, the IPSAQ is comprised of a series of 32 hypothetical situations for which the participant is required to generate a cause and to indicate whether this cause is internal (personal), or external (either due to others or due to situation/circumstances). Although the IPSAQ is less complex than the ASQ and has acceptable internal reliability (Kinderman & Bentall, 1996), some participants report difficulty in pretending that hypothetical events have occurred in their lives (Beese & Stratton, 2004). To increase ecological validity, methods using natural speech from this population may be preferred (e.g. Stewart, Corcoran & Drake, 2009). The analysis of speech and dialogue allows not only an exploration of mental state words but also offers a quantitative measure of the different types of attributions made for autobiographical memories. This study will adopt both a quantitative measure (the IPSAQ) and a dialogue task in order to investigate attributional style in people with current grandiose delusions.

The Present Study

Although more researchers are now adopting a symptom orientated approach to improve our understanding of psychiatric disorders (Bentall, Jackson, & Pilgrim, 1988;

Bentall, 2003), little research has focussed on grandiose delusions (Knowles, McCarthy-Jones and Rowse, 2011). There is however a growing body of research into ToM performance in affective disorders (Bonshtein, Leiser & Levine, 2006; Bora et al., 2005; Bora, Yucel, & Pantelis, 2009; Corcoran et al. 2008; Doody, Gotz, Johnstone, Frith & Cunningham-Owens, 1998; Kerr, Dunbar, & Bentall., 2003; Inoue, Yamada & Kamba, 2006; Lahera et al., 2008; Malhi et al., 2008; Montag et al. 2010; Schenkel, Marlow-O'Connor, Moss, Sweeny, & Pavaluri, 2008), but limited theoretical understanding of the mechanisms underlying the association between grandiose delusions and ToM.

Support for a link between ToM and the personalising is mixed (Craig et al., 2004; Langdon, Corner, McClaren, Ward & Coltheart, 2006; Randall et al., 2003) and warrants further investigation. In the context of grandiose ideation, we might expect to observe more internal personal attributions for positive events and more external attributions for negative events (Jolley et al., 2006). This would accord with Bentall and Kinderman's theory (1998), in that the individual may make more explicit internal attributions for positive events in order to regulate self-esteem. A concurrent ToM deficit could contribute to the maintenance of a grandiose delusion, if more external personal attributions for negative events resulted from an inability to adequately represent the role of dynamic situational factors in determining the mental and emotional states and interpersonal behaviour of others.

This study aims to investigate these cognitive processes in people experiencing grandiose delusions. Specifically, it was hypothesised that:

(i) Participants with psychosis will score poorly on both types of ToM tasks in comparison to depressed control participants.

(ii) Participants with psychosis will show a strong self-serving attributional bias, making excessively external (blaming other people and circumstances) attributions for negative events and excessively internal attributions for positive

events. These results will be found in both the IPSAQ and dialogue task. This will contrast to the typical depressive attributional style seen in the unipolar depressed 'psychiatric control' group.

(iii) When exploring by delusion type, participants with persecutory delusions will score lower on both ToM tasks compared to the participants who do not experience this symptom.

(iv) Participants experiencing grandiose delusions will score lower on both ToM tasks than participants without this symptom. Furthermore, we can expect this impairment to remain after controlling for the severity of persecutory delusions in participants who experience both these symptoms.

(v) Participants with grandiose delusions will also demonstrate excessive personalising and externalising biases. These biases will be found in both the IPSAQ and the dialogue task.

In addition to these hypotheses, this study also set out to investigate whether ToM performance is associated with a personalising and externalising bias irrespective of diagnostic category or symptoms.

Methods

The study received ethical approval from the South Yorkshire NHS Ethics Committee (Appendix C). Approval was also granted by the South West Yorkshire and Sheffield Health and Social Care NHS Foundation Trust Research & Development departments (Appendices D & E).

Participants

This study adopted a two-group case-control design to investigate performance on two ToM and two attributional style tasks in currently depressed and grandiose populations. An *a priori* power analysis based on the second order ToM task data from Corcoran et al.'s (2008) cross-sectional transdiagnostic study was conducted using

G*Power to determine the required sample size (Erdfelder & Faul & Buchner, 1996). Using Cohen's (1988) criteria, a large effect size of f = .82 was assumed. The findings showed that with p = .05 and two groups of participants, a total sample of 15 participants would be required to achieve 80% power if conducting an analysis of covariance (ANCOVA). However, Corcoran et al. (2008) looked at ToM performance in individuals experiencing persecutory delusions, whereas this study investigated ToM performance in individuals experiencing grandiose delusions. Therefore, the effect size was reduced from .82 to a more conservative .5 to ensure the study was not underpowered. Consequently, the result of the *a priori* power analysis revealed that a total sample of 34 participants would be required to achieve 80% power.

Recruitment

A convenience sampling methodology was adopted to recruit individuals accessing either NHS mental health services or third sector providers. Potential referrers were invited by letter (Appendix F) to identify possible participants who may be suitable to take part in the study. A PowerPoint presentation (Appendix G) was also delivered by the author to outline the proposed project at team meetings in order to engage clinical staff. Clinicians were provided with information sheets (Appendices H & I) that could be given to potential participants, highlighting the researcher's contact details and a brief description of the study. Follow up phone calls and emails were carried out to maintain the relationship with clinicians and to continue the progress of the recruitment over a period of eight months.

Experimental group

Demographic information for both participant groups can be found in Table 1. Eighteen people (ten women) with psychosis were recruited to the experimental group. Participants were aged between 18 and 65 years (M_{age} = 43.4 years, SD = 9.1). Only one participant in this study was African-Caribbean, while the rest of the sample recruited in

this study were white-British. The inclusion criteria were a DSM-IV (American Psychiatric Association, 2000) diagnosis of bipolar disorder, schizophrenia, schizoaffective disorder, or delusional disorder. In addition, participants were identified by a clinician as currently experiencing a DSM-IV defined grandiose delusion. All participants in the experimental group also had to endorse either item 6 (*Do you ever feel as if you are, or destined to be someone very important?)* or 7 (*Do you ever feel that you are a very special or unusual person?)* on the short form of the Peters Delusion Inventory (PDI-21, Peters, Joseph, Day & Garety, 2004). Participants who opted into the study from third sector organisations such as Bipolar UK were recruited if they endorsed these items and had a diagnosis of Bipolar disorder by a consultant psychiatrist. This was clarified both by the referrers and by the participants when providing medical information on the day of testing. Fourteen participants had a diagnosis of bipolar disorder, two of schizophrenia, and two of schizoaffective disorder. Five participants were inpatients on psychiatric wards, and 13 were psychiatric outpatients attending regular clinic appointments.

Because this study involved a measure of natural speech, only people with English as a first language were included. Participants with a history of central nervous system disease or head injury, a learning disability or pervasive developmental disorder were excluded from this study as these comorbidities would have been likely to impact on IQ and cognitive performance.

Controls

The depressed control group comprised 14 participants (M_{age} = 43.5 years, SD = 13) with a primary diagnosis of depression (as defined by the DSM-IV). Nine members of the group were women. Participants were recruited via an Improving Access to Psychological Therapies (IAPT) service. It was an aim of this study that both groups

would be matched for age, sex and IQ as far as possible. The same exclusion criteria for the experimental group were applied to the controls.

Table 1.

Comparison of the demographics of both groups

	Grandiose group (n=18)		Depressed controls (n=14)		Statistical test
	Mean	SD	Mean	SD	
Gender (% female)	56%		64%		$x^2(1, n=32)=0.25$
Age (years)	43.39	13.02	43.50	9.11	$t(30)=0.27$
Education (years)	14.28	1.93	14.50	1.45	$t(30)=0.36$
Years since diagnosis	12.83	11.27	10.21	10.94	$U=93$, $Z=-1.258$
No. of medications	1.39	1.20	.86	.36	$t(30)=-1.79$
WASI IQ	106.61	11.13	110.0	9.94	$t(30)=0.91$
Vocabulary	56.33	7.11	55.21	6.86	$t(30)=-0.45$
Matrix Reasoning	50.83	8.89	55.29	8.04	$t(30)=1.46$

Note. IQ=Intelligent Quotient

Procedure

Participants identified through NHS services were asked by their care co-ordinator to give permission for the researcher to contact them to arrange a meeting. These meetings were usually held at an NHS base, the University department or client's home. The nature of the study was explained in participant information sheets (Appendix H & I) and reiterated by the researcher during the meeting. All participants provided informed consent (Appendix J). Demographic details were recorded on a screening form (Appendix K). Where participants were unable to answer any questions regarding diagnoses or medication, they were asked to consent to the researcher to speak to their care co-ordinator/referring clinician or to access their medical notes. This

was specified on the information sheet prior to interviewing. Participants were verbally debriefed about the aims of the study after all tasks had been administered, and any questions were answered. The questionnaires and tasks were administered in a fixed order. No financial incentive was provided to participants, although expenses were reimbursed for those who travelled to the session.

Service user involvement

In order to ensure the study was accessible to participants and that the procedure caused as little anxiety as possible, a service user who has a diagnosis of Bipolar Disorder was consulted before recruiting participants. The service user provided feedback on the information sheets and consent form and estimated the measures would take most people no longer than 35 minutes to complete.

Measuring delusions

As well as having been identified by the referring clinician as having a current grandiose delusion, participants were asked to complete the PDI-21 (Peters et al., 2004) as a measure of delusion proneness. The PDI (Appendix L) is quick to administer and is easily accessible, and has been used in a number of studies to identify individuals with both persecutory delusions (Corcoran et al. 2008; Moore et al. 2006) and grandiose delusions (Armando, Nelson, Yung, Ross, Birchwood, & Girardi, 2010; Jones & Fernyhough, 2007; Peters et al. 1999; Scott, Chant, Andrews & McGrath, 2006; Verdoux, et al., 1998). Although this is a self-report measure, studies have previously shown that participants can reliably provide information about the presence and type of delusional ideation (Lincoln, Ziegler, Lullman, Muller & Rief, 2010). The measure has high test-retest reliability ($r = 0.71$) and demonstrates good internal consistency and concurrent validity, and it has been used with both clinical and non-clinical groups (Peters et al., 2004). The questionnaire also measures the presence of a range of other types of delusional beliefs (e.g. religious) as well as providing ratings of distress,

conviction and pre-occupation on a scale of 1-5. Thus, the PDI provides information on the total number of items endorsed (out of 21), total distress, preoccupation and conviction (a score of up to 105 for each dimension), and total delusional ideation (the sum of all scores which can be added up to 336). The types of delusions and experiences measured include persecution, suspiciousness, paranoid ideation, religiosity, grandiosity, paranormal beliefs, thought disturbance, negative self, depersonalisation, catastrophic ideation and thought broadcast, and ideas of reference and influence. All types of delusions have two questions each, thus a combined total possible score of 32 when incorporating distress, preoccupation and conviction. Depersonalisation however has just one question (a total score of 16).

Mood

As the link between anxiety/depression and paranoia is strong (Freeman, 2007), the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) was administered to both groups to ensure that any impaired performance could not be better explained by co-morbid mood symptoms. The HADS (Appendix M*)* has high face validity, criterion validity, and internal consistency (between 0.76 and 0.41 for the anxiety items and up to 0.60 for the depression items).

In addition, the Altman self-rating mania scale (ASRM; Altman, Hedeker, Peterson, & Davis, 1997) was administered to measure current symptoms of mania. This measure (Appendix N) has been shown to correlate well with the Young Mania Rating Scale (YMRS; Young, Biggs, Ziegler & Meyer, 1978, r = 0.718) and the Clinician Administered Rating Scale-Mania (CARS-M; Altman, Hedeker, Janicak, Peterson, & Davis, 1994, r = 0.766).

Estimated IQ

The two-subtest version of the Wechsler Abbreviated Scale of Intelligence (WASI; Weschler, 1999) has been used in previous studies exploring ToM in paranoia

(e.g. Corcoran et al. 2008; Langdon, Ward & Coltheart, 2010; Moore et al. 2006). The WASI FSIQ-2 has a correlation co-efficient of 0.81 to the WAIS-III FSIQ and a high validity coefficients for the subtests, ranging between .66 (matrix reasoning) and .88 (vocabulary) in an adult population (Weschler, 1999). This general estimate of current intellectual ability allowed an exploration of whether socio-cognitive functioning was independent of IQ.

Theory of Mind: The Stories Task

Harrington et al. (2005a) suggest that future research should maintain a greater consistency in the ToM tasks employed by different research groups to facilitate comparisons between results. Therefore to continue consistency with the existing research in this field, the most commonly used task for assessing theory of mind was adopted: the first and second order false-belief task (Bora et al. 2009). This task (Appendix O) is brief and makes minimal demands on participants' cognitive resources (Kerr et al. 2003) and has been found to hold good validity for participants of average intellectual ability (Shryane et al., 2008). Four short stories (as previously used by Moore et al. 2006, Corcoran et al. 2008 and Shryane et al. 2008) were read out loud to participants, who were simultaneously shown a series of cartoon drawings depicting the events in each story. Two of the stories assess the ability to understand states of false belief and two assess a characters intention to deceive. All four stories were designed to contain both a first-order question (when the contents of a single person's mind must be inferred) followed by a second-order question (where the contents of two people's minds must be inferred). In addition, participants were also asked questions that tested their understanding of the state of the world (i.e. a reality question), and additional questions of memory and non-mental state inference. Responses to all questions were recorded as correct or incorrect.

