



“Moving Shapes“: Investigation of Theory of Mind (ToM) abilities in a sample of schizophrenia patients compared to normal controls

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Introduction

Social cognition has been defined as the ability to interpret and predict others' behavior in terms of their intentions and to interact in complex social environments and relationships. The term **Theory of Mind (ToM)** refers to the capacity to infer one's own and other persons' mental states. Several psychiatric disorders are accompanied by deficits in these functions, including autism. There is some empirical evidence that ToM is specifically impaired in schizophrenia. This disturbed capacity to relate intentions to executing behavior, or to monitor others' intentions might contribute to the development of psychotic symptoms.

Methods

Movement-provoked mental state attribution was examined in 26 schizophrenia patients (DSM-IV; $n = 12:14$; mean age: 28.7; PANSS+:10.6 ; PANSS-:14.7) and 29 matched controls ($n = 15:14$; mean age:30.8) implementing the moving shapes paradigm used by Castelli et al. (2000, 2002).

Findings were correlated with psychopathological and neuropsychological characteristics.

Psychopathology was assessed by the PANNS, CDS, CGI and GAF.

Neuropsychological testing included: verbal (premorbid) intelligence, inductive thinking, verbal learning and memory, psychomotor velocity, cognitive flexibility as well as selective attention.

Fundamental ToM- abilities (1st and 2nd- order false belief tasks), autistic traits (EQ, AQ), diplomatic abilities (MACH IV) and alexithymia (TAS) were evaluated by specific tests and questionnaires.

Moving Shapes Paradigm

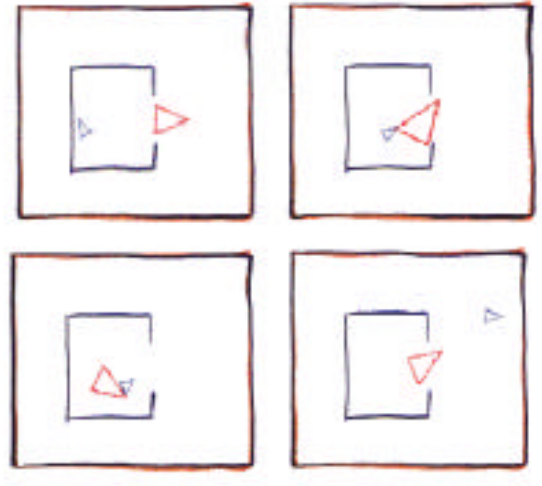
The Moving Shapes paradigm provides a semi-quantitative evaluation of ToM- abilities, in which the motions of animated triangles are associated with specific patterns of movement (e.g. fighting, seducing), are presented. The answers are then subdivided by a) the frequency of Theory of Mind vocabulary (intentionality), b) appropriateness and c) length of answers.

Previous studies provided proof that autistic patients performed worse than normal controls.

Results

In the categories intentionality and appropriateness the schizophrenia patients revealed a highly significant ($p < 0.01$) differential deficit in comparison to normal controls.

On all other categories, schizophrenia patients did not show any difference compared to normal controls. The correlation analysis revealed a positive relationship between the TAS-subscale “identifying and describing feelings” and the Empathy Quotient (EQ) with appropriateness and intentionality on goal directed movement sequences;



	Theory of Mind	Goal directed movement	Random movement
Intentionality (0-5)	S: 2.7 (0.8)*** N: 3.3 (0.7)	S: 2.3 (0.4) N: 2.4 (0.5)	S: 0.6 (0.7) N: 0.4 (0.5)
Appropriateness (0-3)	S: 1.1 (0.4)*** N: 1.4 (0.4)	S: 1.6 (0.4) N: 1.7 (0.4)	S: 1.6 (0.5) N: 1.6 (0.4)
Length of answers (0-4)	S: 3.0 (0.7) N: 3.1 (0.7)	S: 2.7 (0.9) N: 2.7 (0.7)	S: 2.2 (0.8) N: 2.3 (1.0)

Table: Sum scores of verbal descriptions of subjects in dimensions Intentionality, Appropriateness and Length of answers, * significant result
S= schizophrenia patients; N= normal controls

speech production (LPS- 3) and the auditory verbal learning and memory task (AVLT) were correlated with appropriateness and intentionality on Theory of mind tasks.

None of the other psychopathological and neuropsychological parameters as well as 1st and 2nd-order false belief tasks and the autism spectrum quotient (AQ) correlated with clinical findings.

Discussion

Our results show a deficit of schizophrenia patients in naming and evaluating social situations.

According to our data, patients were not disturbed in false belief tasks, and neuropsychological functioning, psychopathology and diplomatic deficits did not have any influence on Theory of mind abilities.

On the other hand, speech production, verbal learning and memory, empathy- abilities and emotion recognition appear to be important factors in the development of the deficit.

References

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- Castelli F, Frith C, Happé F, Frith U (2002) Autism, Asperger syndrome and brain mechanisms for the attribution of mental states to animated shapes. *Brain* 125 (8): 1839-1849

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