



Theory of Mind and psychometric schizotypy

Diane Carol Gooding^{a,b,*}, Madeline Johnson Pflum^a

^a University of Wisconsin-Madison, Department of Psychology, Madison, WI, USA

^b University of Wisconsin-Madison, Department of Psychiatry, Madison, WI, USA

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ABSTRACT

The extent to which Theory of Mind impairments are a trait associated with schizotypy is unclear. To date, findings have been mixed. We compared two groups of psychometrically identified schizotypes, namely, those characterized by positive schizotypy (perceptual aberrations and magical ideation; $n = 36$) and those characterized by negative schizotypy (social anhedonia; $n = 30$) to a low schizotypy comparison group ($n = 68$) in terms of their Theory of Mind performance. Theory of Mind was assessed in two ways: a composite Hinting Task and the Reading the Mind in the Eyes Test. The groups were also compared in terms of their self-reported levels of referential thinking. Our results indicate that individuals characterized by positive schizotypy show Theory of Mind deficits, as measured by the Hinting Task. The three groups did not differ in terms of the Eyes Test. Referential thinking was significantly associated with the Eyes Test but not the Hinting Task. Overall these findings suggest that different aspects of schizotypy are associated differentially with Theory of Mind deficits. The results also provide further rationale for the inclusion of multiple tasks when attempting to study multifaceted constructs such as Theory of Mind.

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1. Introduction

There are several aspects of social cognition, including emotion recognition, attributional style, and Theory of Mind; these subdomains may be independent of each other (Schimansky et al., 2010). Theory of Mind (ToM), or 'mentalising', is defined as the ability to attribute a mental state, i.e., beliefs, wishes, intentions, to oneself or others (Premack and Woodruff, 1978; Frith, 1992).

Increasingly, theorists are recognizing that Theory of Mind is a similarly complex construct. For example, Tager-Flusberg and Sullivan (2000) proposed a componential model of Theory of Mind that includes two distinct aspects, namely, a social-cognitive and a social-perceptive one. The social-cognitive component of ToM involves one's reasoning about others' mental states in order to explain or predict their actions (Tager-Flusberg and Sullivan, 2000). This aspect includes understanding hints, intentions, false beliefs, deception, metaphor, irony, and faux pas (Penn et al., 2008). The social-perceptive component of ToM, which is sometimes referred to as the social-affective component, involves an individual's making online attributions about others' mental state and/or intentions, or making judgments about other person-related knowledge based on immediately available perceptual information, e.g. their actions, and/or their facial, vocal, or body expressions (Tager-Flusberg and Sullivan, 2000; Wang et al., 2008).

As a meta-analysis by Bora et al. (2009) indicates, ToM deficits are common in people with schizophrenia. Indeed, schizophrenia patients display impairments on both components of ToM. The evolution and development of ToM impairments in schizophrenia is unclear. Some, such as Frith (1992) maintain that ToM impairments are state-related deficits, whereas others assert that ToM is a trait characteristic that can be detected prior to disease onset. Studies of ToM in schizophrenia patients reveal that performance deficits appear as early as the first episode (Kettle et al., 2008; Koelkebeck et al., 2010), as well as during acute phases of the disorder (Craig et al., 2004). Although there are reports of ToM deficits in remitted patients (Herold et al., 2002; Inoue et al., 2006), there are also findings of intact ToM in schizophrenia patients during remission (Pousa et al., 2008).

1.1. Theory of Mind in individuals at risk for schizophrenia

If ToM impairments are a trait of schizophrenia, then they should be present in individuals at heightened risk for schizophrenia. Findings from Chung et al. (2008) suggest that ToM impairments precede disease onset in individuals at heightened clinical risk for schizophrenia. ToM impairments appear to be present prior to the onset of the disorder in individuals at genetic risk for schizophrenia (Janssen et al., 2003; Irani et al., 2006; Marjoram et al., 2006; de Achaval et al., 2010; but see Kelemen et al., 2004). However, most individuals who develop schizophrenia do not have a first-degree relative with the disorder.

Another group at risk for schizophrenia are individuals identified as possessing schizotypy on the basis of their psychometric profiles.

* Corresponding author at: Department of Psychology, 1202 W. Johnson Street, Madison, WI 53706, USA. Tel.: +1 608 262 3918; fax: +1 608 262 4029.

E-mail address: dgooding@wisc.edu (D.C. Gooding).

Investigators may prefer to study psychometric schizotypes rather than schizophrenia patients because they are free of the confounds present in schizophrenia or schizotypal personality disordered patients, such as hospitalization and medication effects. Given that only a subset of schizotypes are likely to manifest clinical symptoms, let alone decompensate into psychiatric disorder, studying ToM in this population permits us to explore whether ToM deficits are present in at-risk individuals prior to, or in the absence of, functional impairment. Findings on ToM performance in psychometric schizotypy may thus provide further interesting insights into the development of schizophrenia and schizophrenia-spectrum disorders. ToM impairments may serve as a trait indicator, or they may be a risk factor, which adds to the allostatic load of the schizotypy.

1.2. Studies of Theory of Mind and psychometric schizotypy

To date, studies of ToM in psychometric schizotypes have yielded mixed findings. These seemingly conflicting results may be partly attributable to the fact that schizotypy is multifaceted; the studies which have provided the most interesting leads appear to have divided their groups according to the predominant nature of the schizotypal traits. Schizotypy can be divided into two orthogonal factors, namely, positive schizotypy, reflecting cognitive and perceptual distortions, and negative schizotypy, reflecting anhedonia (Kelley and Coursey, 1992; Lipp et al., 1994).