The Joke Appreciation Task

Researchers should ideally use a range of ToM tasks as they are heterogeneous and differentially sensitive to IQ (Harrington et al., 2005a; Shryane et al., 2008). Thus, the current study also employed a non-verbal visual joke appreciation task which has been shown to discriminate between people with a diagnosis of schizophrenia and non-clinical controls (e.g. Corcoran, Cahill and Frith, 1997; Marjoram et al. 2005). A selection of 10 caption-less cartoons (taken from the set used by Gallagher et al. 2000) were shown one at a time in a fixed pseudorandom order, and participants were asked to "explain the joke" (Appendix P) by providing a short account of their interpretation of the joke's meaning. Responses were given a score between 0 and 3 to provide an index of the overall extent to which participants provide mental state explanations (Appendix P). Five of the jokes could be understood and appreciated at a physical or behavioural level although they can evoke mental state inferences too. The other five jokes definitely require an understanding of one or more of the characters' mental states in order to understand them. The scores given for each of the jokes were summed to given an index of overall ToM. Participants were also asked to subjectively grade each cartoon for humour on a scale of 1-5. This was for the purpose of comparison between both groups and to explore whether the level of humour detected correlates with the participants' ability to infer ToM in the jokes.

Given that studies have found normal appreciation with impaired comprehension of humour in adults experiencing psychosis (e.g. Marjoram et al., 2005; 2006; Tsoi et al., 2008; Ecker, Levine & Zigler, 1973), it is possible that individuals experiencing psychosis and those not may find different aspects of the joke funny (Corcoran, 2008). This study therefore also investigated 'typicality'. To do so, the narrative interpretations of jokes were rated as either typical/common or atypical/uncommon. This judgement

was made based upon a clear derivation from the typical explanations given to the researcher (see Appendix P for typical explanations given for these cartoons).

Attributional Style

The IPSAQ (Appendix Q) is a self-report 32 item questionnaire which describes 16 positive and 16 negative social situations (e.g. 'a friend thinks you are interesting') presented in a fixed pseudorandom order. The participant is asked to write down the single most likely cause for this and to categorize this cause as something about themselves (internal self-attribution), something about other people (external-personal attribution) or something about the situation (external-situation attribution). These six subscales (three for positive events and three for negative events) can then be used to compute two cognitive bias scores which quantify whether the participant has a tendency to externalise or to personalise attributions for negative and positive social events. The 'externalising bias' is calculated by subtracting the number of negative self-attributions from the number of positive self-attributions. A positive externalising bias score indicates a strong self-serving bias in which the respondent attributes cause to themselves less for negative events than for positive events. The percentage of externally attributed negative events (external-personal or external-situational) that were attributed to other people is calculated to give the 'personalising bias' score. A personalising bias score greater than 0.5 represents a tendency to attribute the causes of negative events to other people as opposed to situations. These two scores have acceptable levels of reliability (Cronbach's alphas of 0.7189 and 0.7609 respectively, Kinderman & Bentall, 1996).

Semi-Structured Dialogue Task

Given the concerns over the psychometric properties of the IPSAQ and anecdotal reports indicating that participants have difficulty completing these attributional style questionnaires (Freeman, 2007), this study also used a quantitative

analysis of semi-structured dialogue. This approach explored how well participants make 'online' attributions during conversation by examining dialogue and quantifying the speech according to the three types of attributional style typically explored in previous research. This task was intended to provide a more meaningful and ecologically valid method measure of attributional style in a currently symptomatic group.

Designed as a semi-structured conversation, the researcher asked four autobiographical questions of the participant to prompt discourse. Participants were asked to describe two real positive events ("when was the last time you had a visitor/you laughed out loud?") and two real negative events ("when was the last time you were lied to/not listened to?"). The researcher was free to clarify any confusing or interesting points made by the participant. Although the researcher guided the participant to make attributions for recent events that have happened to them, the free nature of the response allowed the participant to make any type and number of attributions for these real events. The aim was for the conversation to last between 2 and 7 minutes, although this was flexible for participants who either could not maintain a conversation for that long or who wanted to talk about their thoughts for longer.

Statistical Analysis

Statistical analyses were conducted using the SPSS Software (PASW version 18 for Windows). Independent t-tests and chi square analyses were performed to confirm that the groups were adequately matched for age, IQ, and gender. A series of independent t-tests were then carried out to determine whether there were any differences between the groups on their performance on the joke appreciation task for understanding, funniness ratings, and number of atypical responses given. Further independent samples t-tests were used to explore the differences between groups on the ToM stories tasks and a series of one-way ANCOVAs were carried out to control for

any significant differences on the memory, reality, and inference control questions to test whether differences between the groups remained. For attributional style, independent t-tests tested for significant differences between the groups on mean personalising and externalising bias scores. A chi square analysis was then carried out to explore associations between the groups and the bias scores.

Finally, the groups' were collapsed to allow further investigation for associations of specific symptoms, irrespective of diagnostic group, on ToM performance and attributional style. Delusions (as measured by the PDI-21) relating to paranoia (persecutory ideation and delusions of reference) or grandiosity (grandiose and religious delusions) were investigated.

The conversational task. The coding procedure for this task was similar to that used by Stewart, Corcoran and Drake (2009). Participants' answers were tape recorded, transcribed and coded independently by two researchers. One rater was blind to group membership. The other rater could provide clarification over any confusing details or exchanges in the transcripts. One rater joined the author in coding the mental state words and a different rater joined the author to code the different attributional style types within the transcripts. To calculate inter-rater reliability for coding of mental state words, the intraclass correlation coefficient (ICC; $\rho = 0.98$, $p < 0.0001$) between the two raters indicated almost perfect agreement (Futrell, 1995).

The total number of words generated by each participant was summed to control for the amount of speech produced. The participants' speech was then divided into "speech phrases" encapsulating separate ideas or details. The raters then examined each phrase for evidence of references to emotion (such as "confused" or "liked"), intention (such as "wanted") and mental state ("think", "believe") during the course of the conversation. Interactive mental states were also included. For instance, the phrases "you know" and "aren't they" reflect that inferences are being made about the

conversational partner's mental state. The percentage of mental state references was calculated by dividing the number of mental state words by the total number of words produced, and multiplied by 100. Lastly, the transcripts were analysed quantitatively to assess whether the participants' explanations for each situation were primarily defined as something about them (internal), other people (external-personal) or the situation (external-situational). Any errors in attributions made by the participant were subtracted (i.e. the participant initially states that the event was caused by them and then decides it was to do with somebody else). Percentage scores were again derived by dividing the counts for each type of attribution by the total number of speech phrases, and multiplied by 100. A series of Mann-Whitney U tests were conducted on the data extracted from the coded and scored transcripts to explore differences in the number of different types of causal attributions made by the two groups.

Where the raters disagreed on the identification of mental state references or the type of attribution made, a brief discussion was held until consensus was reached. If a disagreement persisted, the non-blind rater deferred to the blind rater to minimise bias. The outcome of such disagreements was noted so that they could be applied to similar later disagreements, if any, to ensure the ratings were consistent. The percentage of inter-rater agreement (92.58%) was calculated to estimate the inter-rater reliability.

Results

Analyses by Diagnostic group

Table 1 shows the groups were matched for age, gender, education, years of illness, medication and IQ, vocabulary and matrix reasoning. All variables were found to be normally distributed except for length of illness. As expected, there were significant differences between groups for depression, anxiety, mania and the total PDI score (see Table 2), with the depressed group scoring higher for HADS depression (t (29.21) = 5.15, $p < .0001$) and anxiety (t (29.09) = 4.28, $p < .0001$), and the psychoses

group having higher mania (t (24.08) = -3.96, p < 0.001) and PDI scores (t (30) = -2.11, p = .043). Mann Whitney U tests showed no significant differences between those who were on no medication and participants on one or more medications for the joke task (U = 68.50, z = -1.201, p = .230), ToM stories (U = 82.50, z = -.61, p = .545) or the personalising bias (U = 62.50, z = -1.46, p = .145) and externalising bias (U = 91.50, z = - 0.20, p = .844).

Table 2.

Mood variables for both groups

	Grandiose group (n=18)		Depressed controls (n=14)		Statistical test
	Mean	SD	Mean	SD	
HADS Depression	5.44	4.96	12.93	3.22	t(29.21) = 5.15***
HADS Anxiety	7.72	4.69	13.57	3.01	t(29.09) = 4.28***
AMRS Mania	7.76	4.58	2.93	1.94	t(24.08) = -3.96**
PDI Total Score	106.78	57.21	65.57	51.50	t(30.00) = -2.11*
PDI Grandiosity total score	17.61	7.05	0.71	2.67	t(22.85) = -9.35***

Note. HADS=Hospital Anxiety and Depression Scale, PDI=Peters Delusion Inventory.

*p = 0.05, two-tailed test, **p < 0.001, two-tailed test, ***p < 0.0001, two-tailed test

Group performance on Theory of Mind tasks

Jokes task. The grandiose group performed significantly worse compared to depressed controls on the ToM understanding of the cartoon jokes (t (30) = 3.65, p < .001, r = .55*).* This effect size was large according to Cohen's (1988) criteria. There was also a significant difference between the groups for the number of atypical responses even after controlling for PDI thought disorder score (F(1, 29) = 8.583, p = .007). No group differences existed for the perceived funniness of the jokes (t (30) = -0.799, p = .431)

Theory of Mind Stories. Overall, the grandiose group performed significantly worse on the theory of mind stories task (t (30) = 3.07, p = 0.05, r = .49). The grandiose group also answered more of the memory control questions embedded in these stories incorrectly (t (22.71) = 3.45, p = .02), particularly for second-order memory questions (t (23.07) = 3.32, p = .003).

Table 3.

Means and Standard Deviations for the ToM tasks

	Grandiose group (n=18)		Depressed controls (n=14)		Statistical test
	Mean	SD	Mean	SD	*t(30)*
ToM joke appreciation task	12.56	2.30	17.71	4.95	3.65*
Subjective funniness ratings	23.94	9.70	21.43	7.57	-0.80
No. of atypical responses	2.00	1.68	0.43	0.76	-3.24*
Stories task total ToM	4.78	1.31	6.14	1.17	3.07*
First-order ToM	3.33	0.77	3.71	0.99	1.23
Second-order ToM	1.44	1.04	2.71	1.14	3.30*
First-order Memory	3.94	0.24	4.00	0.00	0.88
Second-order Memory	3.06	0.94	3.86	0.36	3.32*
Total Memory score	7.00	0.97	7.86	0.36	3.45*
First-order Reality	3.83	0.51	3.93	0.27	0.63
Second-order Reality	3.50	0.79	3.36	0.84	-0.50
First-order Inference	3.17	0.92	3.57	0.65	1.39
Second-order Inference	3.33	0.84	3.64	0.50	1.22

Note. *p = 0.05, two-tailed test, ToM=Theory of Mind.

However, a one-way ANCOVA revealed that after controlling for the significant group difference in performance on the total memory questions the ToM group difference remained significant (F(1, 29) = 8.306, p = .007, u = 0.22). An independent

samples t-test found no difference between groups on first-order ToM performance (t (30) = 1.23, p = .230) but there was a difference in the expected direction for second-order ToM (t (30) = 3.29, p = .003). The groups performed significantly differently on the false-belief ToM questions (t (30) = 2.94, p = .006) but differences between the groups for deception ToM questions (Appendix R) were not significant (t (30) =1.25, p = .221). This suggests that it was the second-order false-belief questions that were the most sensitive.

Group performance on IPSAQ. Notably, across the whole sample only three people showed no evidence of an externalising bias (see Table 4). Two participants were from the grandiose group and one was from the depressed group. Because of this no further analyses were carried out for the externalising bias. A Chi square analysis revealed no significant differences between the groups for the personalising bias (χ^2 (1, n = 32) = 1.659, p = .198, phi = 0.23).

Table 4.

Frequency counts for the externalising and personalising bias

	Personalising Bias		Externalising Bias	
	Present	Not present	Present	Not present
Grandiose group (n=18)	13 (72.22%)	5 (27.78%)	16 (88.89%)	2 (11.11%)
Depressed group (n=14)	7 (50%)	7 (50%)	13 (92.86%)	1 (7.14%)

Group performance on the dialogue task. The total recording time for all 32 participants was one hour, 45 minutes, and 6 seconds. Across all participants, conversations lasted for a mean of 3 minutes and 27 seconds. The means and standard deviations of conversation length for each group can be found in Table 5. There was no significant difference between the groups for total recording time (t (30) = -0.83, p = .414). The psychosis group produced significantly more speech phrases than controls (t

(29.10) = -2.72, p = .011) yet made significantly fewer implicit mental state inferences than the controls (t (30) = 3.18, p = .003).

