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SOCIAL COGNITION AND SCHIZOPHRENIA SYNDROMES

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A Thesis

Presented to

The Faculty of the Department of Psychology

The College of William and Mary in Virginia

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

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by

Ann Murphy

2003

APPROVAL SHEET


This thesis is submitted in partial fulfillment of

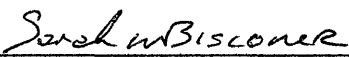
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## ABSTRACT

Social cognition was evaluated among subgroups of schizophrenics from stories told to the Picture Arrangement (PA) subtest of the Wechsler Adult Intelligence Scale-Revised (WAIS-R). PA stories were scored on six measures that were developed to measure social cognition. Symptom ratings were made using the Scale for the Assessment of Negative Symptoms (SANS) and the Scale for the Assessment of Positive Symptoms (SAPS) and evaluated on three dimensions: negative, disorganized, and psychotic. Of the three syndromal dimensions only disorganized symptoms were predictive of scores on the PA derived measures. When IQ subtest scale scores (PA) were entered into a regression equation with disorganization scores however, the IQ subtest scores were the only significant predictors of all but two social cognition scales. Further research should be conducted to determine if social cognition measures assess more than general cognitive ability.

## **Social Cognition and Schizophrenia Syndromes**



## INTRODUCTION

Schizophrenia is a debilitating illness that impacts all aspects of the lives of those affected by it. Researchers have long sought to understand the etiology of schizophrenia, to appropriately categorize its symptoms and to develop effective methods of treatment. Recently there has been a growing body of research that suggests the applicability of a social cognition model for understanding schizophrenia. Social cognition has been found to be relevant to the understanding and treating of other mental disorders, particularly depression and anxiety (Abramson, 1988; Dobson & Kendall, 1993). As social dysfunction is one of the primary symptoms of schizophrenia a social cognitive approach to the understanding and treatment of the disorder is particularly relevant (American Psychiatric Association, DSM-IV, 1994).

Frith, (Corcoran, Mercer & Frith, 1995; Frith & Corcoran, 1996; Corcoran, Cahill & Frith, 1997) and Hardy-Bayle (Sarfati, Hardy-Bayle, Nadel, Chevalier & Widloecher, 1997; Sarfati, Hardy-Bayle, Besche & Widloecher, 1997; Sarfati, Hardy-Bayle, Brunet & Widloecher, 1999) have conducted research on how theory of mind (ToM), may be an underlying construct of social cognition, and how deficiencies of ToM relate to particular symptoms of schizophrenia. This study will expand on these findings by considering ToM as well as additional aspects of social cognition as they relate to syndromal patterns of schizophrenia. A measure of social cognition will be derived from ratings of stories told to the Picture Arrangement subtest of the Wechsler Adult Intelligence Scale- Revised (WAIS-R; Wechsler, 1981).

“Many people with schizophrenia experience disabilities in several domains of social functioning, such as interpersonal relationships, self-care skills, education, work and personal achievement, finances, housing, recreation, physical health and wellness, mental health and drug abuse, spirituality, and legal matters” (Corrigan & Penn, 2001, p. 4). As compared to both clinical (affective disordered patients) and nonclinical control groups, individuals with schizophrenia demonstrate deficits on measures of social skills including a role-play test of social skills, a social adjustment scale, and a quality of life scale (Bellack, Morrison, Wixted, & Mueser, 1990). These deficits are generally stable over time and typically do not significantly improve simply as a result of improvements in specific symptoms. Mueser, Bellack, Douglas, and Morrison (1991) found that when comparing individuals with schizophrenia to non-psychiatric controls on measures of social skills using a role play test, 67% of schizophrenics fell below the range of scores for the controls at initial assessment and 64% were below the range one year later.

Often in conjunction with an individual’s difficulty with social functioning he or she may withdraw from society, friends, and family, decreasing his or her level of social and emotional support. This can often lead to an exacerbation of symptoms. In addition, poor social interaction skills often limit the number of people a person with schizophrenia has available to rely on for support. Although it is generally accepted by mental health professionals that social skills training is an important component of rehabilitation for individuals with schizophrenia there is conflicting evidence of the effectiveness of such interventions (Morrison & Bellack, 1981). This conflicting evidence may be a result of the fact that deficits in social interactions are indicative of problems at one stage of

cognitive processing, i.e. stimuli perception, and social skills training addresses the behaviors that may represent a different stage, i.e. response.

A great deal of research has been done assessing the ability of people with schizophrenia to accurately perceive and identify the emotional expressions of others. Penn, Combs, and Mohamed (2001) present a summary of many years of research on this topic concluding the following: schizophrenics generally show deficits in facial-affect perception; they demonstrate greater deficits for negative compared to positive facial expressions; and it may be the case that individuals with paranoid, as compared to nonparanoid, schizophrenia show less difficulty with facial-affect perception, although this is only based on limited findings. Penn et al. (2001) have also considered research that has evaluated how this impairment in facial-affect perception relates to social functioning. Fewer studies have been completed in this area of research but the results indicate that deficits in facial-affect perception are related to ward behavior, particularly difficulty with hygiene, grooming, social competence, social interest, and neatness.

The perceptual deficits associated with schizophrenia are not limited to interpretation of facial-affect. Penn et al (2001) reduced the large amount of research in this area to two major findings, “people with schizophrenia tend to be impaired in their perception of dynamic emotional displays... [and] have particular difficulty in discerning abstract, rather than concrete cues” (p. 102). Toomey (1997) specifically considered the relationship between nonverbal social perception and other areas of social functioning and found that individuals with schizophrenia as compared to normal controls performed significantly worse on tasks of social problem solving, social sequencing, and social judgment. Nonverbal social perception skills were significantly related to all social

problem-solving skills, as well as to performance on the Picture Arrangement and Comprehension tasks of the WAIS-R (measures of sequencing and interpersonal interactions and knowledge of practical information and social conventions, respectively).

In summary, evidence strongly suggests a deficit in the perceptual abilities of individuals with schizophrenia, particularly in relation to socially related stimuli. The question remains, however, whether this difficulty is with actual perceptions or with the cognitive processing of these perceptions. Improved understanding of the relationship between social cognition and the symptoms of schizophrenia may aid in understanding this question and developing targeted interventions to improve social cognitive deficits and by extension social functioning.

