

# Theory of mind, neurocognition, and functional status in schizotypy

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## Abstract

The present study is the first to concurrently examine social cognition, neurocognition, and social functioning in psychometric schizotypes. Screening of 2108 undergraduates with the Schizotypal Personality Questionnaire–Brief (SPQ-B) identified 52 persons high in schizotypy and 40 persons low in schizotypy. All participants were administered a test battery designed to assess two elements of neurocognition, verbal secondary memory (California Verbal Learning Test) and executive functioning (Wisconsin Card Sorting Test), two elements of social cognition, emotion perception (The Awareness of Social Inference Test—Part 1) and theory of mind (The Awareness of Social Inference Test—Parts 2 and 3), and social functioning (Social Adjustment Scale–Self Report). Although the persons with high schizotypy were impaired in social functioning relative to the persons with low schizotypy, they were not impaired in theory of mind, emotion perception, verbal secondary memory, or executive functioning. Theory of mind and verbal secondary memory were correlated in persons with high schizotypy. The present findings suggest that psychometric schizotypes are not impaired in the domains of social cognition and neurocognition examined.

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## 1. Introduction

Social cognition refers to the ability to construct mental representations about others, oneself, and relations between others and oneself (Adolphs, 2001). Theory of mind (ToM), an aspect of social cognition, refers to the ability to represent the mental states of others and/or to make inferences about the intentions of oneself and others (Baron-Cohen, 1995). Persons with schizophrenia are impaired in many aspects of social cognition including ToM (e.g., Corrigan and Green, 1993; Greig

et al., 2004; Penn et al., 2002; Roncone et al., 2002, Toomey et al., 2002), and ToM deficits may contribute to the impaired social functioning experienced by patients (Brune, 2005a; Roncone et al., 2002). ToM and the other aspects of social cognition (e.g., emotion processing, social perception, social knowledge) are gaining visibility in the schizophrenia literature because correlational and structural equation modeling analyses strongly suggest that social cognition mediates relations between neurocognition and social functioning in schizophrenia (e.g., Brekke et al., 2005; Sergi et al., 2006; Vauth et al., 2004).

Schizotypy is conceptualized as a non-clinical manifestation of the same underlying biological factors that give rise to schizophrenia and other schizophrenia-spectrum disorders (Claridge, 1994; Claridge and Beech, 1995). Investigators interested in identifying the key

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features of schizophrenia value studies of persons with schizotypy (psychometric schizotypes or persons diagnosed with schizotypal personality disorder) because performance impairments in these persons cannot be explained by confounds often present in schizophrenia samples such as antipsychotic medication usage, social isolation, and recurrent hospitalization.

### *1.1. Neurocognition in schizotypy*

Psychometric schizotypes and persons with schizotypal personality disorder often evidence neurocognitive deficits, suggesting that neurocognitive impairments are a key feature of schizophrenia. Such schizotypy samples consistently display impairments in attention/vigilance (e.g., Chen et al., 1998; Lenzenweger et al., 1991; Lenzenweger, 2001; Obiols et al., 1992; Roitman et al., 1997) and spatial working memory (Roitman et al., 2000; Park et al., 1995; Park and McTigue, 1997). Deficits in executive functioning have been observed in schizotypes when this construct was assessed with the Wisconsin Card Sorting Test (e.g., Raine et al., 1992; Poreh et al., 1995; Suhr, 1997; Gooding et al., 1999, 2001), but not when it was assessed with the Trail Making Test (Mitropoulou et al., 2002; Suhr, 1997) and the Tower of Hanoi Test (Suhr, 1997). Schizotypy studies that find impairments in verbal secondary memory (e.g., Bergman et al., 1998; Voglmaier et al., 1997) are matched in number by those that find no group differences in performance on measures such as the California Verbal Learning Test (Lenzenweger and Gold, 2000; Mitropoulou et al., 2002). Neurocognitive deficits have also been observed in “at risk” persons. The unaffected biological relatives of persons with schizophrenia appear to experience impairments in attention (e.g., Keefe et al., 1997; Michie et al., 2000; Schubert and McNeil, 2005), verbal memory (e.g., Cannon et al., 1994; Lyons et al., 1995; Faraone et al., 1995; Toomey et al., 1998; Keri et al., 2001), and executive functioning (e.g., Franke et al., 1992, 1993; Yurgelun-Todd and Kinney, 1993; Faraone et al., 1995; Toomey et al., 1998; Egan et al., 2001).

### *1.2. Social cognition in schizotypy*

Do studies of social cognition in schizotypy suggest that impaired social cognition is a key feature of schizophrenia? Studies of emotion recognition in schizotypy samples (psychometric schizotypes and persons with schizotypal personality disorder) have yielded mixed results. Studies finding impairments in emotion recognition (Poreh et al., 1994; Mikhailova et al., 1996; Platek et al., 2005) are matched in number by those

finding no differences between schizotypes and comparison participants (Toomey and Schuldberg, 1995; van't Wout et al., 2004; Waldeck and Miller, 2000). In contrast, studies of ToM in schizotypy regularly observe impairments (e.g., Pickup and Frith, 2001; Pickup, 2006). Schizotypal personality traits in non-clinical populations appear to be related to deficits in understanding false-beliefs and attributing mental states to others (Langdon and Coltheart, 1999, 2001; Platek et al., 2003a), as well as impairments in the ability to detect deception (Malcolm and Keenan, 2003), appreciate ironical statements (Langdon and Coltheart, 2004), and process information about the self (Platek and Gallup, 2002; Platek et al., 2003b). Moreover, studies have found that first-degree relatives of schizophrenia patients are impaired in social perception and ToM (Toomey et al., 1999; Janssen et al., 2003) but not in facial affect recognition (Loughland et al., 2004; Kee et al., 2004; Kelemen et al., 2004; Toomey et al., 1999). No studies have examined ToM in schizotypy using a videotape-based measure that requires participants to infer the motives of others.

The primary aim of the present study was to examine theory of mind skills in persons with schizotypy. Undergraduates identified as high or low in schizotypy were administered The Awareness of Social Inference Test (TASIT; McDonald et al., 2003), a videotape-based measure that assesses emotion recognition and theory of mind skills with many interpersonal vignettes. Although the TASIT has not been used with schizophrenia spectrum populations, it is a developmentally appropriate measure designed to assess cognitively impaired adults. Another asset of the TASIT is that it involves videotaped interpersonal interactions rather than simple photographs or stories. We hypothesized that persons high in schizotypy would be impaired in theory of mind and emotion recognition relative to those low in schizotypy. The second aim of this study was to examine executive functioning and verbal secondary memory in persons with schizotypy. Executive functioning and verbal secondary memory, although only two of many other potential areas of cognitive impairment in schizotypy, were selected as neurocognitive constructs because they are often impaired in schizophrenia spectrum disorders. The California Verbal Learning Test (CVLT) and the Wisconsin Card Sorting Test (WCST), used to examine verbal secondary memory and executive functioning respectively, are well-recognized measures that are frequently used in studies of schizophrenia. We hypothesized that persons high in schizotypy would be impaired in executive functioning and verbal secondary memory relative to those low in schizotypy. The third aim of this study was to examine differences in functional status

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