Table 5 shows the mean percentage of attribution types for the positive and negative questions. As the data were not normally distributed, a series of Mann-Whitney U tests were conducted to investigate differences between the groups for attribution types. No significant differences between the groups were made for the mean percentage of internal (U = 121.00, Z = -0.206, p = .837), external-personal (U = 81.00, Z = -1.723, p = .085), or external-situational (U = 109.00, Z = -0.649, p = .516) attributions made for the positive questions. There were also no significant differences for the mean percentage of internal (U = 111.50, Z = -0.619, p = .536), external-personal (U = 116.50, Z = -0.361, p = .718) or external-situational (U = 109.00, Z = -0.814, p = .415) attributions made for the negative questions.

Table 5.

Mean percentage (sd) scores on the dialogue task

	Psychosis/grandiose group (n=18)	Depressed controls (n=14)
Total recording time (minutes)	3.46 (1.29)	3.02 (1.71)
Total speech phrases	67.39 (28.81)	44.57 (18.49)
Mental state words	4.49 (1.15)	5.91 (1.39)
Positive questions		
Internal	1.09 (1.47)	1.39 (2.50)
External-Personal	3.12 (2.26)	2.36 (3.29)
External-Situational	2.46 (1.93)	2.41 (2.86)
Negative questions		
Internal	1.10 (1.77)	1.99 (2.88)
External-Personal	4.97 (3.70)	4.32 (2.26)
External-Situational	0.90 (1.66)	0.49 (1.10)

Analyses by Delusions

Demographics. Table 6 shows the frequency of each delusion across the sample. As expected, there was substantial comorbidity of symptoms within the sample. 15 out of 19 people with a persecutory delusion also had a grandiose delusion. Out of the 19 people with a grandiose delusion, 15 also had a persecutory delusion, 15 a religious delusion, and 15 had ideas of reference and influence.

The relationship between delusion type and ToM. Table 7 shows the ToM performance of the sample based on symptomology. Independent group t-tests revealed that participants with persecutory ideation - as measured by the PDI – performed significantly lower on the joke appreciation task (t (30) = 2.24, p = .033) but not the stories task (t (30) = 1.06, p = .299). Participants with ideas of reference and influence - another symptom associated with paranoid ideation – did not perform lower on the joke appreciation task (t (30) = 1.12, p = .274) but struggled significantly on the stories tasks (t (29.86) = 4.43, p < .0001). Participants endorsing the ideas of reference and influence questions performed significantly poorer on the deception stories in particular (deception t (30) = 3.57, p < 0.001; false-belief task t *(29.02)* = 1.86, p = .72).

There was a significant difference between those with and without a grandiose delusion on both the joke appreciation task (t (30) =4.25, p < .001), and stories task (t (30) = 2.53, p = .017). When controlling for total memory score on the stories task, the significant effect for endorsement of grandiose delusions survived, F(1, 29) =5.16, p = .031, u = .151). Within the stories task the presence of grandiose delusions indicated significantly poorer performance on the false belief stories in particular (false-belief t (30) = 2.29, p = .029; deception t (30) = 1.15, p = .261). When controlling for the false-belief memory questions, this effect did not remain significant (F(1, 29) = 3.76, p = .062).

Table 6.

Demographics of the sample displaying particular symptomology (mean and (sd))

	Paranoid symptoms		Grandiose symptoms	
	Persecutory delusion (n=19)	Reference and influence (n=20)	Grandiose delusion (n=19)	Religious delusion (n=14)
Age	38.84 (9.88)	43.80 (11.27)	43.74 (12.75)	43.80 (11.27)
IQ	106.37 (12.27)	109.10 (9.96)	107.11 (11.08)	109.10 (9.96)
Medication	1.21 (1.03)	1.30 (1.08)	1.37 (1.17)	1.30 (1.08)
Education (years)	14.47 (1.71)	13.80 (1.40)	14.26 (1.88)	13.80 (1.40)
Illness (years)	10.79 (9.07)	10.50 (8.76)	12.42 (11.10)	10.50 (8.76)
HADS Depression	9.21 (5.73)	7.45 (5.88)	5.95 (5.30)	7.45 (5.88)
HADS Anxiety	10.74 (5.00)	9.60 (5.34)	8.11 (4.85)	9.60 (5.34)
ARMS Mania	6.21 (4.50)	6.05 (3.71)	7.42 (4.57)	6.05 (3.71)
Total PDI score	120.74 (49.31)	109.45 (55.92)	109.26 (56.65)	124.00 (53.88)
PDI Distress	2.74 (2.45)	2.80 (2.42)	3.47 (1.95)	2.80 (2.42)
PDI Preoccupation	4.42 (3.98)	4.45 (3.87)	5.42 (3.27)	4.45 (3.87)
PDI Conviction	4.84 (3.80)	5.05 (4.08)	6.63 (3.06)	5.05 (4.08)

Given that religious delusions are often reported in conjunction with grandiose and persecutory delusions (Getz, Fleck & Strakowski, 2001) this symptom was also explored. Those with a religious delusion were found to perform worse on the jokes task (t (30) =2.91, p = .007), and the total ToM stories score was lower for those with this symptom (t (30) = 2.22, p = .035). However, neither false belief nor deception understanding were compromised in the presence of this type of delusion (false-belief t (30) =1.44, p = .160; deception t (30) = 1.38, p = .177). The significant effect of the presence of religious delusions on ToM stories performance did not remain after controlling for total memory score (F(1, 29) = 3.787, p = .061).

To examine the specificity of the ToM difficulties described above to the particular delusions, a series of one-way ANCOVAS were performed. First, joke appreciation between groups who did or did not endorse experiencing grandiose delusions remained significant when controlling for the severity of comorbid persecutory delusions in the group (F(1, 29) = 13.50, p < .001). When controlling for the severity of comorbid delusions of reference, the association between grandiosity and performance on the stories task just failed to reach significance (F(1, 29) = 3.98, p = .056).

The presence of persecutory delusions failed to predict joke task performance in this group when controlling for the severity of comorbid grandiosity (F(1, 29) = 1.57, p = .220). There was a significant association between religious delusions and the joke task after controlling for the severity of comorbid persecutory delusions (F(1, 29) = 4.97, p = .034) but no significant difference with the stories task after controlling for ideas of reference (F(1, 29) = 3.37, p = .076).

Table 7.

Mean (sd) IPSAQ personalising bias (PB) score and ToM performance based on symptomology

	Paranoid symptoms				Grandiose symptoms			
	Persecutory delusion		Ideas of reference and influence		Grandiose delusion		Religious delusion	
	With	Without	With	Without	With	Without	With	Without
ToM joke task	13.37 (4.61)	16.92 (4.09)	14.10 (3.71)	16.00 (5.97)	12.47 (2.93)	18.23 (4.75)	12.36 (3.13)	16.72 (4.87)
ToM stories	5.16 (1.39)	5.69 (1.44)	4.70 (1.26)	6.50 (0.80)	4.89 (1.37)	6.08 (1.19)	4.79 (1.31)	5.83 (1.34)
Deception	2.58 (1.02)	2.77 (1.24)	2.20 (1.06)	3.42 (0.67)	2.47 (1.07)	2.92 (1.12)	2.36 (1.01)	2.89 (1.13)
False-belief	2.85 (1.02)	2.77 (1.24)	2.55 (0.95)	3.08 (0.67)	2.47 (0.84)	3.15 (0.80)	2.50 (0.86)	2.94 (0.87)
IPSAQ PB	0.51 (0.31)	0.56 (0.37)	0.56 (0.26)	0.53 (0.39)	0.40 (0.26)	0.64 (0.36)	0.44 (0.30)	0.67 (0.37)

The relationship between the severity of delusions and the presence of a personalising bias. One-way ANOVAs revealed no association between the personalising bias with the severity of persecutory ideation ($F(1, 31) = 0.13$, $p = .721$), ideas of reference ($F(1, 31) = 0.07$, $p = .801$) or religious delusion ($F(1, 31) = 3.58$, $p = .068$). However, there was a significant association with a personalising bias and the severity of grandiose ideation ($F(1, 31) = 4.29$, $p = .047$) but this finding became non-significant after controlling for ideas of reference and persecutory delusions ($F(1, 28) = 3.07$, $p = .091$).

Exploring the association between ToM and the personalising bias. Only performance on the jokes test was explored in these analyses because like the IPSAQ, the joke task is an inductive, ambiguous task while the stories task is much less ambiguous and more deductive (Corcoran et al., 2011). An independent t-test was conducted with group defined as presence or absence of a personalising bias and jokes test performance as the DV. Those with a personalising bias (n = 12) performed poorer on the joke appreciation task (mean = 12.05, SD = 5.30) than those without (mean = 16.06, SD = 3.26). However, this result was not significant ($t\ (30) = 1.196$, $p = .241$). Interestingly, those with a personalising bias were found to make more mental state inferences on the dialogue task, but this was not significant ($t\ (14.84) = -1.23$, $p = .239$).

Discussion

This study tested the application of socio-cognitive models of paranoid delusions (Frith, 1992; Bentall & Kinderman, 1998) to grandiose delusions. The current study did not, however, find any significant results in relation to attributional style as measured by the IPSAQ and the dialogue task. These results are in contrast to the study by Jolley et al. (2006) who found that patients with grandiose delusions and a diagnosis of schizophrenia showed externalising and self-serving attributional biases, in contrast to the “depressive” cognitive style associated with persecutory delusions. Reasons for

these non-significant findings may relate to the use of a depressed control group who were receiving cognitive behavioural therapy (CBT) at the time of recruitment. A key central component of CBT for patients receiving pharmacological support involves addressing attributional style and close monitoring of times when the client may falsely attribute a negative event internally, as opposed to externally (Peterson et al., 2004). Furthermore, it is possible other factors not measured in this study, such as different affective states (e.g. anger or self-esteem) could have influenced attributional style and would be worthwhile accounting for in future research.

To test ToM this study employed both verbal and nonverbal, and implicit (dialogue and the jokes task) and explicit (stories task) measures. These dichotomies have been well documented in the ToM literature (Frith & Frith, 2008) and researchers have questioned whether patients with psychosis demonstrate both explicit *and* implicit ToM impairments by adopting a variety of measures. As predicted, this study found those experiencing grandiose delusions performed significantly worse on both the ToM jokes and stories task than depressed controls. The most sensitive measure on the stories task was the second-order false belief questions. Thus, participants with grandiose delusions struggled to make inferences about a person's false attribution of belief.

Frith (2004) proposes that online mentalising is also impoverished in people experiencing psychosis. The results of the dialogue task revealed that participants experiencing grandiose delusions made less implicit references to mental states. These results are in line with recent studies which have found patients with schizophrenia have shown implicit theory of mind impairments in 'on-line' mentalising tasks (Horan et al., 2009; Pederson et al., 2012; Russell, Reynaud, Herba, Morris & Corcoran, 2006; Stewart et al., 2009). However, participants with grandiose delusions in the present study did demonstrate appropriate (although less frequent) use of mentalising language. However, there were differences in the overall diversity of ToM words used by

participants in the dialogue task. Where some speech contained predominantly the words "think", 'know" and "remember", others contained much more sophisticated references to complex thoughts and feelings. It must be highlighted that coders included a range of different types of words referring to mental states overall - references to one's own mental states and emotions, as well as reference to others' mental states and emotions. Future studies would do well to code these separately using various verbal topics to prompt a larger variety of verbal speech for analysis.

The role of a grandiose delusion

Across the whole sample, this study found that persecutory delusions and grandiose delusions are significantly associated with ToM performance. More interestingly, the association between grandiose delusions and ToM performance on the jokes task remained after controlling for the presence and severity of persecutory delusions. This supports the tentative model put forward by Knowles et al. (2011) who propose that ToM may contribute to the maintenance of grandiose delusions, just as they do to persecutory delusions, and may also play a role in the dynamic shift between both types of delusions. They propose that as a result of negative fluctuations in self-esteem, individuals with grandiose delusions may believe they have a special power or ability that others wish to steal or destroy, resulting in secondary persecutory delusions. Alternatively, grandiose delusions may emerge from existing persecutory delusions, since positive fluctuations in self-esteem may lead the individual to believe that the intention of others to persecute or follow them are due to something that the individual holds of great worth. This may explain the frequent co-morbidity between both delusion subtypes (Jolley et al., 2006), which were also demonstrated in this study.

Study Limitations and Future Research

This study is affected by a number of limitations. Whilst acknowledging that this is a preliminary study, it may have been beneficial to investigate whether either the

ToM or attributional scores were associated with a third socio-cognitive bias that is reportedly found in patients with paranoia - the data-gathering bias. Also known as the 'jumping-to-conclusions' bias, this phenomenon has been shown by Garety and colleagues who postulated that the tendency to take into account less information before reaching decisions is also involved in the maintenance of delusions (Garety & Hemsley, 1987; Garety, 1991). The additional exploration of the samples performance on tasks measuring the presence of a data gathering bias may have allowed additional insight into the development of grandiose delusions. This bias has also been shown to be strongly associated with levels of conviction, but not of distress and pre-occupation with delusions. Recent research has found that individuals with grandiose delusions are more likely to show a reasoning bias than those with persecutory delusions (Garety et al., 2012). Future research may wish to consider the relationship between this bias, theory of mind and attributional style in larger samples.