Social cognition has been defined as “the processes and functions that allow a person to understand, act on, and benefit from the interpersonal world” (Corrigan & Penn, 2001, p. 3). More specifically, Broks (1997) operationally defined social cognition as: “(1) the perception of the dispositions and intentions of other individuals; (2) the construction and maintenance of a viable concept of self; (3) the production and regulation of behavior in social contexts” (p. 107). Many individuals with schizophrenia have difficulties with aspects of social cognition and are unable to internalize others’ points of view (Diamond, 1956).

The ability to discern that others have minds and act in accordance with the contents of their minds has been described as theory of mind (ToM; Frith, 1992). Without thinking we use this theory of mind on a regular basis whenever we interact with others. We use this ability when we infer the intentions of someone else despite the content of

their verbal communication; when we recognize that someone is lying or deceiving us; and when we participate in pretend mental activity. Frith (1992) explains that the reason we are able to do this without becoming hopelessly confused is because there are two separate mechanisms for mental representations. The first mechanism handles primary representations that have to do with the physical world. Propositions at this level can be objectively determined to be true or false. The second mechanism deals with metarepresentations that concern mental states. This refers to an understanding of our own and others' mental states. This is a subjective understanding and therefore cannot be objectively determined as true or false. Frith (1992) uses an example of pretend play to explain this distinction. Frith explains,

During the first years of life, a child must learn about the properties of objects; for example, that a banana is yellow, curved, nice to eat, but must be peeled first.

Then, at around 18 months, the child starts playing games of pretend. When the mother pretends that a banana is a telephone, why does this not hopelessly confuse everything the child has learned about bananas so far (p. 120)?

Primary representations are statements about the physical state of the banana, such as "this banana is edible" (p. 120). This statement can either be true or false and applies to all bananas. Metarepresentations, on the other hand, regard the attitude that is being held toward the banana, that "I pretend, this banana, it is a telephone" (p.120). This statement cannot be evaluated as either true or false and it does not apply universally to all bananas. The child would need to use this metarepresentation to understand the intention of the mother, i.e., that she is pretending.

It is widely accepted that people with autism or Asperger's syndrome lack a ToM and thus cannot use metarepresentations. It is argued that these individuals lack the capacity to recognize that others have minds, a state that seems to result from a failure of neurodevelopment (Corcoran, 2001). Frith (1992) proposes that people with schizophrenia are similar to those with autism in that they both lack the ability to form metarepresentations. The difference is, however, that most individuals with schizophrenia did at one time (i.e. prior to their first breakdown) have functional use of this mechanism. According to Frith (1992), "the autistic person has never known that other people have minds. The schizophrenic knows well that other people have minds, but has lost the ability to infer the contents of these minds: their beliefs and intentions" (p. 121). In addition, the individual with schizophrenia will likely continue to infer the mental states as he or she had done effectively earlier in life even though he or she now lacks the mechanisms for metarepresentation. Predictably, this individual's conclusions are generally going to be incorrect.

Frith (1992) postulates that this deficit in the ability for metarepresentation underlies all the widely varying features of schizophrenia. Specifically, Frith (1992) explains that there are three types of cognitive impairments that characterize the primary signs and symptoms of schizophrenia. The first is a lack of awareness of one's own goals and intentions. This is believed to lead to negative symptoms such as abulia or poverty of will, alogia or poverty of words, and athymia or lack of feelings. This is thought to arise as a result of disruption to the system causing a complete inability to represent intentional behavior. This likely extends to a lack of awareness of others' goals and intentions leading to the social withdrawal so often seen in schizophrenia. It is also suggested that

this is related to some of the positive symptoms. According to Corcoran (2001) “passivity phenomena, such as delusions of control, thought insertion or withdrawal, and auditory hallucinations, arise as a result of a failure at a point within the system when one’s own intentions to act ought to be monitored” (p. 151). Auditory hallucinations, for example, involve the failure of the self-monitoring system because when the person makes inferences about the intentions and thoughts of others they are perceived as coming from an external source (Corcoran et al., 1995). The second type of impairment is a failure to take into account the state of knowledge of other people resulting in formal thought disorder. This presents itself in symptoms such as neologisms and the overuse of pronoun references. For example, in telling a story an individual with formal thought disorder may use pronouns exclusively without ever qualifying to whom he or she is specifically referring. The individual makes the mistake of presuming that the listener knows what the speaker knows. The third type of cognitive impairment results from faulty awareness of the intentions of others that often leads to mistaken beliefs as evidenced by delusions of reference and persecution as well as delusions of one’s thoughts being read. The schizophrenic may become suspicious when he or she can no longer infer the intentions of others and concludes that this is because the other person is trying to hide malevolent intentions. The false belief that others can read one’s thoughts may simply be the result of others using their intact ToM to correctly infer the intentions of the schizophrenic (Corcoran, 2001). Frith (1992) utilizes the ToM hypothesis as a way of understanding and categorizing the symptoms of schizophrenia in terms of the social cognitive deficits that underlie them.

### *Sub-grouping of Symptoms*

The categorization of the symptoms of schizophrenia has long been, and continues to be, a very difficult task because often the classifications do little to reduce heterogeneity within the diagnostic groups. The *DSM-IV* (1994) continues to use diagnostic categories based on the studies of Kraepelin (1950) and Bleuler (1950) despite their poor predictive validity, particularly regarding prediction of response to treatment (Andreasen & Grove, 1986). Hughling-Jackson's neurological concepts of positive and negative symptoms have been applied to the understanding of schizophrenia (as cited in Andreasen & Grove, 1986). In this case, positive symptoms refer to the presence of functions not evident in a healthy individual or exaggerations of normal functions (e.g. hallucinations and delusions). Negative symptoms refer to the absence or deficit of functions generally present in healthy individuals (e.g. poverty of content and avolition).

Crow (1982) has suggested that this distinction actually represents two separate syndromes rather than uncorrelated symptom dimensions. One syndrome, in his view, is the result of a neurochemical disturbance (i.e. positive symptoms) and the other is the result of structural changes in the brain (i.e. negative symptoms). Crow (1982) arrived at this conclusion based on the convergence of several lines of research. First, Crow (1982) considered the findings from brain imaging studies indicating that in some individuals affected by schizophrenia there is an increase in ventricular size. According to Crow (1982), "within the patient group, increased ventricular size was associated with intellectual impairment as in the case of dementia. It was also associated with the presence of negative symptoms" (p.352). Next Crow (1982) considered that in some individuals the disease might remit or respond to treatment with neuroleptic medications.



