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## Review Article

# Social cognition in schizophrenia: cognitive and neurobiological aspects<sup>☆</sup>

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### ABSTRACT

Social cognition in schizophrenia is currently one of the major fields of interest in studies of this disorder. It is commonly conceptualised as a set of mental operations underlying social interactions and therefore related to the ability to interpret and predict the behaviour of others in different social contexts. The research community has defined the functional areas that constitute the domain of social cognition, including, at least, the theory of mind, sensory perception, social perception, and attributional bias. Different bodies of evidence have shown that alterations in these functions in patients with schizophrenia are linked to some of their main psychopathological dysfunctions, such as defects in sensory perception, insight and attributional origin, and authorship of human acts. These behavioural alterations have been linked to structural and functional disturbances in the constituents of the so-called social brain. This includes a set of medial parietal, temporal, and pre-frontal areas that have been associated with some anomalies in the theory of mind, the perception of emotions, and the ability to consider the perspective of others, phenomena commonly found in schizophrenia. Future research in the domain of social cognition should be aimed at clarifying its relationship with the social brain and neurocognition.

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**Cognición social en esquizofrenia: aspectos cognitivos y neurobiológicos**

## R E S U M E N

*Palabras clave:*

Esquizofrenia

Cognición

Cerebro

Neuroimagen funcional

La cognición social en la esquizofrenia actualmente es uno de los campos de mayor interés en los estudios de este trastorno. Se la conceptualiza comúnmente como el conjunto de operaciones mentales que subyacen a las interacciones sociales y que, por lo tanto, se relacionan con la capacidad para interpretar y predecir la conducta de los otros en los diferentes contextos sociales. La comunidad de investigadores ha definido las áreas funcionales que constituyen el dominio de la cognición social, que incluyen, al menos, la teoría de la mente, la percepción sensorial, la percepción social y la atribución de sesgos. Un variado conjunto de evidencias ha demostrado que las alteraciones de estas funciones en pacientes con esquizofrenia se vinculan con algunas de las manifestaciones clásicas de la psicopatología de la esquizofrenia, como los defectos en la senso-percepción, la conciencia de enfermedad y la atribución del origen y la autoría de actos humanos. Estas alteraciones conductuales se han vinculado a perturbaciones estructurales y funcionales en los constituyentes del llamado cerebro social. Este incluye un conjunto de áreas prefrontales mediales, parietales y temporales que se han asociado a algunas anomalías en la teoría de la mente, la percepción de emociones y la capacidad para considerar la perspectiva de los otros, fenómenos comúnmente encontrados en la esquizofrenia. Las futuras investigaciones en el dominio de la cognición social debieran orientarse a clarificar su vínculo con el cerebro social y la neurocognición.

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**Introduction**

Schizophrenia is one of the most challenging mental health problems in the world. The statistics published by the international health agencies all indicate that schizophrenia affects approximately 1% of the population, with a slight preponderance of males. Over the last 20 years, accumulating evidence has shown us that schizophrenia has its origins in multiple alterations in brain development involving genes and proteins which support the formation and functioning of extensive neural networks.<sup>1</sup> From a clinical point of view, diagnosing schizophrenia continues to be a complex challenge for mental health professionals, and a broad knowledge of clinical psychopathology is required to adequately interpret the signs and symptoms caused by the dysfunction, which mainly affects cognitive, affective, and social aspects of the individual's life. In fact, one of the most pertinent aspects in the current discussion about schizophrenia is the domain known as social cognition (SC). This area has attracted wide interest over the last 10 years, further encouraged by recent evidence that SC may be independent of neurocognition (attention, language, executive functions) and have a mediating role between the neurocognition and social behaviour exhibited by patients with schizophrenia. In general terms, SC refers to the set of mental operations that underlie social interactions<sup>2</sup> and it necessarily involves processes related to the interpretation and development of responses to the intentions and behaviours of others. We felt that it would be of interest, through this article, to briefly analyse and discuss both the cognitive aspects and the neurobiological structures and processes on which the SC dynamic is based. We begin with a

short discussion of the cognitive aspects that current consensus considers to be components of SC and have been incorporated into the MATRICS<sup>3,4</sup> project. We then go on to discuss the neurobiological aspects linked to SC, considering the fundamental components of the so-called social brain. The discussion is based on current knowledge in this particular field of schizophrenia research.

**SC and the MATRICS consensus**

With SC gaining increasing importance in clinical practice and research in schizophrenia, there was a need to establish a consensus on the criteria and concepts that form its theoretical foundations. This has led to the adoption of recommendations emanating from working meetings held over the last 10 years as part of the Measurements and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) initiative, a project sponsored by the United States National Institute of Mental Health (NIMH).<sup>3,4</sup> The aim of the meetings was to clarify the main concepts and criteria associated with SC in response to the lack of agreement on the main terms, definitions, and measurement methods which existed in this domain. The resulting consensus was that SC should include several areas of interest.

**Theory of mind**

Theory of mind (ToM) is the ability to attribute mental states, i.e. intentions, desires, and beliefs, to others.<sup>5</sup> Although this is a field that opened up in relation to the dysfunctions observed in autism, study of ToM has been extended to schizophrenia

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