As proposed by Corcoran et al. (1997), the results of a study which compares the performance of participants experiencing psychosis to that of participants with depression might provide a better basis for an explanation of the humour deficit in schizophrenia. The recruitment of a depressed group in this study was to ensure that any differences found in attributional style cannot be explained by co-morbid depression which has been shown to be characterised by a distinct attributional style (Bentall et al., 1991). Nonetheless, future research would benefit from the inclusion of a non-clinical second control group to further investigate attributional style in adults with grandiose delusions.

The inter-rater reliability for the dialogue task achieved a high percentage of agreement for the attributional style (92.58%) and the frequency counts of implicit mental state references ($r = .98$). These high reliability scores are likely to have been a result of clear operational definitions. Stewart et al. (2008) failed to provide inter-rater

reliability checks in their study and it is highly recommended that future research ensures that findings which relate to verbal transactions take into account raters' observations of references that can be extremely subtle in nature.

This study included participants with grandiose delusions from both an inpatient and outpatient setting. It could be argued this heterogeneity allows us to generalise the ToM impairment across the population experiencing this symptom, given that recent views support the continuum theory of psychotic experiences (Strauss, 1969; van Os, Hannsenn, Bijl & Ravelli, 2000). However, future research may wish to explore differences between participants who are in remission compared to participants in the acute stage in order to explore whether ToM ability varies with severity of illness. Overall, ToM tests are very diverse with some tasks more sensitive to the effects of demographic variables such as age and IQ (Corcoran et al., 2011; Shryane et al., 2008). Participants in this study experiencing higher levels of mania may have been less inhibited when responding to questions. Thus, the overall word count in the conversational task may not have been the most sensitive covariate, although it is generally very difficult to control for this aspect. However, both the WASI vocabulary measure and estimate of full IQ was equal between both groups, and is therefore not a factor that can account for the group difference in proportion of mental state words.

Additional differences between the groups included the significantly higher number of atypical explanations made by patients in the psychosis group when attempting to explain the joke behind the ToM cartoons. Furthermore, this difference remained when controlling for thought disorder. Regrettably, this study did not record verbatim the unusual explanations given for the humour stimuli. For example, one participant described a cartoon of a woman hiding behind a couch as "a prostitute in a window and some people are looking to buy a kitchen there". Not only would this allow a second rater to improve reliability of the subjective assessment of grading 'ToMness'

in these answers, but a qualitative analysis might have revealed interesting themes across participants who provided atypical explanations of what they perceived to be the intention of the artist who drew the cartoon jokes. Nonetheless, this finding provides support to the hypothesis that although patients experiencing grandiose delusions find cartoons amusing to the same extent as controls (there were no significant differences for the reported subjective humour appreciation for the jokes) it appears that they find different aspects of the jokes humorous.

Finally, this study recruited close to the number of participants stipulated by the power analysis which stated a total sample size of 34 participants would be required to achieve 80% power. These significant results achieved a large effect size for the jokes task (r = .55) and the stories task (r = .49). However, when controlling for memory performance on the stories task this effect size did become smaller (u = .22), suggesting that future research studies may wish to investigate the role of memory in relation to ToM in people with grandiose delusions.

Clinical Implications

A theoretical understanding of the role of ToM deficits or attributional biases in grandiose delusions could help clinicians develop appropriately targeted psychological interventions. Treatment is problematic in the presence of grandiose delusions which predict poor clinical outcome in adults with a diagnosis of schizophrenia and are negatively correlated with medication compliance transdiagnostically (Thara & Eaton, 1996; Applebaum & Gutheil, 1980). Furthermore, grandiose beliefs tend to be held with particularly strong conviction (Applebaum et al., 1999). People with grandiose delusions are reported to be challenging to engage therapeutically because of the positive mood and self-esteem associated with these delusions, which may hold low motivation for change (Garety et al., 2012; Knowles et al., 2011). Thus, theory of mind impairments may well go under-recognised and may be a cognitive ability that

clinicians may wish to assess in clinical assessments. Therapeutic interventions must be tailored and developed specifically to address this cognitive impairment when patients present with this delusional content. Individuals with ToM impairments may be less likely to understand the impact of their behaviour upon others, and may be more likely to engage in reckless or dangerous behaviours if they cannot infer the perspectives of others (Kerr et al., 2003). Such socio-cognitive difficulties might be amenable to cognitive restructuring within therapy which addresses unhelpful appraisals of events in relation to mood. Furthermore, this study has implications for therapists providing mentalisation-based therapy (MBT) who may wish to encourage patients to consider taking the time to seek information or clues in social scenarios in which patients have to recognise or understand the emotions and intentions of themselves or others.

Conclusions

There is a strong need for a better theoretical understanding of the role of cognitive processes in grandiose delusions (Knowles et al., 2011). The significant findings of a ToM deficit in individuals with grandiose as well as persecutory delusions should stimulate further research into cognitive styles within a more narrow and specific symptom investigation. Future research would benefit from administering a wider battery of neurocognitive tasks such as measures of working memory, attention or verbal fluency. Furthermore, the inclusion of both a non-clinical and a psychiatric control group to ensure that any impairments are symptom-specific would strengthen findings. Further exploration of ToM and attributional style in individuals experiencing grandiose delusions may have implications for the clinical treatment and management of this type of experience.

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Young, R. C., Biggs, J. T., Ziegler, V. E., & Meyer, D. A. (1973). A rating scale for mania: reliability, validity and sensitivity. *British Journal of Psychiatry, 133,* 429-435. doi:10.1192/bjp.133.5.429

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LIST OF APPENDICES

Appendix A. *Quality Appraisal Tool*

Question/checklist item	Adapted from tool	Response	Scoring
Reporting			
1. Is the hypothesis/aim/objective of the study clearly described?	Downs & Black	Yes No	1 0
2. Is the choice of study method appropriate?	Health Evidence Bulletins-Wales	Yes No	1 0
3. Is the population studied appropriate? *Was an appropriate control group used – i.e. were groups comparable on important confounding factors?*	Health Evidence Bulletins-Wales	Yes No	1 0
4. Are the main outcomes to be measured clearly described in the Introduction or Methods section? *If the main outcomes are first mentioned in the Results section, the question should be answered no.*	Downs & Black	Yes No	1 0
5. Are the characteristics of the patients included in the study clearly described? *A case-definition and the source for the controls should be given.*	Downs & Black	Yes No	1 0
6. Are the distributions of principal confounders in each group of subjects clearly described?	Downs & Black	Yes Partially No	2 1 0
7. Are the main findings of the study clearly described? *Simple outcome data should be reported for all major findings so that the reader can check the major analyses and conclusions.*	Downs & Black	Yes No	1 0
8. Are tables/graphs adequately labelled and understandable?	Health Evidence Bulletins-Wales	Yes No	1 0
9. Does the study provide estimates of the random variability in the data for the main outcomes? *The standard error, standard deviation or confidence intervals should be reported.*	Downs & Black	Yes No	1 0
10. Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?	Downs & Black	Yes No	1 0

External validity			
11. Were the subjects asked to participate in the study representative from of the entire population from which they were recruited? *The study must identify the source population and describe how the patients were selected.*	Downs & Black	Yes No Unable to determine	1 0 0
12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited? *The proportion of those asked who agreed to participate should be stated.*	Downs & Black	Yes No Unable to determine	1 0 0
Internal validity - bias			
13. Was an attempt made to blind study subjects to the differences of the measures they have received? *For studies where the participants would have no way of knowing what the outcome measures aim to explore (to prevent socially desirable answers), this should be answered yes.*	Downs & Black	Yes No Unable to determine	1 0 0
14. Was an attempt made to blind those measuring the main outcomes of the intervention?	Downs & Black	Yes No Unable to determine	1 0 0
15. Were the statistical tests used to assess the main outcomes appropriate?	Downs & Black	Yes No Unable to determine	1 0 0
Internal validity – confounding			
16. Were the participants and controls recruited from the same population? *Patients for all comparison groups should be selected from the same population. This question is answered unable to determine where there is no information concerning the source of patients included in the*	Downs & Black	Yes No Unable to	1 0 0

study.		determine	
17. Were the participants and controls recruited over the same period of time? *For a study which does not specify the time period over which patients were recruited, the question should be answered as unable to determine.*	Downs & Black	Yes No Unable to determine	1 0 0
18. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn? *The question should be answered no if known confounders were not taken into account in the analyses or if possible confounders were described but not investigated.*	Downs & Black	Yes No Unable to determine	1 0 0
19. Did the study have sufficient power to detect a clinically important affect where the probability value for a difference being due to chance is less than 5%? *Studies that do not report an effect size should be answered no.*	Downs & Black	Reported Not reported	1 0

Note. Several questions of the Downs and Black checklist (questions 4, 8, 9, 13, 16, 17, 19, 20, 23, 24, and 26) were omitted as these were considered to be specific to intervention/treatment studies, randomised trials or irrelevant to observational studies. Questions were taken from the Health Evidence Bulletins-Wales checklist if they were considered relevant but not covered by the Downs and Black tool.

Appendix B. *Poor Quality Studies Excluded from the Review*

Study	Sample characteristics (n)	Humour task	Additional measures	Comprehension deficit?	Appreciation deficit?	Other findings	QR
Falkenberg et al. (2007)	Schizophrenia (18) Non-clinical controls (18)	STCI, CHS, 3WD test of humour appreciation	PANNS, BDI	✓	×	Patients indicated non-understanding more often than the control group. Patient group reached higher scores for seriousness and bad mood than the controls, and lower cheerfulness trait scores. Depression was positively correlated with bad mood and negatively correlated with cheerfulness. No differences found between groups for coping humour or for preferred type of humour or for funniness or aversiveness ratings.	6

Note. 3WD=3 Witz-Dimension test of humour appreciation, BDI=Beck's Depression Inventory, CHS=Coping Humour Scale, PANAS=The Positive and Negative Affect Scale, STCI= State and Trait Cheerfulness Inventory

Appendix C: *NHS Ethical Approval*

NHS

National Research Ethics Service

NRES Committee Yorkshire & The Humber - Sheffield
Yorkshire and the Humber REC Office
First Floor, Millside
Mill Pond Lane
Meanwood
Leeds
LS6 4RA

Telephone: 0113 30 50126

01 August 2011

Mr Paul Boyden
Clinical Psychology Unit
Western Bank
University of Sheffield
S10 2TN

Dear Mr Boyden

Study title:	**A preliminary investigation of 'Theory of Mind' and 'Attributional Style' in adults with grandiose delusions.**
REC reference:	**11/YH/0238**
Protocol number:	**131143**

Thank you for your letter of 27 July 2011, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS sites

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Advertisement		18 May 2011
Covering Letter		28 May 2011
Covering Letter		27 July 2011
Evidence of insurance or indemnity		15 June 2011
GP/Consultant Information Sheets	1.0	18 May 2011
Investigator CV		25 May 2011
Letter from Sponsor		24 May 2011
Letter from Statistician		18 December 2010
Letter of invitation to participant		01 July 2020
Participant Consent Form	2.0	21 July 2011
Participant Information Sheet: for Group 2 (Depression)	2.0	22 July 2011
Participant Information Sheet: for Group 1 (Unusual beliefs)	2.0	21 July 2011
Protocol	3	18 May 2011
Questionnaire: Validated: HADS, PDI-21, AMRS, IPSAQ		18 May 2011
Questionnaire: Non-validated: ToM tasks, attribution style task, screening form		18 May 2011
REC application		13 June 2011
Referees or other scientific critique report		18 December 2010
Response to Request for Further Information		

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

11/YH/0238	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project

Yours sincerely

pp **Dr Basil Sharrack**
Chair

Email: anne.ward7@nhs.net

Enclosures: "After ethical review – guidance for researchers" *[SL-AR2]*

Copy to: Mr Richard Hudson
Research and Innovation Services, Academic Services
University of Sheffield,
New Spring House
231 Glossop Road,
Sheffield
S10 2GW

Dr Marios Adamou,
South West Yorkshire Mental Health Trust
Manygates Clinic
Portobello Road
Wakefield
WF1 5PN

Appendix D: *R&D Approval (South West Yorkshire Partnership Trust)*

The University Of Sheffield.

Department Of Psychology.
Clinical Psychology Unit.

Doctor of Clinical Psychology (DClin Psy) Programme
Clinical supervision training and NHS research training & consultancy.

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield S10 2TP UK

Telephone: 0114 2226570
Fax: 0114 2226610
Email: dclinpsy@sheffield.ac.uk
Please address any correspondence to Ms. Christie Harrison, Research Support Officer

Dr Marios Adamou
Marygates Clinic
Portobello Road
Wakefield
WF1 5PN

24th May 2011

Dear Dr Adamou

RE: **Project title:** Theory of mind and attributional style in grandiose delusions
Applicant: Paul Boyden (DClin Psy trainee, University of Sheffield)

1. Confirmation of NHS employment status
2. Confirmation of independent scientific approval
3. Confirmation of Indemnity of enclosed Research Project

I write to confirm that the enclosed proposal forms part of the educational requirements for the Doctoral Clinical Psychology Qualification (DClin Psy) run by the Clinical Psychology Unit, University of Sheffield and that the applicant is under pressure to complete this within a designated time period.