Among this group Crow reports that the medications were selective to positive symptoms and that negative symptoms were generally not present. In the cases where negative symptoms were present they did not respond to the medication. Neuroleptic drugs are dopamine antagonists suggesting that positive symptoms may be the result of dysfunction in the dopamine system. Crow (1982) concluded that positive symptoms reflect a neurochemical disturbance most likely involving the dopaminergic pathways whereas; negative symptoms are the result of a degenerative process involving cell death and ultimately leading to changes in ventricular size and structural abnormalities of the brain. Crow (1982) suggested that the negative symptom syndrome is related to intellectual impairment and poorer prognosis as a result of the potentially irreversible brain structural changes.

Andreasen (1983; 1984) developed rating scales to measure positive and negative symptoms. These are the Scale for Assessment of Negative Symptoms (SANS) and the Scale for Assessment of Positive Symptoms (SAPS). Initial studies using the SANS and SAPS seemed to support the positive/negative subtyping of schizophrenia (Kulhara, Kota & Joseph, 1986). It is of importance to note however that while ratings of the SANS demonstrated high inter-rater reliability and internal consistency (above 0.70), the internal consistency for the SAPS was less than 0.40 (Andreasen & Olsen, 1982; Andreasen, 1982). Additional research indicated that the SANS and SAPS scales are actually measures of three, rather than two separate symptom dimensions. The additional component was a result of splitting the positive symptom domain into two factors; one composed of ratings of hallucinations and delusions and the other bizarre behavior and formal thought disorder. This distinction explains the low internal consistency of the

SAPS (Arndt, Alliger & Andreasen, 1991). Additional studies and a re-analysis of published SANS and SAPS ratings support the grouping of symptoms of schizophrenia into three independent groups: Hallucinations/Delusions (Psychotic dimension), Positive Thought Disorder and Bizarre Behavior (Disorganized dimension) and Negative Symptoms (Andreasen, Arndt, Alliger, Miller & Flaum, 1995; Klimidis, Stuart, Minas, Copolov & Singh, 1993; Liddle, 1987; Minas et al., 1992).

#### *Relationship between Cognition, Social Functioning, and Sub-groupings*

Several lines of evidence suggest that the symptom sub-groupings are differentially related to cognitive and social abilities. While both negative and disorganized symptoms are related to impaired performance on measures of cognitive functions, individuals with a predominance of disorganized symptoms appear to evidence the greatest impairment in both cognitive and social functioning. Individuals with mostly positive symptoms show the fewest deficits. Rowe and Shean (1997) conducted an experiment to evaluate the ability for individuals with schizophrenia to improve their performance on the Wisconsin Card Sort Test (WCST) with coaching and incentives. They reported that individuals with a predominance of negative or psychotic symptoms were able to improve their WCST performance following coaching instructions and provision of small monetary incentives. Individuals with a predominance of symptoms of disorganization, however, were not able to improve their performance even with explicit coaching instructions and incentives. An additional study by Shean, Burnett, and Eckman (2002) extended these findings by evaluating schizophrenics performance on a battery of neuropsychological tests including the digit span, digit vigilance, logical memory, and Trails A and B. Participants were tested and then provided with instructions on how to

improve their performance and retested. Symptoms of disorganization were associated with a lack of improvement following instruction showing only minimal improvement in performance on the digit vigilance, logical memory, and Trails A and B tests. Negative symptoms were also associated with a lack of improvement, but only on the logical memory task. Psychotic symptoms were related to improved post-instruction performance. The authors suggest, “it may be that the disorganization symptoms themselves functioned to interfere with attentional processes; as a result, participants did not attend to or process the instructions. An alternative interpretation is that these symptoms reflect dysfunctions in neural systems that are needed to perform effectively these cognitive tasks” (Shean et al., 2002; p. 729).

Research by Walker and Harvey (1986) and Cornblatt, Lenzenweger, Dworkin, and Erlenmeyer-Kimling (1985) supported the proposition that impairments of attentional processes are associated with symptoms of disorganization. Walker and Harvey (1986) evaluated attentional performance using a digit-span task and demonstrated that high ratings of disorganized symptoms were inversely related to performance on the distraction condition of the task. Attentional and information-processing deficits were also tested by Cornblatt et al. (1985) using the Information Overload task under three distraction conditions. Condition one involved no distraction, condition two used undifferentiated background noise, and condition three had a male voice reciting stories in the background that the participants were told they would later have to answer questions about. Positive symptoms were related to distraction, whereas negative symptoms were associated with lowered processing capacity. It is important to note that

in this study the positive symptom category was not divided into the psychotic and disorganization sub-groupings.

Additional research has been conducted evaluating the relationship between symptom sub-groups and social abilities. Brekke, DeBonis, and Graham (1994) compared social functioning, assessed on the Community Adjustment Form, among the three symptom dimensions. Generally, disorganized and negative symptoms were more strongly correlated with impaired social functioning. Specifically, disorganized symptoms were negatively related to days worked, quality of friendships, social satisfaction, and social competence and negative symptoms were negatively related to days worked, quantity, frequency, and quality of friendships, social satisfaction, and social competence. Positive symptoms were only related to poorer quality of friendships and less social satisfaction. Research by Liddle (1987) examined the association between symptoms, self-care, occupation, and social function. The disorganization factor and the negative symptoms factor were related to greater impairment in the areas assessed. Disorganization was significantly related to the greatest number of impairments, namely: poor grooming and hygiene, impersistence at work, and social inattentiveness. Negative symptoms were related to problems with physical anergia and relationships with friends and peers. The positive symptoms factor did not correlate significantly with any functioning area. This body of research comparing symptom sub-groups and their relationship to general and social cognitive skills presents a consistent picture in which individuals with a predominance of disorganized symptoms demonstrate significant impairments. The social and cognitive skills of those who experience negative symptoms

are also often impaired, while individuals with psychotic symptoms of hallucinations and delusions appear to be only mildly impaired.

