Mental state attribution, neurocognitive functioning, and psychopathology: What predicts poor social competence in schizophrenia best?[☆]

Martin Brüne [*], Mona Abdel-Hamid, Caroline Lehmkämper, Claudia Sonntag

Center for Psychiatry, Psychotherapy, Psychosomatics and Preventative Medicine, University of Bochum, Alexandrinenstr. 1, 44791 Bochum, Germany

Abstract

Background: Research into mental state attribution has repeatedly shown that patients with schizophrenia are impaired in their capacity to reflect upon their own and others' beliefs, knowledge and intentions, with important confounds being executive functioning, intelligence, duration of illness, and medication. Furthermore, the extent to which impaired mental state attribution, neurocognition and psychopathology explain abnormal social behavior in schizophrenic patients has been a matter of debate. We sought to determine whether mental state attribution in schizophrenia predicts poor social competence better than "non-social" cognitive factors or psychopathology.

Methods: Intelligence, executive functioning, mental state attribution, psychopathology and social behavior were assessed in 38 patients diagnosed with schizophrenia according to DSM-IV criteria and compared with 29 healthy controls paralleled for age and sex. All patients received antipsychotic treatment, and all participants had no history of substance abuse or traumatic brain injury.

Results: In the entire schizophrenia group impaired mental state attribution alone accounted for about 50% of the variance of deviant social behavior, whereas the PANSS positive score and the duration of illness contributed an additional small amount of variance. This effect was even more pronounced in a subgroup of patients with at least normal intelligence, where neither the PANSS score nor the chronicity of the disorder remained significant predictors of poor social competence. Medication was not associated with any one of the neurocognitive measures including mental state attribution, psychopathology or social behavior.

Conclusions: Impaired capacity to appreciate one's own and others' mental states is the single-best predictor of poor social competence in schizophrenia, and should perhaps be included in future definitions of the "core" symptomatology of schizophrenic disorders.

1. Introduction

The term "mental state attribution" has been introduced to describe the cognitive capacity to reflect upon one's own and other persons' mental states such as beliefs, desires, feelings and intentions. Mental state

attribution is part of the broader concept of "social cognition" that involves the perception, processing and interpretation of social signals (Adolphs, 2001). Frith (1992) has proposed a critical link between schizophrenia "core" symptoms and patients' ability to reflect upon their own and other persons' mental states. In essence, Frith's concept predicts that, if a patient is unaware how his or her intentions translate into actual behavior, impaired recursion on one's own mental states may lead to negative or disorganized symptoms. On the contrary, experiencing behavior or cognitive processes as being not self-generated may produce "passivity" symptoms such as voice-commenting hallucinations or fragile ego-boundaries. Finally, lacking the cognitive flexibility to adjust one's judgment about the intentions of others may increase the likelihood of developing delusional beliefs of reference or persecution (Frith, 1992). This model assumes that impaired mental state attribution in patients with schizophrenia is heterogeneous in nature, that is, the actual pattern and severity of patients' performance in mental state attribution tasks depend on the localization and developmental onset of dysfunction within the underlying neural network (Lee et al., 2004).

In partial support of this conceptualization, a substantial number of studies – the majority of which examined mental state attribution using inference tasks involving other persons' mental states – have revealed that mental state attribution or "mentalizing", is impaired in many, but not all patients with schizophrenia (reviewed in Brüne, 2005a; McCabe et al., 2004). Patients with prominent negative or disorganized symptoms are generally more severely affected than paranoid patients, patients with passivity symptoms and remitted patients, although the association of impaired mentalizing in schizophrenia with individual symptoms or symptom clusters is inadequately understood (reviewed in Harrington et al., 2005). However, there is little contest that the longer the duration of the illness the more poorly schizophrenic patients perform on tests tapping into mentalizing abilities, and that "non-social" cognition, particularly executive functioning and general intelligence (IQ), may confound empirical findings regarding mental state attribution (overviews in Lee et al., 2004; Brüne, 2005a). As a side note, it is worth mentioning that there is still disagreement over questions how to exactly distinguish mental state attribution from "non-social" cognition, and whether or not the mechanisms contributing to mentalizing abilities are domain-specific or reflect domain-general functioning (Adolphs, 2001). Stone and Gerrans (2006), for example, have argued that mental state attribution depends on both domain-specific mechanisms

such as face processing and joint attention, and domain-general mechanisms including executive functioning (important to inhibit one's own knowledge), metarepresentation (having representations of one's own and others' knowledge states as representations) and recursion (allowing to reason about others' thoughts about thoughts). In any event, keeping the concept of social cognition – of which mental state attribution constitutes a key element – does make sense, particularly in light of its evolved function in humans in response to highly complex social environments to help predict the behavior of significant others (Adolphs, 2001; Brüne 2006).

This debate notwithstanding, at least three important issues pertaining to impaired mental state attribution in schizophrenia are disputed or under-researched: (1) the question whether deficits in mental state attribution are selective, i.e. independent of executive functioning and IQ; (2) the question as to what extent such deficits are linked to patients' abnormal or bizarre behavior in social interactions; and (3) the question as to what degree patients' performance on mental state attribution tasks and social behavior interfere with antipsychotic medication and conventional measures of psychopathology.

With respect to the first question, several studies have shown that poor cognitive functioning or low IQ negatively affects mental state attribution in schizophrenia (e.g., Doody et al., 1998), although some patients with schizophrenia may be able to compensate for their mental state attribution deficit by using analogical reasoning (perhaps as a function of IQ) or even perform similar to controls if their verbal IQ is taken into account (Pickup and Frith, 2001; Brüne, 2003a; Corcoran and Frith, 2005). In any event, the question of what exactly IQ contributes to mental state attribution is complex, because IQ tends to deteriorate over time in patients with schizophrenia, and samples with normal IQ are therefore under-represented in current research into mentalizing in schizophrenia.

Second, a small number of studies have revealed that poor mental state attribution contributes substantially to the statistical variance if social behavior or social functioning is the target variable, and that this contribution is greater than the amount of variance explained by "non-social" cognition (Roncone et al., 2002; Brüne, 2005b; Lysaker et al., 2005). This is exactly what has been predicted in a number of seminal papers (Penn et al., 1997; Pinkham et al., 2003) including an evolutionary perspective (Brüne, 2006), and a recently published research consensus paper (Green et al., 2005); however, these studies warrant replication in carefully selected samples, where the confounding effects of the duration of the disorder and IQ have to be taken into account.