I also confirm that the applicant, Paul Boyden is an NHS employee and is also supervised by a clinical academic. As such the applicant has an NHS contract and has had a CRB check.

Three independent reviewers appointed by the Clinical Psychology Unit Research Sub-committee have scientifically reviewed it, including a statistician.

I can confirm that all necessary amendments have been made to the satisfaction of the reviewers, who are now happy that the proposed study is of sound scientific quality. Consequently, the University will also indemnify it, and would be happy to act as research sponsor once ethical approval has been gained.

Given the above, and in line with current NHS guidance I would ask that you exempt this proposal from further NHS scientific review and the applicant from completing an unnecessary honorary contract. The Unit already has an agreement with several local NHS Trusts (SHSRC, STH & SCH) to this effect. If you require any further information, please do not hesitate to contact me.

Yours sincerely

Dr. Andrew Thompson
Director of Research Training
Senior Clinical Lecturer & Chartered Clinical/Health Psychologist

Cc. Paul Boyden; Dr Rebecca Knowles (Academic Supervisor, University of Sheffield)

Appendix E: *R&D Approval (Sheffield Health and Social Care Trust)*

The University Of Sheffield.

Department Of Psychology.
Clinical Psychology Unit.

Doctor of Clinical Psychology (DClin Psy) Programme
Clinical supervision training and NHS research training & consultancy.

Clinical Psychology Unit
Department of Psychology
University of Sheffield
Western Bank
Sheffield S10 2TP UK

Telephone: 0114 2226570
Fax: 0114 2226610
Email: dclinpsy@sheffield.ac.uk
Please address any correspondence to Ms. Christie Harrison, Research Support Officer

31st March 2011

To: Research Governance Office

Dear Sir/Madam,

RE: Confirmation of Scientific Approval and indemnity of enclosed Research Project

Project title: Theory of mind and attributional style in grandiose delusions
Investigators: Paul Boyden (DClin Psy Trainee, University of Sheffield); Dr Rebecca Knowles (Academic Supervisor, University of Sheffield).

I write to confirm that the enclosed proposal forms part of the educational requirements for the Doctoral Clinical Psychology Qualification (DClin Psy) run by the Clinical Psychology Unit, University of Sheffield.

Three independent reviewers appointed by the Clinical Psychology Unit Research Sub-committee have scientifically reviewed it.

I can confirm that all necessary amendments have been made to the satisfaction of the reviewers, who are now happy that the proposed study is of sound scientific quality. Consequently, the University will also indemnify it, and would be happy to act as research sponsor once ethical approval has been gained.

Given the above, I would remind you that the Unit already has an agreement with your office to exempt this proposal from further scientific review. However, if you require any further information, please do not hesitate to contact me.

Yours sincerely

Dr. Andrew Thompson
Director of Research Training

Cc. Paul Boyden; Dr Rebecca Knowles

Appendix F: *Study Invitation Letter to Clinicians*

Letter inviting clinician's to refer participants to the project. Version 1.0. 18th May 2011 2011.

Appendix 2

Sheffield Health and Social Care NHS
NHS Foundation Trust

Paul Boyden
Trainee Clinical Psychologist
Clinical Psychology Unit
Western Bank
University of Sheffield
S10 2TN

Tel: 07763749259
Email: pcp09pb@sheffield.ac.uk

Dear *(clinician)*,

I am writing to inform you of an exciting research project that I am carrying out as part of my Doctorate in Clinical Psychology at the University of Sheffield. I am investigating the association between grandiose delusions and cognitive processes, namely, theory of mind and attributional style. I am hoping to recruit potential participants for this study via clinicians from your service. I would very much appreciate any time you can spend in helping to identify potential participants who you believe would be happy to take part, and who would be suitable for the study as described in the criteria below.

What does this research project hope to investigate?

I am hoping to compare two groups of participants on a number of tasks which should take around 35 minutes to complete. I would like to explore how well people who are currently experiencing depression or grandiose delusions are able to understand the mental states of others. I also wish to see how they understand the causes for negative or positive events when they happen.

Why have I been invited to refer potential participants to the project?

You are being invited to help with recruiting potential participants because you are likely to either work with clients who currently experience grandiose delusions, or who are experiencing depression with no other psychotic symptoms.

What will the participants have to do?

Firstly, the participant will be asked to complete five tasks that explore different areas of experience including mood, the interpretation of cartoon jokes, a word meaning task and a picture puzzle. They will also be asked to provide demographic details such as age and ethnicity. A later section of the task will be tape recorded and transcribed for analysis. All information collected will be kept strictly confidential.

Who would be a suitable participant?

Anybody who you believe will endorse two items on the Peters Delusion Inventory (PDI-21) that relate to grandiose delusions:

- Do you ever feel as if you are, or destined to be someone very important?
- Do you ever feel that you are a very special or unusual person?

OR

Letter inviting clinician's to refer participants to the project. Version 1.0. 18th May 2011 2011.

Somebody who you believe would score higher than 11 for depressive symptomology on the Hospital Anxiety and Depression Scale (HADS) but who does *not currently* hold any delusional beliefs. Individuals with a history of suicidal ideation, or substance misuse will **not** be excluded from this study unless they report active suicidal plans on the day of participation.

Who would *not* be suitable to refer to this project?
Individuals who have a history of central nervous system disease or head injury, a learning disability, autism, or who are non-English speaking.

Who has ethically reviewed the project?
This project has been scientifically approved via the University of Sheffield Clinical Psychology Department. It has also been approved by the Sheffield NHS Research Ethics Committee and is supported by the South West Yorkshire Partnership Foundation Trust and Sheffield Health and Social Care Trust research governance offices. Guy Hollingsworth and Katy Kendall, the service directors for the Sheffield Health and Social Care Trust have also approved the go ahead of this study.

What do I do next when I know somebody who would be interested in taking part?

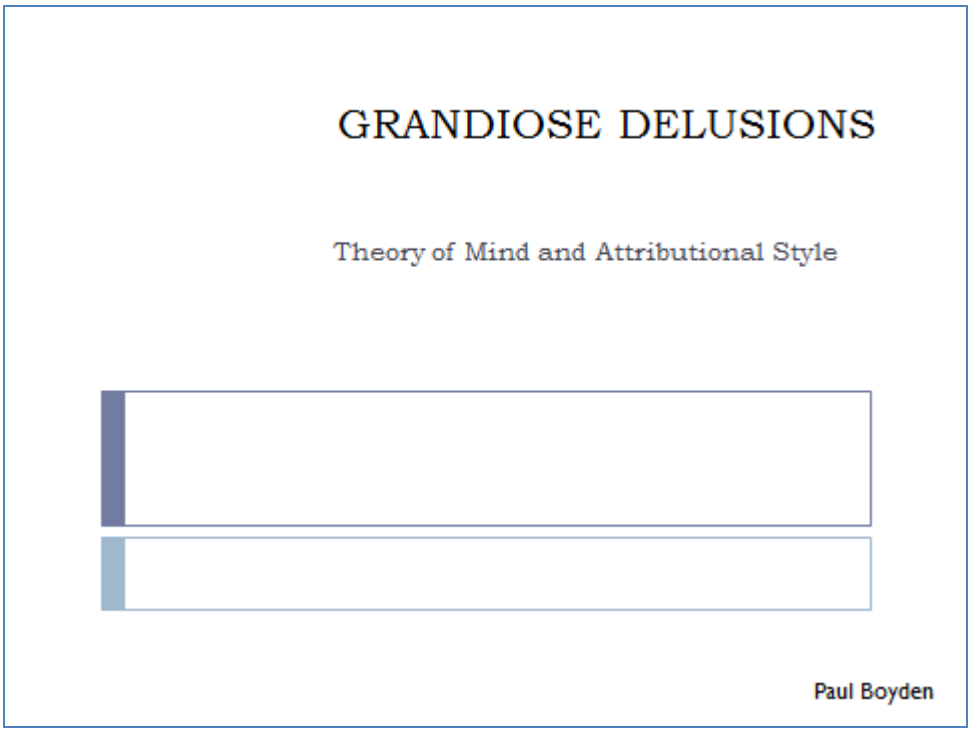
Please ask the client if they would be happy to participate and provide them with either the 'depressed group' or 'unusual beliefs group' participant information sheet I have provided you with. Please check that they are happy for me to contact them to arrange a convenient time and place to meet and then please let me know their name and contact information by email (pcp09pb @sheffield.ac.uk) or telephone (07763749259).

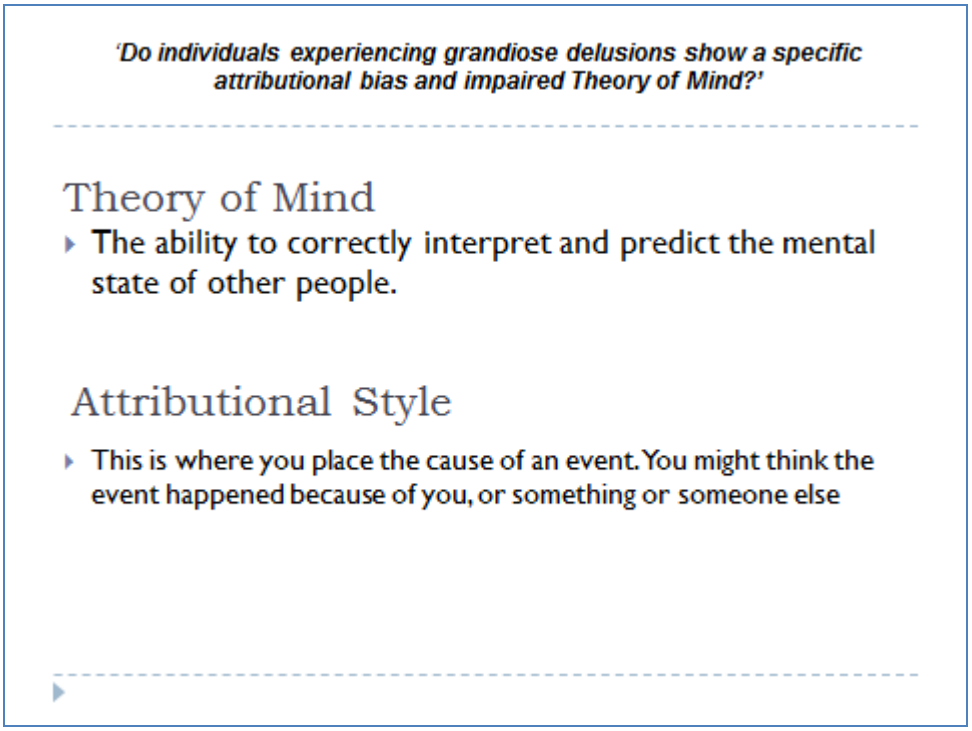
I hope you will be keen to consider inviting as many clients as possible who you believe to be suitable to take part in this project. If you have any questions about the project please do not hesitate to contact me.

Yours sincerely,

Paul Boyden
Trainee Clinical Psychologist
Supervised by Dr Georgina Rowse, Dr Rhiannon Corcoran & Dr Simon Hamilton

Appendix G: *PowerPoint Presentation Slides to Clinical Teams*





Why do this study?

- Grandiose delusions are hard to treat; a better understanding will have implications for treatment and the management of this symptom
- Theory of mind could be a cognitive ability clinicians may wish to assess for in risk assessments

Who would be a suitable participant?

Anybody between 18 and 65 years; and has English as their first language

And will either:

1. Score higher than 11 for depression on the HADS but has never experienced any psychotic/paranoid symptoms

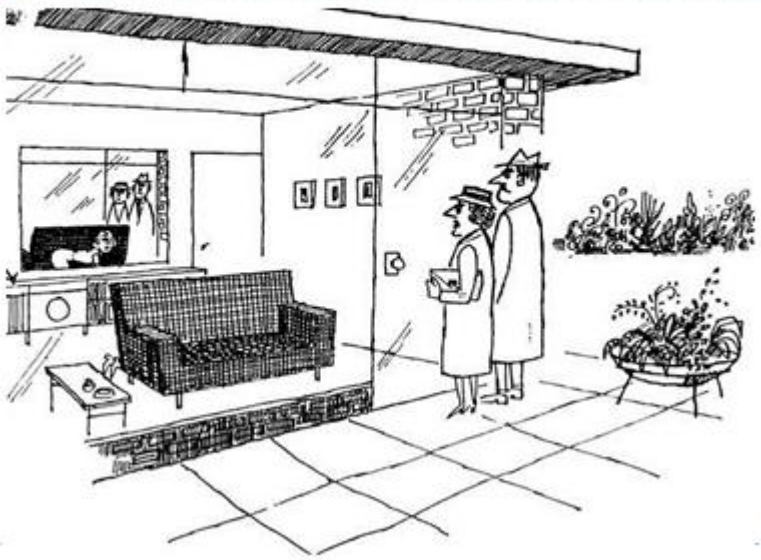
OR

2. Will currently say YES to the following questions:
   - *Do you ever feel that you are a very special or unusual person ?*
   - *Do you ever feel as if you are, or destined to be someone very important*

Those with a history of central nervous system disease or head injury, a learning disability, autism, and non-English speaking will be excluded from this study as these factors will impact on the ability to complete the tasks.