### *Measures of Social Cognition*

Several paradigms have been developed to assess ToM in relation to the symptoms of schizophrenia. Corcoran et al. (1995) developed a task to assess the ability to “infer the real intentions behind indirect speech utterances” (p. 7). The test was composed of 10 passages each of which describes the interactions of two characters. At the end of the passage one of the characters drops an obvious hint and the participant is asked what the character really meant by it. This is known as the hinting task. Performance on this task by people with schizophrenia was poorer than that of normal controls. When specific symptoms of schizophrenia were assessed individuals with symptoms of disorganization scored most poorly followed by those with negative features and then people with paranoid delusions. Frith and Corcoran (1996) utilized a second measure of ToM in which participants heard stories that contained false beliefs or deceptions and were simultaneously shown cartoon pictures corresponding to the story. Following the story, participants were asked one memory question that required recalling a piece of the story and one question that required inferring the mental state of one of the characters. The primary finding of this research was that individuals with paranoid delusions were most impaired on the mental state questions as compared to those with passivity symptoms (i.e., delusions of control or reference, thought insertion, thought withdrawal and/or second person auditory hallucinations in the absence of paranoid symptoms) and normal controls. Individuals with behavioral symptoms (e.g., poverty of speech, flattening of affect, social withdrawal, incoherent speech, and incongruity of

affect) also had difficulty with the mental state questions, but this appeared to be related to memory impairments. A third method was devised to test ToM using joke cards (Corcoran, et al., 1997). In this study there were two sets of 10 joke cards. One set of cards had jokes that were behavioral in nature (i.e. slapstick type comedy). The other set of cards had jokes that required the inference of the character's mental state to "get it". The participants were then asked to explain each joke. Individuals with schizophrenia had the most difficult time explaining the mental state jokes. Specifically, the behavioral signs group, those with paranoid symptoms, and the passivity features subgroup all demonstrated the most marked impairment. Although the cumulative results of this research seem to indicate that different symptoms affect ToM tasks in particular ways, results do not consistently demonstrate which symptom patterns are related to poorer performance on ToM tasks. Sarfati et al. (1997a; 1997b; 1999) devised a slightly different type of ToM task in which participants were asked to read a comic strip and then select one of two (Sarfati et al., 1997a) or three (Sarfati et al., 1997b; 1999) answer cards that most logically complete the sequence. Individuals with thought and language disorders (disorganized symptoms) (Sarfati et al., 1997a; 1997b; 1999) as compared to those with other symptoms showed the most impairment in their ability to attribute intentions and false beliefs to characters in the comic strip.

The Picture Arrangement (PA) subtest of the WAIS-R has been identified as a potentially useful measure of "intelligence relevant to social functioning" (Lipsitz, Dworkin, & Erlenmeyer-Kimling, 1993; p. 430) because of its socially relevant content. According to Ott et al. (1998) the PA subtest "assesses the subject's ability for perceptual organization and sequencing, to distinguish essential from non-essential details in a social

context, and requires integrated brain functioning” (p. 4). The task in the PA subtest involves presenting a series of cards to the participant in a mixed up sequence and then requesting that the participant rearrange the cards so that the pictures tell a logical story. Toomey, Wallace, Corrigan, Schuldberg, and Green (1997) found differences on PA scores for individuals with schizophrenia as compared to normal controls.

Westen and Segal (1990) developed a methodology to study social cognition using stories told to the Picture Arrangement (PA) subtest of the WAIS-R. Having the participant “tell the story” adds a projective component that “allows clinicians to draw inferences about the way patients experience people and relationships from the content of their stories” (p. 1). In this case the participant is instructed to rearrange the pictures and then to “tell the story” they used in the organization of the cards. Utilizing these additional measures one can gather information regarding the participants understanding of the cards even if they do not arrange them in the correct order. Considering the arrangement alone leads to two potential problems, first, that the participant may have arranged the cards in the correct order, but did not really understand the relations between the cards; or second, that the participant has arranged the cards in the wrong order but has a reasonable and logical story to go along with the arrangement. This measure appears to hold promise as a means of assessing the relationship between symptom syndromes and aspects of social cognition

Westen and Segal (1990) have developed a scoring system using performance on the WAIS-R PA subtest to measure social cognition. They have presented evidence of satisfactory levels of interrater reliability and convergent and discriminant validity for six

measures of social cognition and object relations derived from PA stories. The six dimensions are:

[1] Episode integration (the capacity to derive a coherent and integrated account of events), [2] accuracy of causal attributions (the capacity to attribute plausible causes of events), [3] affect-tone of relationship paradigms (the degree to which described relationships or interactions are characterized by benevolent, neutral, or malevolent affective quality), [4] capacity for emotional investment in relationships and moral standards (the extent to which relationships are defined in other than need-gratifying terms), [5] complexity of representation, and [6] the accuracy of character ascription (the extent to which people are perceived accurately and without significant idiosyncratic intrusions) (Segal, Westen, Lohr, & Silk, 1993, p. 59).

Interrater reliabilities for the six scales were as follows: Episode Integration, .84; Accuracy of Causal Attributions, .82; Affect-Tone of Relationship Paradigms, .90; Capacity for Emotional Investment in Relationships and Moral Standards, .90; Complexity of Representations, .96; and Accuracy of Character Ascriptions, .89 (Segal et al., 1993). Each measure can be reliably rated from stories using a scoring manual developed by Westen and Segal (1990).

Segal and colleagues used this methodology to assess social cognition and object relations in individuals with borderline personality disorder, depression and normal comparison individuals (Segal, Westen, Lohr, Silk & Cohen, 1992; Segal et al., 1993). Segal et al. (1993) found that PA scores correlated with Social Adjustment Scale scores. In particular Episode Integration, Accuracy of Causal Attributions, and Emotional



Investment mean scores correlated significantly with Social Adjustment total mean scores. Research utilizing these six scales indicated that mean PA subscale scores significantly distinguished between pathological samples (i.e. borderline patients and depressed patients) and normal controls (Segal et al., 1992; 1993).

