

A neuropsychological investigation into ‘Theory of Mind’ and enhanced risk of schizophrenia

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Abstract

Theory of Mind (ToM) is the ability to correctly determine the intentions and behaviours of others. It is known that this capability is compromised in individuals with schizophrenia. It has not been fully elucidated whether this observed phenomenon is of a state or trait nature. This study investigated whether ToM impairments could be linked to schizophrenia liability. A battery of ToM tests (the Hinting Task, a Self-Monitoring drawing task and cartoon picture stories) were used to compare healthy controls ($n=13$) with relatives of individuals with schizophrenia who had experienced psychotic symptoms (HR+, $n=12$) and those relatives who had not (HR-, $n=13$). All participants belonged to the Edinburgh High Risk Study. Significant group differences were seen on the Self-Monitoring and cartoon tasks for the HR+ group, particularly those who had experienced symptoms at or around the time of testing. The observed ToM deficits measured by this battery of ToM tasks appeared to be related to state effects rather than enhanced risk of schizophrenia.

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1. Introduction

Theory of Mind (ToM), or mentalising (Corcoran et al., 1997), is the ability to represent the mental states of others and to correctly determine the intentions and behaviour behind these. This is a necessary skill for successful complex social interactions, and it is known to be compromised in autism, schizophrenia and schizo-

typy (Abu-Akel, 2003; Baron-Cohen et al., 1985; Langdon and Coltheart, 2004). Most investigations into a compromised ToM function amongst individuals with schizophrenia have looked at psychopathological subgroups (e.g. paranoid, disorganised and negative symptom groups). These patient groups tend to perform less well than the control groups, and most authors conclude that the observed impaired ToM capabilities are a state effect of the disease, i.e. the observed ToM impairments are related to particular symptoms and ToM abilities fluctuate with symptom severity (Corcoran et al., 1995; Frith, 1992; Sarfati et al., 1997, 1999). The alternative view is that of a trait effect in which the observed abnormalities predate the development of the

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illness and may reflect genetic vulnerability. If clinical features (in this case impairment of ToM ability) similar to those occurring in subjects with schizophrenia can be demonstrated in unaffected genetically related individuals, then these may be considered as putative endophenotypic markers of schizophrenia (Sitskoorn et al., 2004).

Investigations into ToM abilities in relatives of subjects with schizophrenia are limited in number, and their findings have been inconsistent. Janssen et al. (2003) tested a group of individuals with schizophrenia or schizoaffective disorder, first degree non-psychotic relatives and matched controls. Using two ToM tasks, a first order ToM story and the Hinting Task (Corcoran et al., 1995), the authors found a significant association between liability to schizophrenia and failure on the Hinting Task, but not the ToM story task, with the relatives having an intermediate performance between the schizophrenia subjects and the controls. The authors concluded that changes in ToM were associated with liability to schizophrenia. Alternatively, Keleman et al. (2004), using the 'Eyes Test' (Baron-Cohen et al., 2001), compared healthy controls against two groups of first degree relatives of schizophrenia patients, an affected group (individuals with a mixture of psychoses) and an unaffected group. They found that the affected relative group performed significantly worse on the task than the controls, whereas the unaffected relatives showed intact performance. From this, they concluded that the observed ToM deficits were not associated with liability to schizophrenia.

The aim of this study was to investigate ToM capabilities in the biological relatives of individuals with schizophrenia, and we recruited participants in the Edinburgh High Risk Study (EHRS) (Johnstone et al., 2000, 2005). The EHRS is a longitudinal investigation into individuals at enhanced risk of schizophrenia. Subjects were recruited based purely on having two or more first or second degree relatives with the disorder, and were not selected based on emerging symptomatology. At ascertainment, they were regarded as well. Participants were recruited in early adult life (late teens and early twenties) such that they could be studied throughout the time period of greatest risk of developing the disorder. These individuals are studied serially in comparison with matched healthy controls on a variety of neuropsychological tests, clinical assessments and magnetic resonance imaging.

We wanted to investigate both the effect of being at high risk as defined above and the effect of transient or partial positive symptomatology on performance of

ToM tests and a Self-Monitoring task. The EHRS participants were consequently divided via symptomatology into approximately equal sized groups of those who had no psychotic or possibly psychotic symptoms during up to 10 years of participation in the study (HR-) and those who had had definite or partial psychotic symptoms at some time (HR+) during that period. Using a small battery of ToM and Self-Monitoring tests, we hypothesised that the ever symptomatic relatives (HR+) would show ToM deficits compared with the controls and relatives who had never experienced psychotic symptoms (HR-). The HR- relatives would perform similarly to the control group.

In secondary analyses, to further investigate the effect of positive symptoms on task performance, we divided the HR+ group into those who were symptomatic in the past month as revealed by the Present State Examination (PSE) (HR+Now), or not (HR+Ever), and a number of high risk relatives who had themselves developed schizophrenia (HRill). The inclusion of a subgroup of individuals with schizophrenia allowed symptomatic relatives to be compared with a schizophrenia group who either would have had or would currently be experiencing a greater range and severity of positive symptoms. It was hypothesised here that those relatives who had been recently symptomatic (HR+Now) would perform worse than previously symptomatic relatives (HR+Ever) and similarly to the HRill group, who in turn would perform even less well.

2. Methods

2.1. Participants

Forty-three age- and IQ- matched individuals from the EHRS were recruited. Twenty-five participants were at high risk in that they had two or more first or second degree relatives with schizophrenia whilst the 13 controls had no family history of the disease. The high risk group was split on the basis of a structured psychiatric interview (the Present State Examination; Wing et al., 1974) by two psychiatrists (Professors Johnstone and Owens) into groups based on a simplified scoring system (Johnstone et al., 2002). A score of 4 was assigned for definite schizophrenia based on the PSE, and a clinical diagnosis of schizophrenia in terms of the ICD-10 (World Health Organisation, 1993). A score of 3 was assigned for any fully rated psychotic feature from PSE items 55–92 (including thought reading, echo broadcast; auditory, visual or other hallucinations; delusions of control, misinterpretation, reference, persecution,

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