Participants will be recruited from the Mental Health Access Team, the local CMHT's and Early Intervention Services

CARTOON JOKE (EXAMPLE)



What to do if you have someone in mind?

- Please ask the participant if they would be happy to take part. If so, please provide the relevant information sheet and the screening questionnaire.

- Please call or e-mail me ASAP!

Tel: 07763749259

E-mail: pcp09pb@sheffield.ac.uk

- I will be recruiting between now and June.

- Please do contact me with any questions or if you aren't sure whether the participant would be suitable.

Appendix H: *Participant Information Sheet – Grandiose Group*

South West Yorkshire Partnership NHS
NHS Foundation Trust

Participant Information Sheet for Group 1 (unusual beliefs). Version 4.0. 26th September 2011.

1. Project title

An investigation into thinking styles and unusual beliefs.

2. Invitation to participate

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Please contact the researcher if there is anything that is not clear or if you would like more information. Thank you for reading this information sheet.

3. What is the project's purpose?

We would like to explore how well people who are currently experiencing unusual beliefs are able to understand the mental states of others. We also wish to see how they understand the causes for negative or positive events when they happen. The results will then be compared to those of a group of people who are experiencing depression.

4. Why have I been chosen?

You have been invited to take part because you may be currently experiencing unusual thoughts or beliefs about yourself or others.

5. Do I have to take part?

No. Taking part in this research is entirely voluntary and you can refuse to participate at any time. If you do decide to take part, you will be given this information sheet to keep, and you will be asked to sign a consent form. You can withdraw your consent **at any time** without it affecting your current or future treatment or access to services.

6. What will happen to me if I take part?

Taking part in this study will involve a one-off meeting with the researcher (Paul Boyden) who will give you a series of questionnaires and tasks to complete. These questionnaires should take no more than 30 to 35 minutes in total. One section will be tape recorded and transcribed for analysis. Your consent for the audio taping will be obtained separately. You may still take part in the study even if you decide you would prefer this not to happen.

8. What are the possible disadvantages and risks of taking part?

We do not anticipate that taking part in this research will cause you any distress or discomfort. Your well being is very important to the researcher. In the unlikely event that you do feel upset by some aspect of the research please tell the researcher immediately. He will ask you whether you would like to continue and will ensure that you feel okay before you leave.

9. What are the possible benefits of taking part?

Whilst we do not anticipate any immediate benefits of participating in the project, we hope that this work will allow us to improve our understanding of the experiences of people who hold this type of unusual belief, which will in turn enable us to develop better psychological interventions to help people who experience these difficulties.

11. What if something goes wrong?

If you feel at all uncomfortable or upset during the completion of the questionnaires, please tell the researcher straight away. It may be in your best interest to stop participating in this study, and the researcher will talk with you to help you decide whether you would like to continue or to stop completing the questionnaires. If the researcher has any concerns about you during this study, he will inform your care co-ordinator who will contact you to talk through how best to proceed. You are of course entitled to make a complaint if you feel that you have not been treated well by any of the researchers involved in this project. In the first instance, you should contact Dr Georgina Rowse (Project supervisor) at the University of Sheffield should you wish to raise a complaint. However, should you feel your complaint has not been

handled to your satisfaction you can also contact the University's registrar on the following contact details: Philip Harvey (registrar@sheffield.ac.uk), Firth Court, Western Bank, Sheffield, S10 2TN. Tel: 0114 222 21101.

12. Will my taking part in this project be kept confidential?

All the information that we collect from you during the course of the research will be kept strictly confidential and will not be accessible by anyone outside of the research team. You will not be able to be identified in any reports or publications. All of the responses to the tasks will be completely anonymous (i.e. no names will be recorded). The consent forms with your name on will be kept separately from the rest of the information in a secure, locked filing cabinet. The information generated in the course of the research will be kept securely in paper or electronic form for a period 5 years after the completion of a research project and then destroyed in line with the university's guidance.

13. What type of information will be sought from me?

You will be asked to complete 5 tasks that explore different areas of experience, such as mood, the interpretation of cartoon jokes, a word task and a picture puzzle. You will also be asked for some demographic details, such as your age, ethnicity, educational level, and some basic information about your mental health.

14. What will happen to the results of the research project?

This study is being conducted in partial fulfilment of a clinical psychology doctoral degree. It is hoped that the results of this project will be published in international peer reviewed journals. It must be emphasised again that you will not be identified in any subsequent reports or publications. If you would like to receive a summary of the results, please let Paul Boyden know by email (pcp09pb@sheffield.ac.uk).

15. Who is organising and funding the research?

This project is organised by the Clinical Psychology Unit at the University of Sheffield. I am conducting this research project in the role of a Clinical Psychologist in Training.

16. Who has ethically reviewed the project?

This project has been approved by the Clinical Psychology Department's research ethics committee as well as the Barnsley PCT and Sheffield Health and Social Care NHS Research Ethics committees.

17. Contact for further information

You can contact the research team via e-mail or telephone or letter at any time by the following details:

Paul Boyden *Clinical Psychologist in training* Clinical Psychology Unit Department of Psychology Western Bank University of Sheffield S10 2TN Tel: 0114 222 6650 E-Mail: Pcp09pb @sheffield.ac.uk	**Dr Georgina Rowse** *Clinical Psychologist and Academic Supervisor* Clinical Psychology Unit Department of Psychology Western Bank University of Sheffield S10 2TN Tel: 0114 222 6650 E-Mail: G.Rowse@sheffield.ac.uk	**Dr Rhiannon Corcoran** *Associate Professor* Room 1916 A Floor South Block Queens Medical Centre Nottingham NG7 2UH Tel: 0115 823 0428 E-Mail: Rhiannon.corcoran@nottingham.ac.uk	**Dr Simon Hamilton** *Contact for reaching care co-ordinators* South & Dearne Valley Community Mental Health Team, Summer Lane, Wombwell Lane, Barnsley, S73 8QH Tel: 01226 341 374 E-mail: simon.hamilton@swyt.nhs.uk

The telephone number for myself will take you through to the clinical psychology unit research support officer who will be able to relay messages but is unable to answer any queries herself. Once the message has been received, you will be contacted by Paul Boyden as soon as possible.

If you have any questions at all about this project, please do not hesitate to ask the research team at the above address, at any stage. I would like to thank you for taking part in this project and spending time to answer the questionnaires.

Appendix I: *Participant Information Sheet – Depressed Group*

South West Yorkshire Partnership NHS
NHS Foundation Trust

Participant Information Sheet for Group 2 (depression). Version 4.0. 26th September 2011.

1. Project title

An investigation into thinking styles and unusual beliefs.

2. Invitation to participate

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Please contact the researcher if there is anything that is not clear or if you would like more information. Thank you for reading this information sheet.

3. What is the project's purpose?

We would like to explore how well people who are currently experiencing depression are able to understand the mental states of others. We also wish to see how they understand the causes for negative or positive events when they happen. The results will then be compared to those of a group of people who are experiencing unusual beliefs.

4. Why have I been chosen?

You have been invited to take part because you may be currently experiencing depression.

5. Do I have to take part?

No. Taking part in this research is entirely voluntary and you can refuse to participate at any time. If you do decide to take part, you will be given this information sheet to keep, and you will be asked to sign a consent form. You can withdraw your consent **at any time** without it affecting your current or future treatment or access to services.

6. What will happen to me if I take part?

Taking part in this study will involve a one-off meeting with the researcher (Paul Boyden) who will give you a series of questionnaires and tasks to complete. These questionnaires should take no more than 30 to 35 minutes in total. One section will be tape recorded and transcribed for analysis. Your consent for the audio taping will be obtained separately. You may still take part in the study even if you decide you would prefer this not to happen.

8. What are the possible disadvantages and risks of taking part?

We do not anticipate that taking part in this research will cause you any distress or discomfort. Your well being is very important to the researcher. In the unlikely event that you do feel upset by some aspect of the research please tell the researcher immediately. He will ask you whether you would like to continue and will ensure that you feel okay before you leave.

9. What are the possible benefits of taking part?

Whilst we do not anticipate any immediate benefits of participating in the project, we hope that this work will allow us to improve our understanding of the experiences of people who experience depression, which will in turn enable us to develop better psychological interventions to help people who experience these difficulties.

11. What if something goes wrong?

If you feel at all uncomfortable or upset during the completion of the questionnaires, please tell the researcher straight away. It may be in your best interest to stop participating in this study, and the researcher will talk with you to help you decide whether you would like to continue or to stop completing the questionnaires. If the researcher has any concerns about you during this study, he will inform your care co-ordinator who will contact you to talk through how best to proceed. You are of course entitled to make a complaint if you feel that you have not been treated well by any of the researchers involved in this project. In the first instance, you should contact Dr Georgina Rowse (Project supervisor) at the University of Sheffield should you wish to raise a complaint. However, should you feel your complaint has not been handled to your satisfaction you can also contact the University's registrar on the following contact details: Philip Harvey (registrar@sheffield.ac.uk), Firth Court, Western Bank, Sheffield, S10 2TN. Tel: 0114 222 21101.

12. Will my taking part in this project be kept confidential?

All the information that we collect from you during the course of the research will be kept strictly confidential and will not be accessible by anyone outside of the research team. You will not be able to be identified in any reports or publications. All of the responses to the tasks will be completely anonymous (i.e. no names will be recorded). The consent forms with your name on will be kept separately from the rest of the information in a secure, locked filing cabinet. The information generated in the course of the research will be kept securely in paper or electronic form for a period 5 years after the completion of a research project and then destroyed in line with the university's guidance.

13. What type of information will be sought from me?

You will be asked to complete 5 tasks that explore different areas of experience, such as mood, the interpretation of cartoon jokes, a word task and a picture puzzle. You will also be asked for some demographic details, such as your age, ethnicity, educational level, and some basic information about your mental health.

14. What will happen to the results of the research project?

This study is being conducted in partial fulfilment of a clinical psychology doctoral degree. It is hoped that the results of this project will be published in international peer reviewed journals. It must be emphasised again that you will not be identified in any subsequent reports or publications. If you would like to receive a summary of the results, please let Paul Boyden know by email (pcp09pb@sheffield.ac.uk).

15. Who is organising and funding the research?

This project is organised by the Clinical Psychology Unit at the University of Sheffield. I am conducting this research project in the role of a Clinical Psychologist in Training.

16. Who has ethically reviewed the project?

This project has been approved by the Clinical Psychology Department's research ethics committee as well as the Barnsley PCT and Sheffield Health and Social Care NHS Research Ethics committees.

17. Contact for further information

You can contact the research team via e-mail or telephone or letter at any time by the following details:

Paul Boyden	**Dr Georgina Rowse**	**Dr Rhiannon Corcoran**	**Dr Simon Hamilton**
Clinical Psychologist in training	*Clinical Psychologist and Academic Supervisor*	*Associate Professor*	*Contact for reaching care co-ordinators*
Clinical Psychology Unit Department of Psychology Western Bank University of Sheffield S10 2TN	Clinical Psychology Unit Department of Psychology Western Bank University of Sheffield S10 2TN	Room 1916 A Floor South Block Queens Medical Centre Nottingham NG7 2UH	South & Dearne Valley Community Mental Health Team, Summer Lane, Wombwell Lane, Barnsley, S73 8QH
Tel: 0114 222 6650 E-Mail: Pcp09pb@sheffield.ac.uk	Tel: 0114 222 6650 E-Mail: G.Rowse@sheffield.ac.uk	Tel: 0115 823 0428 E-Mail: Rhiannon.corcoran@nottingham.ac.uk	Tel: 01226 341 374 E-mail: simon.hamilton@swyt.nhs.uk

The telephone number for myself will take you through to the clinical psychology unit research support officer who will be able to relay messages but is unable to answer any queries herself. Once the message has been received, you will be contacted by Paul Boyden as soon as possible.

If you have any questions at all about this project, please do not hesitate to ask the research team at the above address, at any stage. I would like to thank you for taking part in this project and spending time to answer the questionnaires.