### *Current Study*

This research will test the ability of Westen and Segal's (1990) WAIS-R PA derived measures of social cognition to distinguish between the three syndromal groups of schizophrenia (negative, disorganized, and psychotic), as defined by Andreasen and others (Andreasen et al., 1995; Klimidis et al., 1993; Liddle, 1987; Minas et al., 1992), and bipolar disordered participants. Participants will be rated on each of the three syndromal dimensions of schizophrenia in order to reduce heterogeneity within samples. Individuals with bipolar disorder were selected as a psychotic comparison group. Although at times people with bipolar disorder may present with psychotic symptoms that appear similar to those of schizophrenia, the illnesses are believed to represent two distinct diseases with different underlying pathologies. Research evaluating differences in information processing among schizophrenia and bipolar disordered participants indicated that a computerized battery of information processing tasks correctly classified 75.5% of the cases (Tam, Sewell & Deng, 1998). It is anticipated that bipolar individuals will approximate the demographics of those with schizophrenia, but will evidence less impairment on social cognitive processes.

In this study the PA measures of social cognition will be related to symptom patterns. It is hypothesized that individuals with a predominance of disorganized symptoms will demonstrate the greatest impairments of social cognition as evidenced by

lower scores on the six PA measures. In addition, participants with DSM-IV diagnosis of bipolar disorder will perform better than all other syndromal groups on social cognition measures. It is further predicted that diagnosis and symptom ratings will be related to performance on the PA social cognition tasks independent of WAIS-R PA scale score estimates of general intelligence.

## METHODS

### *Participants*

Participants were identified from the patient population of a large psychiatric hospital in Virginia. Patients were invited to participate in the study if they met the following criteria: (1) primary *DSM-IV* (1994) diagnosis of schizophrenia, schizoaffective disorder, or bipolar disorder, (2) under the age of 60, (3) no secondary diagnosis of mental retardation or organic disorder, and (4) free of substance use for a minimum of two weeks. Patients were approached as soon as they were determined by unit staff to be safe to go off of the ward and were able to provide informed consent. Of the approximately 75 patients approached 47 agreed to participate and completed all tasks. All participants provided informed consent. This group was comprised of 13 individuals diagnosed with schizophrenia, 16 diagnosed with schizoaffective disorder, and 18 diagnosed with bipolar disorder. Thirty-seven of the participants were admitted and evaluated in the acute inpatient facility and ten were residing and evaluated in the long-term rehabilitation program. Twenty-one of the participants were male and 26 were female. Their average age was 38.80. Participants were offered a soda or snack as compensation for their participation.

### *Materials*

The Wide Range Achievement Test-3 (WRAT-3, Wilkinson, 1993) Reading subtest was administered to provide an estimate of premorbid IQ score (Johnstone, Callahan, Kapila & Bouman, 1996). Evidence of sufficient reliability and validity of the

WRAT-3 has been demonstrated (Snelbaker, Wilkinson, Robertson & Glutting, 2001).

The WRAT-3 requires the participant to read a row of letters and as many words as they can from a list of 42.

The WAIS-R Picture Arrangement subtest was administered following the methodology outlined by Westen and Segal (1990). Each participant was presented with 10 sets of picture cards (the first being a sample) in a mixed up order. The participant was instructed to rearrange the cards so that they were in a logical sequential order. Participants were timed, but there was no time limit enforced. After the cards were arranged the participants were asked to “tell the story” they used in determining the card sequence. The researcher wrote down the story as the participant was telling it. Coding of the PA stories was completed following the guidelines specified by Westen and Segal (1990) in the scoring manual.

Two coders scored the six measures of the PA stories. In order to become reliable in this scoring each coder began by scoring eight sets of sample stories provided by Westen and Segal (1990). With these sample stories Westen and Segal (1990) provided written rationales for the scoring so that the coders could better understand the application of the scoring guidelines. The first ten participants’ (1-10) PA stories were subsequently scored by each coder independently. The coders then met and discussed their scoring, further clarifying the guidelines. For measures the coders did not consistently agree on the responses were discussed, in the context of the scoring manual, until a consensus score was agreed upon. The agreed upon scores were then utilized in analysis. The next ten participants’ (11-21) PA stories were also scored independently by both coders and these scores were used to establish interrater reliability.

An informal interview was conducted including questions from the SANS (Andreasen, 1983) and SAPS (Andreasen, 1984). Ratings on the SANS and SAPS were used to identify ratings on syndromal dimensions. Interviewers conducted interviews together for the first seven participants, coded SANS and SAPS symptoms separately and then compared ratings. Utilizing the guidelines for administration of the SANS and SAPS, interviewers came to agreement on how symptoms would be coded. A modified and abbreviated Premorbid Adjustment Scale (PAS; Gittelman-Klein & Klein, 1969) was completed based on participant responses in the interview and hospital records.

### *Procedure*

Names of potential participants were collected from current hospital census records. These names were then reviewed by hospital clinical staff to determine appropriateness for current participation. Patients who met the criteria to be taken off the ward were identified and later approached by the interviewer or by the interviewer and a hospital psychologist and invited to participate in the study. At this time the individual was provided with a brief verbal description of the interview and tasks and notified of the soda/snack incentive. For those patients who agreed to participate the interviewer escorted them to a private meeting room and began the study. The participant was first presented with the informed consent agreement. The participant was given the option to read the form or have it read to them. The interviewer confirmed that the individual understood the agreement prior to signing.

Each interview began with administration of the WRAT-3. The instructions for the WRAT-3 were explained as specified in the manual (Wilkinson, 1993). Individuals were instructed to read the letters that were presented across the top of the page and then

to read the words across each row. Participants were informed to do their best and try to pronounce each word. Next the WAIS-R PA subtest was administered. The instructions provided for this administration followed the guidelines set out in the WAIS-R manual (Wechsler, 1981). The participant was presented with the first set of cards, the practice set, and instructed to rearrange the cards so that they tell a story. If the participant had difficulty with the practice set the researcher demonstrated how the cards should be arranged, then the cards were put back in the original order and the participant was asked to try again. Once the participant had arranged the first set of cards correctly the researcher explained that the participant would be asked to tell the story they used in the arrangement of the cards. For the practice set the researcher provided a sample story. The participant was then presented with the second set of cards and instructed to rearrange the cards so that they tell a story and to indicate to the researcher when the cards were in the arrangement they wanted. The participant would then be asked to tell the story they used in the arrangement of the cards. This procedure was repeated for the remainder of the card sets. Finally, the test session concluded with the informal interview. The informal interview involved the researcher asking the participant questions about how they were currently feeling, what brought them into the hospital, if they were feeling differently then when they first came to the hospital, as well as some personal history questions (e.g., when they were first hospitalized, if they were married or had children, etc). The interviewer pursued further any answers that provided information about symptoms the participant experienced. When the interview was completed the participant was asked if he or she had any questions. The interviewer answered all questions and the participant was taken back to the ward. The duration of interview sessions ranged from

approximately 30 minutes to one and one-half hours. The majority of interviews were completed in 45 minutes. After the interview session was completed the researcher examined the participants' medical chart for demographic information and confirmation of social history information.