Investigations of the relationship between ToM and psychometric schizotypy have used diverse methods to assess schizotypy and have relied on various different measures of ToM. Langdon and Coltheart (1999) studied schizotypal students identified using Raine's Schizotypal Personality Scale (SPQ; Raine, 1991). Both their experiments demonstrated that the high-schizotypy group performed worse on the picture sequencing stories involving false-beliefs relative to the low-schizotypy group. However, median splits based on the ToM scores revealed conflicting findings. In Experiment 1, poorer ToM was associated with negative schizotypy, i.e., schizotypal interpersonal deficits, while in Experiment 2, poorer ToM performance was associated with cognitive-perceptual disturbances and disorganization.

Jahshan and Sergi (2007) used an abbreviated version of the SPQ (SPQ-Brief) to form high- and low-schizotypy groups. ToM was measured using Parts 2 and 3 of the Awareness of Social Inference Test (TASIT; McDonald et al., 2003), a videotape-based assessment of understanding of sarcasm. Although the investigators found no difference between the high and low schizotypy groups, this null finding may be attributable to reliance upon a screening measure that has been criticized for its lack of psychometric robustness (see Compton et al., 2007), and/or the use of a ToM measure developed for assessment of brain-injured patients. Henry et al. (2008) administered the SPQ to a mixed convenience sample of community volunteers and undergraduate students (mean age = 42 years). They found that both positive (i.e., cognitive-perceptual) and negative (i.e., social-interpersonal) schizotypy were associated with reduced performance on the ToM measure, namely, Reading the Mind in the Eyes Test (Baron-Cohen et al., 2001). Subsequent exploratory analyses revealed that the association between positive schizotypy and ToM was mostly attributable to the ideas of reference subsfactor of the SPQ.

In the Pickup (2006) investigation, participants were administered the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE; Mason et al., 1995), along with ToM stories requiring participants to make inferences. Although Pickup found no association between ToM performance and total schizotypy score, he found a significant association between higher scores on the O-LIFE unusual experiences scale and poorer ToM performance. Fernyhough et al. (2008) administered an abbreviated form of the O-LIFE as well as a 10-item questionnaire designed to measure persecutory ideation to over 800 undergraduates in an on-line study. The participants were also

administered computer-adapted forms of the Corcoran et al. (1995) Hinting Task and the Cartoons task (Corcoran et al., 1997). Unfortunately, the investigators did not include any measures to detect random responding or lying. They found no association between any of the schizotypy scores and the ToM measures. Similarly, Fyfe et al. (2008) found no significant differences between participants with high versus low schizotypy, classified according to the STA (Claridge and Broks, 1984) and scores on a measure of delusional thinking style, in terms of their accuracy on stories with ToM themes.

In their study of adolescents grouped according to scores on the O-LIFE, Barragan et al. (2010) noted that the high schizotypy group did not differ from the low schizotypy group in terms of their scores on the Strange Stories task (Happé, 1994). Although global schizotypy was not associated with ToM, the investigators found a significantly negative correlation between ToM story performance and the unusual experiences subscale on the O-LIFE. These findings are consistent with the adult literature in terms of suggesting that ToM impairments are associated with specific positive features, namely, perceptual abnormalities.

There is particular interest in psychometric schizotypes identified on the basis of selected Chapman psychosis-proneness scales because of their demonstrated predictive validity. More specifically, longitudinal research indicates that elevated scores on the Perceptual Aberration and Magical Ideation scales are associated with the later development of psychotic disorders (Chapman et al., 1994), whereas aberrant scores on the revised Social Anhedonia scale are predictive of the later development of schizophrenia-spectrum disorders (Kwapil, 1998; Gooding et al., 2005, 2007). In an unselected sample of college students, Meyer and Shean (2006) reported that higher scores on the Magical Ideation Scale (Eckblad et al., 1983), a measure of positive schizotypy, was associated with poorer performance on the RMET and Character Intention Task (CIT; Sarfati et al., 1997). Schizotypes identified using the revised Social Anhedonia Scale (SAS; Eckblad et al., 1982) are reportedly less accurate than controls when inferring the intentions of the characters on a Hinting Task (Monestès et al., 2008; Villatte et al., 2008) or the false beliefs of others (Villatte et al., 2010). In an earlier study (Gooding et al., 2010) of an independent student sample, we found no significant group differences between positive schizotypes, negative schizotypes, and the controls in terms of their RMET accuracy.

In summary, to date, studies of ToM in psychometric schizotypes have yielded mixed findings. Several of the studies could be criticized on methodological grounds, e.g., reliance upon unselected groups, choice of a questionable version of a screening measure, or using measures that may not be appropriate for use with this population. For example, one could argue that modifying a ToM task that was developed for use with a different patient population is reasonable, as long as there is an adequate range of difficulty and ceiling effects are avoided. However, the use of an untimed computerized version of a shortened ToM task, such as the one(s) used by Fernyhough et al. (2008) raises questions regarding the validity of their measures. Moreover, few investigators have included more than one measure of ToM in their studies. Finally, total schizotypy scores may not be a sufficiently sensitive metric, especially if different aspects of schizotypy are differentially related to ToM performance. If aspects of schizotypy are looked at separately, there appears to be a growing body of evidence in support of an association between specific aspects of positive schizotypy, namely, unusual experiences and/or subsyndromal delusions, and ToM deficits.

1.3. The present study

The purpose of the present study is to explore whether ToM impairments are a trait associated with schizotypy, by comparing individuals with low schizotypy (hereafter referred to as 'controls')

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