Appendix J: *Consent Form*

Consent form. Version 4.0. 26th September 2011

South West Yorkshire Partnership NHS
NHS Foundation Trust

Appendix 12

Study Number:

Participant Identification Number for this study:

Consent Form

Title of Research Project: An investigation into thinking styles

Name of Researcher: Paul Boyden (Tel: 0114 222 6650)

Participant Identification Number for this project:

Please initial box

1. I confirm that I have read and understand the information sheet explaining the above research project and I have had the opportunity to ask questions about the project. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. ☐
3. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. ☐
4. I understand that relevant sections of my medical notes and data collected during the study, may be looked at by individuals from the research team, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. ☐
5. I also give permission to be tape recorded during the completion of one of the tasks. I understand that the recording is solely for the purpose of analysis, and will be destroyed at the end of the project. ☐
6. I agree for the data collected from me to be used in future research ☐
7. I agree to take part in the above research project. ☐

Name of Participant	Date	Signature
Lead Researcher	Date	Signature

To be signed and dated in presence of the participant

Appendix K: *Screening Questionnaire*

South West Yorkshire Partnership NHS
NHS Foundation Trust

Appendix 1

Screening Questionnaire

To be completed by the staff member who is referring the participant that has agreed to take part in the study.

All details recorded on this form will be kept confidential, as mentioned in the information sheet, and participant's names will NOT be linked to this information.

Age:

<18	
18 – 25	
26 – 35	
36 – 45	
46 – 55	
56 – 65	
>65	

Gender: Male Female

Educational experience:
None
School level
A-Level/College diploma
University
Other

Ethnic background:

White	British	
	Irish	
	Any other white background	
Mixed	White & Black Caribbean	
	White & Black African	
	White & Asian	
	Any other mixed background	
Asian or Asian British	Indian	
	Pakistani	
	Bangladeshi	
	Any other Asian background	
Black or Black British	Caribbean	
	African	
	Any other Black background	
Chinese or other ethnic group	Chinese	
	Any other ethnic group	
Not stated		

Does the participant have a mental health diagnosis? If so, please state these below:

How long has the participant been suffering with a mental health difficulty?

Is the participant currently taking any medication to help with their mental health difficulties ? If so, please state these below and the current dosage taken.

- Does the participant ever feel if they are, or destined to be someone very important?

  YES ☐ NO ☐

- Does the participant ever feel that they are a very special or unusual person?

  YES ☐ NO ☐

Risk assessment (to be completed by the researcher on the day)

Do you have any thoughts about harming yourself or other people at the moment?
Yes No

What are these thoughts?

Have you ever acted on these thoughts in the past? Yes No

Have you currently got any plans to act on these thoughts? Yes No

If yes, what are these plans?

What would stop you from acting on these thoughts?

Are you currently hearing voices or having any other symptoms that may stop you from concentrating on the interview or cause you distress?

Yes No

If yes, please give details _____

Are you currently under the influence of alcohol/drugs? Yes No

Appendix L: *Peters Delusion Inventory-21 (PDI-21)*

Note. For the purpose of the eThesis, this document has been removed for copyright reasons. Copies are available on request by the author of this measure.

Appendix M: *Hospital Anxiety and Depression Scale (HADS)*

Note. For the purpose of the eThesis, this document has been removed for copyright reasons. Copies are available on request by the author of this measure.

Appendix N: *Altman Self-Rating Mania Scale (AMRS)*

Note. For the purpose of the eThesis, this document has been removed for copyright reasons. Copies are available on request by the author of this measure.

Appendix O: *Task: Theory of Mind Stories*

1. It's Mary's birthday and her auntie pops in to give her a box of chocolates. She puts her chocolates in her top drawer for safe-keeping.

Memory question: Where does Mary put her chocolates?

A few minutes later her greedy brother Bill comes in and asks Mary:

"Where have you put your chocolates, in your top drawer or your bottom drawer?"

Mary doesn't want Bill to find her chocolates.

FOD question: In which drawer does Mary say her chocolates are and why?

Reality question: Where are the chocolates really?

Inference question: Does Mary's auntie live close to her?

Mary discovers that 5 of her chocolates have disappeared. She suspects that Bill was not fooled when she said her chocolates were in the bottom drawer and has pinched them.
Later on Mary's best friend gives her a tin of sweets. She hides these carefully in her bottom drawer. Mary doesn't want Bill to pinch any of these.

Memory question: Where does Mary put the tin of sweets?

When Bill next sees Mary he asks her:
"Where have you put your sweets, in your top drawer or your bottom drawer?"

Bill expects Mary to lie but Mary is very clever and realises this and she doesn't want Bill to find her sweets.

SOD question: In which drawer will Mary say her sweets are and why?

Reality question: Where are the sweets really?

Inference question: Does Bill have a sweet tooth?
(238 words; Flesch rating = 79.4)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3.
!
CHOC
SWEETS
4.
?

2. Tony is trying to give up smoking. To help him Jessie has hidden his cigarettes in her jewellery box.

Memory question: Where has Jessie put the cigarettes?

A couple of hours later, Tony is looking for his cigarettes. He has looked in all of the obvious places but not Jessie's jewellery box. He asks Jessie: "Have you hidden my cigarettes in your jewellery box or somewhere else?"

FOD question: Does Jessie say she has hidden the cigarettes in the jewellery box or somewhere else?

Reality question: Where are the cigarettes really?

Inference question: Is Tony addicted to cigarettes?

Later that day, Jessie discovers that one of the cigarettes is missing from the packet. She realises that Tony must have found the cigarettes in her jewellery box and smoked one.

Memory question: Where did Tony find the cigarettes?

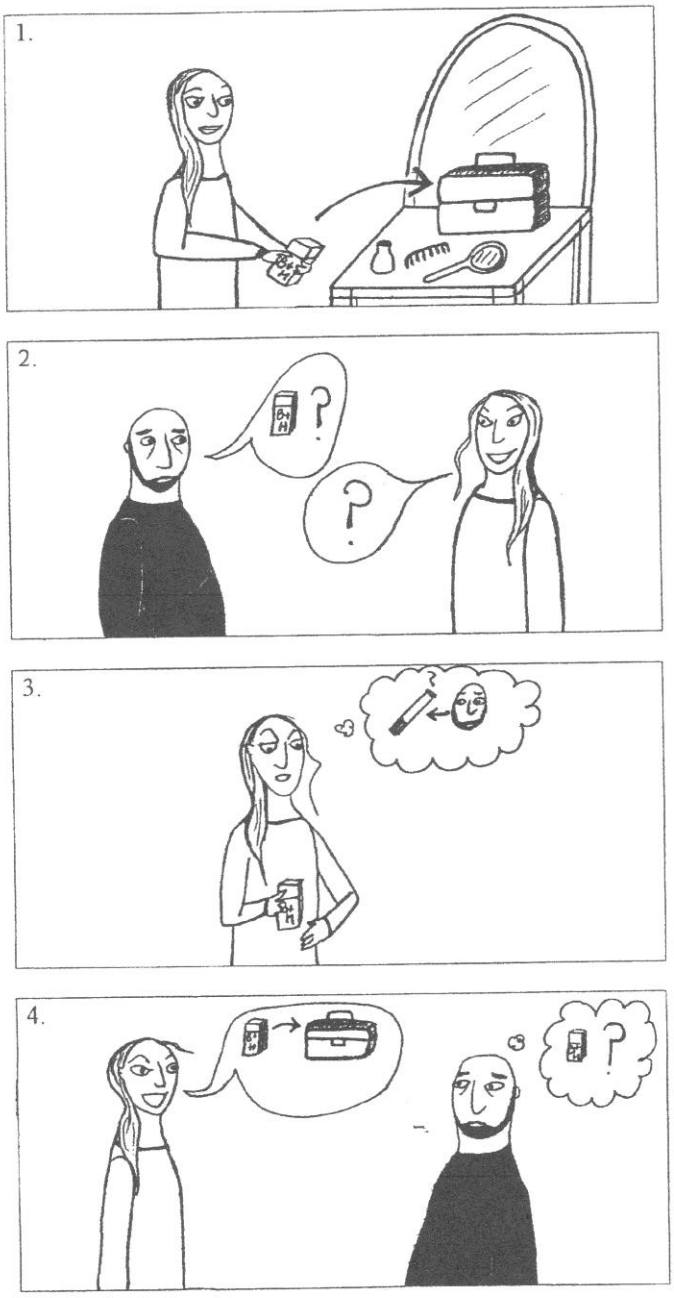
Jessie leaves the cigarettes in the jewellery box. She tells Tony she knows he's had a cigarette. She also tells him she hasn't moved them. Tony does not trust Jessie about this.

SOD question: Next time Tony wants a cigarette will he look for them in the jewellery box or somewhere else?

Reality question: Where are the cigarettes really?

Inference question: Is Jessie's jewellery box lockable?

(189 words, Flesch rating = 69.7)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4. Lucy and Darren have arranged to meet a group of their colleagues in the Crown for a drink.

Memory question: Which pub are they meeting in?

Lucy gets a phone call from Emma who tells her there has been a last minute change of plan and they are now all meeting at the Swan. Emma does not have Darren's phone number, so she asks Lucy to let Darren know about the change of plan.

FOFB question: Which pub does Darren think they are meeting in, the Crown or the Swan?

Reality question: Which pub are they meeting in?

Inference question: Are Lucy and Darren good friends?

Lucy tries to phone Darren but there is no answer, so she assumes he has already left. She decides to meet him in the Crown anyway, then they can go to the Swan.

Memory Question: Does Darren answer the phone when Lucy rings?

On his way to the pub, Darren bumps into Emma who tells him they are now meeting at the Swan. Darren and Emma walk to the Swan together.

SOFB question: Which pub will Lucy expect to find Darren in, the Crown or the Swan?

Real MS question: Where does Darren expect to meet his friends?

Reality question: Which pub has Darren gone to?

Inference question: Are the Crown and the Swan close to each other?

(231 words; Flesch rating = 79.5)

5. Denise and Rob are very good friends. One evening they go to the pub and it's Rob's turn to buy the first round. Denise orders a gin and lemonade.

Memory question: What drink does Denise order?

Denise goes to find a table while Rob goes to the bar. The barman tells Rob that they are out of gin so Rob orders Denise a vodka and lemonade instead.

FOFB question: What drink does Denise expect to get?

Reality question: What drink will Denise get?

Inference question: Is Denise older than 17?

A friend of their's met Rob at the bar as Rob was giving the barmaid the money for the drinks.

Memory Question: Did Rob give the money to a barmaid or a barman?

The friend sees Denise before Rob gets to the table and tells her about the drinks.

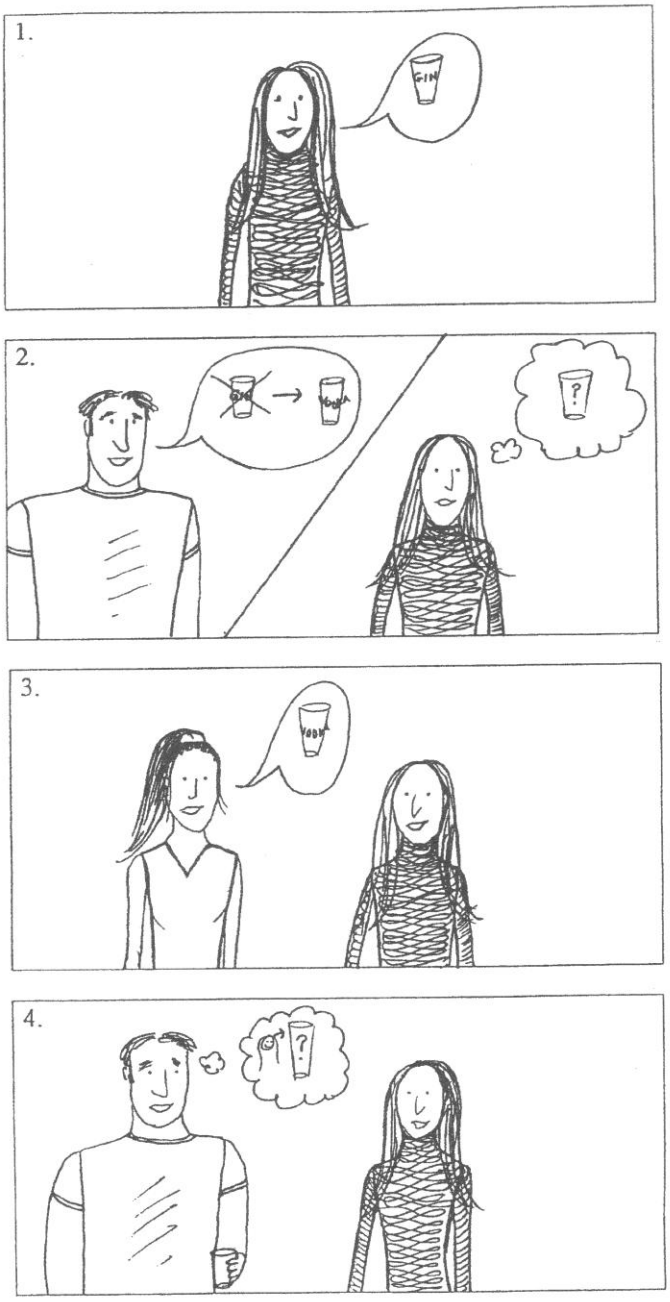
SOFB question: When Rob arrives at their table, what drink does he think Denise is expecting?

Real MS question: What drink is Denise expecting?

Reality question: What drink has Rob bought?