## RESULTS

Demographic and clinical information for all participants is presented in Table 1. An ANOVA was performed on these variables to identify any significant differences between diagnostic groups. There was a significant difference on Premorbid Adjustment scores,  $F(2, 44) = 3.70, p = .03$ . Post hoc analysis using Tukey's HSD procedure indicated that individuals diagnosed with bipolar disorder had significantly higher premorbid adjustment scores than individuals diagnosed with schizoaffective disorder, mean difference = -1.52,  $p < .03$ .

SANS and SAPS global symptom ratings for each participant were combined to create the three syndromal dimension scores: the global rating for negative symptoms was used to form the negative symptom score, the sum of the global ratings for delusions and hallucinations were used to create the psychotic symptoms score, and the sum of the global ratings for formal thought disorder and bizarre thoughts and behaviors was calculated to create the disorganized symptoms score. The syndrome groupings were analyzed as continuous variables since most of the participants evidenced symptoms of more than one of the syndromes. Each participant has a score for all three syndromal dimensions. The syndromal dimensions did not significantly correlate with each other confirming that they are assessing distinct sets of symptoms.

The first twenty participants' PA stories were double-coded independently by two coders. Each of the coders had been trained using the detailed scoring manuals provided by Westen and Segal (1990). Of the first twenty participants' PA stories the scoring of



the last ten participants' stories were used to establish interrater reliability. Reliability of the Capacity for Emotional Investment could not be computed because there was no variance in the scores. However, both judges had perfect agreement in their coding of this scale. Reliability for the remaining five PA derived measures scales was computed using Pearson's *r*. Correlations were computed comparing each coders ratings on the six derived measures for each of the PA stories. The average of the correlations was computed across stories for each scale. The mean reliabilities for the scales were as follows: Integration of Episodes, .74; Accuracy of Causal Attributions, .67; Affect-Tone of Relationship, .93; Complexity of Representations, .78; and Accuracy of Character Ascriptions, .76.

The intercorrelations of the six PA derived measures are presented in Table 2. Correlations were significant for Integration of Episodes and Accuracy of Causal Attribution, Complexity of Representations and Affect-Tone of Relationship, Accuracy of Character Ascriptions and Affect-Tone, and Accuracy of Character Ascription and Complexity of Representations. Internal consistency was evaluated for the six scales. The standardized inter-item alphas were as follows: Integration of Episodes, .81; Accuracy of Causal Attribution, .63; Affect-Tone of Relationship, .48; Capacity for Emotional Investment, .94; Complexity of Representations, .57; and Accuracy of Character Ascription, .43. Findings were similar to those reported by Segal et al. (1993) with the exception of Complexity of Representations being substantially lower (Segal et al. reported .73) and Accuracy of Character Ascription moderately lower (Segal et al. reported .58).

### *Syndromal Dimensions Results*

Standard multiple regressions were run on scores of each of the six PA derived measures, the mean of the PA derived measures and the standard PA scale score with scores on the three syndromal dimensions and premorbid adjustment ratings entered as predictors. The disorganized syndrome dimension was a significant predictor of performance for Integration of Episodes,  $t = -1.95, p < .05$ , partial  $r = -.29$ , Affect-Tone of Relationship,  $t = -2.39, p < .05$ , partial  $r = -.35$ , Accuracy of Character Ascriptions,  $t = -2.36, p < .05$ , partial  $r = -.35$ , and mean PA derived measures,  $t = -2.04, p < .05$ , partial  $r = -.30$ . Premorbid adjustment rating was a significant predictor of performance for PA scale scores,  $t = 2.01, p < .05$ , partial  $r = .30$ . Neither the psychotic nor the negative syndrome dimensions were predictive of performance on the PA derived measures, the mean score of the PA derived measures, or the PA scale score.

### *Axis I Diagnosis Results*

Multivariate analysis of variance (MANOVA) was used to test for differences between Axis I diagnosis groups and the PA derived social cognition measures, average social cognition score, and Wechsler IQ test PA sub-test scale score. Significant differences were found among the Axis I diagnosis groups on Integration of Episodes,  $F(2,44) = 3.85, p < .05$ , Accuracy of Causal Attribution,  $F(2,44) = 4.10, p < .05$ , mean score of the PA derived measures,  $F(2,44) = 3.96, p < .05$ , and the PA scale score,  $F(2,43) = 4.42, p < .05$ . Post hoc analyses were done using Tukey's HSD procedure to identify specific group differences (see Table 3). Results indicated that individuals diagnosed with bipolar disorder differed significantly from individuals with

schizophrenia and schizoaffective disorder, with bipolars consistently outperforming schizophrenics and schizoaffectives.

*Interactions between Symptoms, Diagnosis, and Overall Cognitive Ability*

Correlations between the syndromal dimensions and the WRAT 3 and the WAIS-R PA scaled score were computed. The correlation was significant for disorganized symptoms and the PA scale score,  $r = -.30, p < .05$ , and approached significance for the WRAT 3,  $r = -.25, p < .10$ . A significant difference was also observed between diagnostic groups and performance on the PA scale score,  $F(2, 43) = 4.42, p < .05$ , and the difference approached significance for the WRAT 3,  $F(2, 44) = 2.10, p = .13$ .

Standard multiple regressions were run on scores of the six PA derived measures and the mean of the PA derived measures with the WAIS-R PA scale scores and the disorganized syndromal dimension as predictors. The regression equations indicated that PA scale scores were the strongest predictors of performance on three of the PA derived measures (i.e., Integration of Episodes, Accuracy of Causal Attributions, and Accuracy of Character Ascriptions) and the mean of the PA derived measures. Disorganized symptom ratings remained the strongest predictor for Affect-Tone of Relationships and were moderately predictive of Accuracy of Character Ascriptions (see Table 4).