Inference question: *Whose round is it next?*

(149 words; Flesch rating = 86.6)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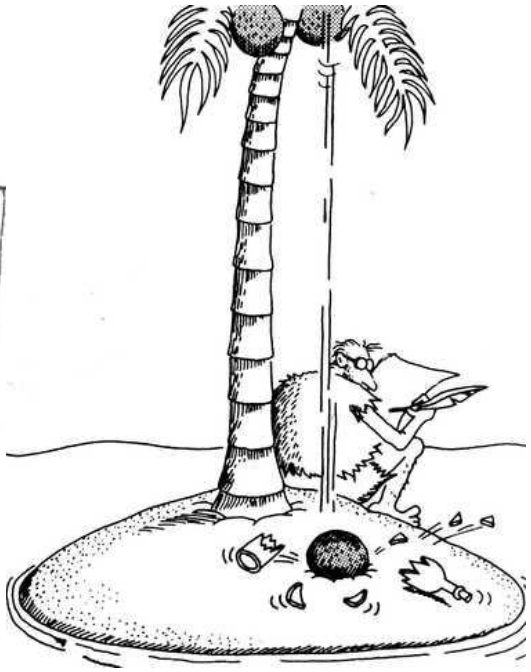
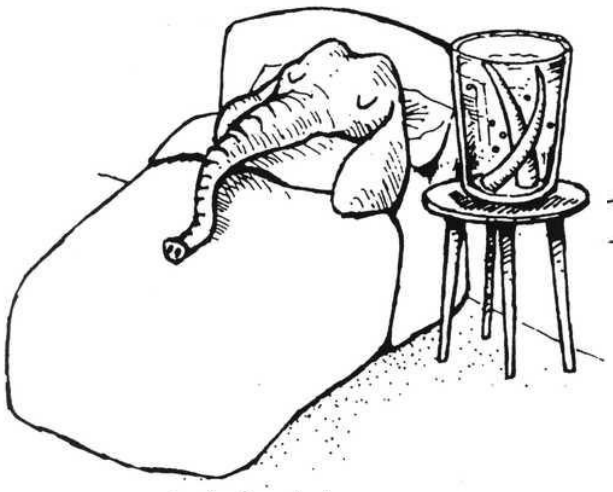
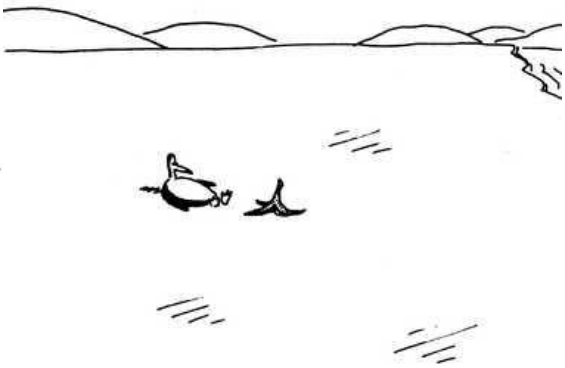
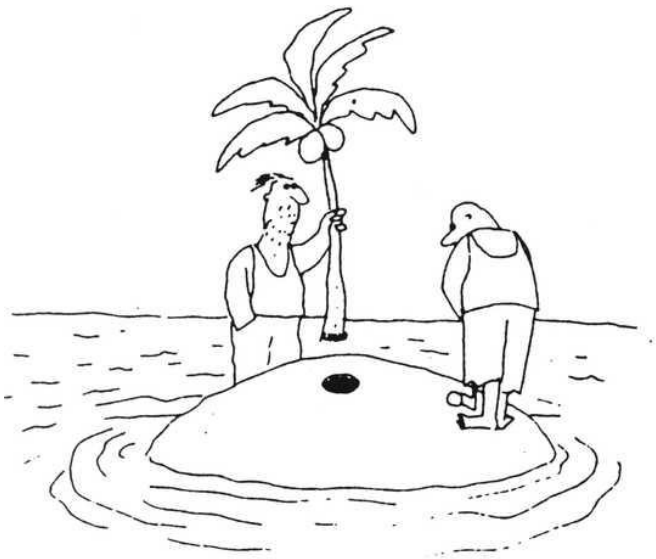
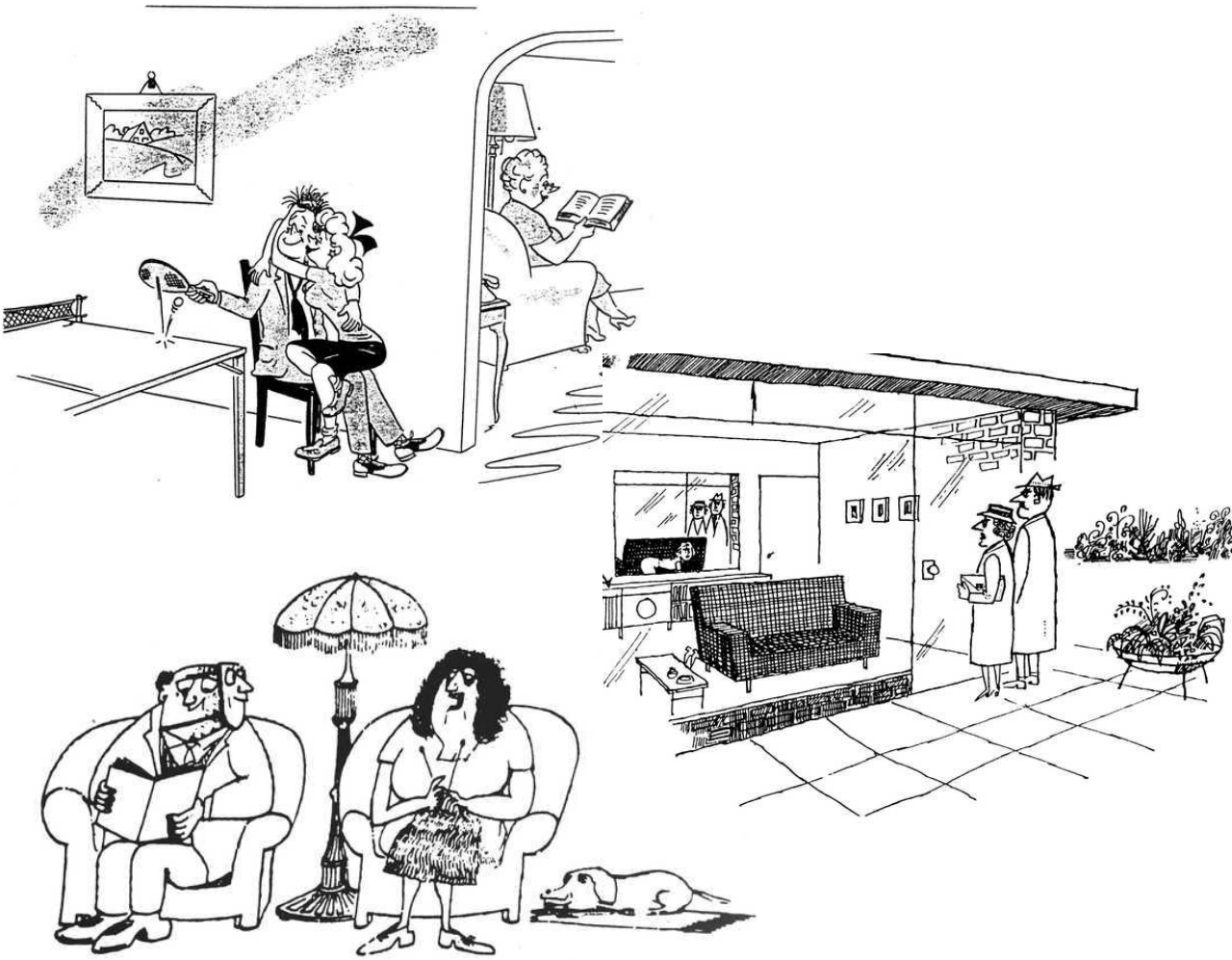
Appendix P: *Cartoon Jokes Task*

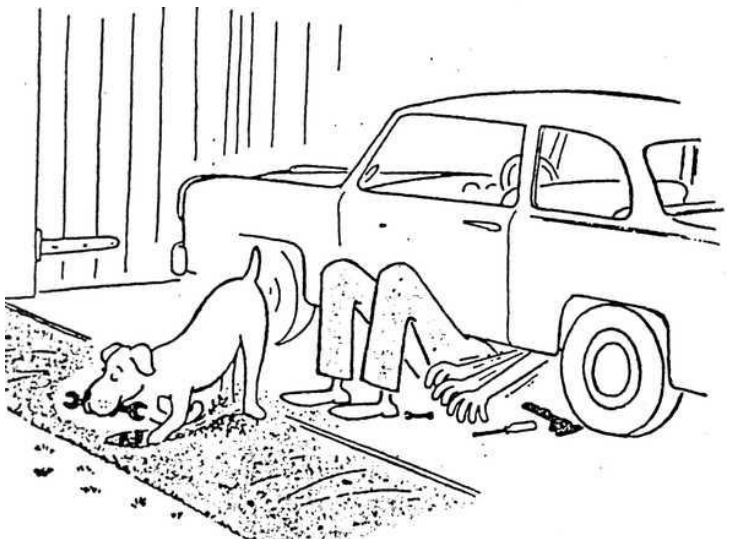


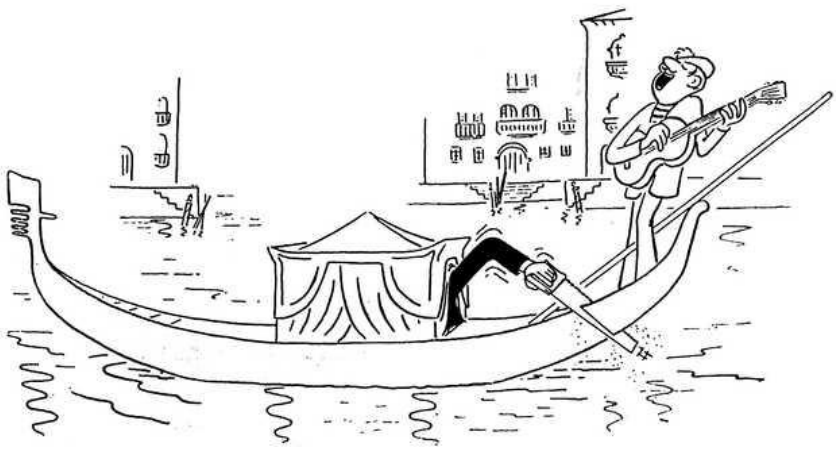












Typical joke explanations

Minnie Mouse: someone is taking the mickey (no pun intended!) out of her by putting on a toilet seat with two lids which looks like her.

Message: he was intending to put his letter in a bottle and send it out to sea to be saved.

Tusks: the elephant has taken his tusks out and put them in a glass overnight like people do with false teeth.

Penguin: the penguin is wondering here the banana skin came from that he has just slipped on.

Hole in one: they don't know the island is sinking – (it's like a plug)

Ping-pong: the couple are pretending to play table tennis so the mum doesn't know they are otherwise occupied.

Visitors: she is hiding from the people who have knocked because she doesn't want to see them but she doesn't realise they can see her reflection and so know that she is in and hiding from them.

Talkative wife: the husband has a mask on the side of his face so his wife thinks he is listening attentively whilst she knits, when really he is reading his book

Dog and bone: the dog thinks the spanner is a bone.

Gondola: the people in the gondola are getting annoyed by/ being distracted by the singer who doesn't know that he is about to be sawn off and sink.

Rating scales

Typicality:

0= typical/ common/ usual explanation given

1= atypical/ uncommon/unusual; explanation given.

Mentalizing scale:

0 = not got

1 = entirely physical or behavioural interpretation of the joke with no reference to mental states.

2 = an interpretation in terms of mental / emotional states is suspected but can only be inferred because there is no explicit reference to mental states in the explanation offered.

3 = an interpretation which explains the joke in terms of the character(s) mental/ emotional state using explicit mental or emotional state terms.

Funniness rating:

Ask participant to rate each joke for funniness out of 5 with 0 being not at all funny and 5 being hysterically funny.

Appendix Q: *Internal, Personal and Situational Attributions Questionnaire (IPSAQ)*

Note. For the purpose of the eThesis, this document has been removed for copyright reasons. Copies are available on request by the author of this measure.

Appendix R. *Means and Standard Deviations for the ToM Stories*

	Grandiose group (n=18)		**Depressed controls (n=14)**		**Statistical test**
	Mean	**SD**	**Mean**	**SD**	*t(30)*
Deception tasks					
ToM deception	2.44	1.10	2.93	1.07	1.25
Memory deception	3.67	0.69	3.93	0.27	1.35
Inference deception	3.28	0.83	3.64	0.50	1.46
Reality deception	3.67	0.59	3.71	0.47	0.25
False-belief tasks					
ToM false-belief	2.39	0.78	3.21	0.80	2.94*
Memory false-belief	3.22	0.81	3.7	0.63	2.73*
Inference false-belief	3.22	1.06	3.57	0.51	1.13
Reality false-belief	3.67	0.59	3.57	0.65	-0.43

*p<0.01