A MANCOVA was performed to assess the effect the Picture Arrangement test estimate of cognitive functioning had on the significant differences observed for several PA measures and Axis I diagnosis. Axis I and gender were entered as the between-subjects factors and PA scaled scores were entered as a covariate. After the general cognitive scores were covaried there was no longer any significant difference among Axis I diagnosis on the PA subscales. A second MANCOVA was run with Axis I

diagnosis and gender entered as between-subject factors and WRAT scores entered as a covariate. When differences on WRAT scores were controlled for there were no longer any differences between Axis I diagnosis and performance on the PA subscales.

## DISCUSSION

The findings of this study support the hypothesis that disorganized symptoms are related to impaired performance on measures of social cognition. The disorganized symptom dimension was a significant predictor of performance on several of the Picture Arrangement derived social cognition measures, specifically, Integration of Episodes, Affect-Tone of Relationships, Accuracy of Character Ascriptions, and the mean of the PA derived measures. This finding supports prior research (Rowe & Shean 1997; Shean et al. 2002) that symptoms of disorganization are related to greater cognitive impairment. Negative and psychotic syndrome dimensions were not predictive of performance on any of the PA social cognition measures.

Axis I diagnosis was also related to the social cognition measures, with individuals diagnosed with bipolar disorder outperforming individuals with schizophrenia and schizoaffective disorder. This finding supports clinical observations that people with bipolar, when not in an active manic state, demonstrate generally intact social abilities. Based on the behavior of bipolars, not acutely manic, it does not appear that their ToM has been permanently compromised, thus allowing them to understand their own and others' mental states.

Although significant relationships between symptoms, diagnosis and social cognition measures were observed, there was also an association between symptoms, diagnosis and general cognitive functioning as measured by WAIS-R PA subtest scale scores. Symptoms of disorganization were correlated with both the PA scale scores, an

estimate of current cognitive functioning, and the WRAT 3, an estimate of premorbid cognitive functioning. When the PA scale score estimate of cognitive functioning was entered as an independent variable it became the sole predictor of social cognition scores on all of the PA derived measures, except for the Affect-Tone of Relationships and the Accuracy of Character Ascriptions subscales. Disorganized symptoms remained the most significant predictor of performance for these subscales. When general cognitive measures were evaluated as covariates there was no longer a significant difference among Axis I diagnosis for social cognition measures.

Segal and Westen et al. (1992; 1993) did not correlate their PA derived measures with general cognition tests so it is impossible to determine if the same interaction of general and social cognition was present in their samples of people with borderline personality disorder, depression, and normal controls. It may be that the social cognition measures are so heavily influenced by the general PA task that poor performance on the general task of arranging the cards will result in low social cognition scores just by virtue of the interaction between the two. Part of the reason for having the participants “tell the story” was to allow the researcher to take into account appropriate stories despite incorrect picture arrangement. In practice, however, it seemed that when the participant was not able to put the cards in a relatively correct arrangement they were also unable to tell a coherent story. The story was forced to follow the incorrect card arrangement sometimes leading to disjointed and strange stories.

The correct card arrangement seemed to affect scores on some scales more than others. This may explain why the Affect-Tone of Relationships and the Accuracy of Character Ascription scales were not predicted by the general cognition measure. These

two scales do not rely as heavily on the arrangement of the cards. The Affect-Tone of Relationships scale is scored based on whether the participant ascribes malevolent or idiosyncratic negativity to characters in the pictures. Generally participants did not ascribe malevolence to the characters, but when they did it was often unrelated to the correctness of the card arrangement. Similarly, the Accuracy of Character Ascription scale measures the participants' ability to attribute reasonable traits, thoughts, feelings, or intentions to the characters. This can be done with the cards in virtually any order. On the other hand, the Integration of Episodes scale measures that participants' ability to tell a coherent story. A story would receive a low score on this scale if they told the story card by card and a high score if they formed an integrated plot. The ability to do this clearly relies heavily on a reasonable arrangement of the cards. The Accuracy of Causal Attributions is also greatly influenced by card arrangement as it measures how the participant explains the causal links between actions in the cards. If the cards are not in the correct order it becomes difficult to make reasonable causal explanations. In these cases participants often left out explanations or created peculiar explanations to compensate, both of which resulted in a lowered score. Based on this evidence the scales that rely heavily on correct card sequence are going to be highly related to general cognitive abilities as measured by PA scale scores, whereas those scales that are relatively independent of card arrangement may be less influenced by general cognitive performance.

Additionally, it is important to consider the role attention may play in the mutual impairment of general and social cognition. As reported previously Walker and Harvey (1986) and Cornblatt et al. (1985) found that symptoms of disorganization were

positively related to distraction. The findings of this study may be the result of impaired attention negatively affecting performance on both general and social cognition tasks. An individual with a predominance of disorganized symptoms may be unable to focus his or her attention on the task resulting in lower test scores.

The effects of medications must always be considered when evaluating a psychiatric population. Often participants' antipsychotic medications are translated into Thorazine equivalents so that they can be controlled for in statistical analyses. This study did not lend itself to such measures, as many of the participants were prescribed medications other than antipsychotics. Mood stabilizers were predominant either alone or in combination with antipsychotics for many of the participants in this sample. When medication effects cannot be controlled for there remains a possibility that the results may have been influenced by the therapeutic and side effects of the medication. Medications are more often prescribed in relation to symptoms present than diagnosis. Perhaps individuals with a predominance of disorganized symptoms are more likely to be prescribed medications that interfere with their ability to perform well on general and social cognition tasks. For all of these reasons it is unclear what aspects of the symptoms of disorganization are most responsible for impaired cognitive functioning, both general and social.

Participants in this study were inpatients in a state psychiatric hospital who were invited to voluntarily participate. The sample is inherently biased because of this self-selection process. Individuals who agreed to participate and were able to complete the testing may not be representative of the general inpatient psychiatric population. For example, individuals who were paranoid were often unwilling to be interviewed; those



with severe negative symptoms could not motivate themselves enough to participate; and people with severe symptoms of disorganization were unable to focus their attention long enough on a task to complete even small portions of the testing session. Evidence of this sampling bias may be demonstrated by the unusually high WRAT 3 scores for the participants tested with 70% of participants scoring in the high school or above range and 21% scoring in the post high school range. Utilizing a larger sample size in future research will not eliminate this bias, but it will reduce its effects and create a more representative sample.

The primary goal of this study was to determine if the PA derived measures, previously found to be predictive of social cognition in people with borderline personality disorder, could be utilized with a different psychiatric population known to have impairments in ToM and social cognition. Based on the results of this study several limitations of the PA measures when applied to this severe psychiatric population can be addressed. First, one of the derived measures did not perform in the same manner for these two populations, i.e. borderlines and schizophrenics. Westen and Segal et al. (1993) reported the most consistent support for the validity of three of the scales, Integration of Episodes, Accuracy of Causal Attributions, and Capacity for Emotional Investment. In this study the Capacity for Emotional Investment scale provided minimal information, as there was little variability of scores. This scale is designed to measure the participant's capacity to invest emotionally in people, relationships, morals, and ideals. The majority of participants' stories did not indicate a deficiency in this capacity. This may suggest that the Emotional Investment scale is not a relevant measure for individuals with psychotic disorders.

Second, the Accuracy of Character Ascriptions scale, as scored according to the manual, did not seem to accurately portray performance. The Accuracy of Character Ascriptions scale measures the participant's description of the characters. It relies heavily on the scoring of the previous scale, the Complexity of Representations. For the Complexity of Representations scale participants are given a point for every emotion, intention, thought, and trait that is ascribed to the character. This complexity is then evaluated for accuracy in the following scale, i.e. the Accuracy of Character Ascriptions. The problem with this is that while participants who give detailed descriptions of the characters receive high Complexity scores they often receive lower Character Ascription scores because their descriptions are idiosyncratic. Conversely, participants who provide no description of the characters receive low Complexity scores, but high Character Ascription scores, by default, because they did not attribute to the characters any idiosyncratic traits. Therefore, participants who are just concretely describing what they physically see in the cards will receive high Character Ascription scores even though they have not ascribed any traits to the characters. This could possibly be resolved by adding another scoring level reflecting that the participant did not provide any character ascriptions.

Third, by having participants "tell the story" they used in arranging the cards a projective component is added to the PA test. While a projective test is highly applicable to evaluating individuals with personality disorders, it may not be as informative for those with a psychotic disorder. During testing it was rare that a participant added much more than was actually present in the cards. This may require a level of abstraction that many individuals with psychotic disorders lack. When additional information was

provided it was usually to try to compensate for incorrect card sequencing. On rare occasions a participants' delusion was projected onto the story. Differences in scores on the PA derived measures seemed to result mostly from incorrect card arrangement and therefore an incoherent story, not fully explaining the causal links between events in the cards, and difficulty in moving beyond the concrete description of the pictures on the cards.

In order to evaluate the usefulness of the PA derived measures of social cognition for a psychotic population further research is warranted. As mentioned previously a larger sample would need to be assessed in order to improve the representativeness of the sample. In addition, the relationship between performance on general cognition tasks and social cognition tasks needs to be considered further. It may also be that measuring social cognition via picture cards requires too much abstraction for many individuals with schizophrenia disorders and investigating another method of measurement could be fruitful. Valuable information could be gathered from a study that assessed symptom dimensions, several measures of general cognition, the PA subscale and its derived measures, as well as a more real-life social cognition task. Others have utilized role-play tests with a simulated social encounter to assess social skill level (Mueser, Bellack, Morrison, & Wixted, 1990). Videotaped encounters similar to those presented in the PA cards may provide a more ecologically valid assessment of social cognition. Results from a more comprehensive study, such as the one discussed here, could lead to more conclusive evidence regarding schizophrenia, its symptoms, and their effects on social cognition.

TABLE 1

## DEMOGRAPHIC AND CLINICAL INFORMATION FOR ALL PARTICIPANTS

	All Particip.	Schizophrenia	Schizoaffective	Bipolar
<i>N</i>	47	13	16	18
Gender				
Male	21	5	7	9
Female	26	8	9	9
Age ( <i>M</i> ± <i>SD</i> )	38.80 ± 9.92	37.46 ± 10.41	37.75 ± 10.72	40.82 ± 8.99
Previous Admissions ( <i>M</i> ± <i>SD</i> )	3.72 ± 3.76	3.69 ± 4.27	3.50 ± 2.76	3.94 ± 4.32
Premorbid Adjustment ( <i>M</i> ± <i>SD</i> )	2.51 ± 1.78	2.23 ± 1.69	1.81 ± 1.60	3.33 ± 1.75
MMSE ( <i>M</i> ± <i>SD</i> )	26.80 ± 3.54	26.04 ± 3.67	25.83 ± 4.04	28.54 ± 2.13

TABLE 2

## INTERCORRELATIONS OF THE SIX DERIVED PA MEASURES

	Episode Integ.	Causal Attrib.	Affect- Tone	Emotion Invest.	Complex. of Rep.	Character Ascrip.
Episode Integration	-	.75**	.19	.21	.17	.21
Causal Attributions			.18	.24	.23	.22
Affect-Tone of Relation.				.07	-.69**	.54**
Emotional Investment					.07	.05
Complexity of Rep.						-.63**
Character Ascriptions						-

\*\*  $p < .01$

TABLE 3

## POST HOC COMPARISONS FOR AXIS I DIAGNOSIS AND PA SCORES

		Schizophrenia		Schizoaffective	
		Mean Difference	Sig.	Mean Difference	Sig.
<u>Bipolar</u>	Integration of Episodes	.39	.03*	.27	.14
	Accuracy of Causal Attributions	.38	.03*	.29	.09
	Mean PA Derived Measures Score	.16	.04*	.13	.07
	PA Scaled Score	1.81	.17	2.77	.02*

\*  $p < .05$

TABLE 4  
 PREDICTION OF SOCIAL COGNITION FROM SYNDROMAL DIMENSIONS AND  
 GENERAL COGNITIVE ABILITIES

	Significant Predictor	<i>t</i>	<i>p</i>	Partial <i>r</i>
Integration of Episodes	PA Scale Score	5.13	.00	.62
Accuracy of Causal Attributions	PA Scale Score	3.45	.00	.47
Affect-Tone	Disorganized Syndrome	-2.22	.03	-.32
Capacity for Emotional Investment	None			
Complexity of Representations	None			
Accuracy of Character Ascriptions	PA Scale Score	2.01	.05	.30
	Disorganized Syndrome	-1.70	.10	-.25
Mean PA Derived Measures Score	PA Scale Score	4.70	.00	.59

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