



Visual perspective-taking and schizotypy: evidence for a *simulation*-based account of mentalizing in normal adults

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Received 28 June 2000; received in revised form 20 December 2000; accepted 9 May 2001

Abstract

Modular theory-of-mind accounts attribute poor mentalizing to disruption of a cognitive module dedicated to computing higher-order representations of primary representations (metarepresentations). Since metarepresentational capacity is needed to mentalize about other people's beliefs but is not needed to judge visual perspectives (which can be done by mentally rotating primary representations of seen objects), this view predicts that visual perspective-taking will be intact in individuals with selective mentalizing impairments. Counter to that prediction, this study found evidence of disturbed visual perspective-taking in normal adults who score higher on the personality variable of schizotypy and who are known to be relatively poor mentalizers (despite intact ability to inhibit salient inappropriate information in order to reason consequentially on the basis of hypothetical states, other than mental states). Whereas high-schizotypal adults and low-schizotypal adults did not differ in their ability to judge item questions (asking the relative location of array features), high-schizotypal adults performed more poorly than low-schizotypal adults in judging appearance questions (asking how an array would appear from another perspective) under viewer-rotation instructions (asking subjects to imagine moving themselves relative to a fixed array) and performed better than low-schizotypal adults in judging appearance questions under array-rotation instructions (asking subjects to imagine rotating an array relative to their own fixed viewer position). Based on these and other findings we conclude that poor mentalizing in normal adults is better understood as an impairment of perspective-taking (visual and/or cognitive) and introduce the concept of *allocentric simulation* to explain the functional basis of this perspective-taking impairment. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Perspective-taking; Theory-of-mind; Psychosis-proneness; Schizotypy; Schizophrenia

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1. Introduction

Mentalizing refers to the cognitive capacity to impute causal mental states in order to explain and predict people's thoughts and behaviour. That human beings have the capacity to mentalize is beyond doubt – understanding people as intentional agents who act to satisfy desires in accord with a set of held beliefs is a commonplace feature of our everyday social interactions. However, debate continues about the nature of cognitive processes that underpin normal mentalizing. This paper aims to further that debate by investigating why non-clinical adults who score higher on the personality variable of schizotypy are relatively poor mentalizers (Langdon & Coltheart, 1999). Schizotypy refers to a style of personality expression found within the normal adult population that is conceived to be a non-clinical manifestation of the same underlying biological and cognitive factors that, when seen in a more extreme form, also cause clinical psychotic symptoms (e.g. delusions, paranoia and idiosyncratic behaviour) in patients with schizophrenia and allied psychotic disorders (Claridge, 1987, 1994; Claridge & Beech, 1995).

1.1. Theoretical accounts of mentalizing

Theories of mentalizing can be broadly classified into those that hold that mentalizing depends upon some capacity to represent the representational nature of mental states (i.e. that mental states are about reality and yet separate from reality) – *metarepresentation* theory – and those that hold that mentalizing is an act of role-taking (i.e. an act of imaginatively projecting oneself into someone else's situation) – *simulation* theory. Within the metarepresentation camp, there are both developmental and modular approaches. The former is the view that mentalizing depends upon a young child's developing capacity to acquire concepts about mental states (i.e. a theory, or a representation, of the representational nature of mental states) (Gopnik & Wellman, 1994; Perner, 1991). The latter is the view that on-line mentalizing is underpinned by a domain-specific cognitive module dedicated to computing and manipulating representational structures that embody the “aboutness” (representational nature) of mental states (Baron-Cohen, 1995; Leslie & Roth, 1993; Leslie & Thaiss, 1992). We say more about these contrasting approaches later. For now, the account offered by Davies and Stone (1995) provides a useful way of conceptualizing the distinction between metarepresentation theory and simulation theory. In metarepresentation theory, mentalizing depends upon some capacity to hold in mind higher-order representations of the type “Mary thinks ‘x’ about ‘z’” and “Fred thinks ‘y’ about ‘z’”, where the contents of ‘x’ and ‘y’ can be contradictory. This ability has been termed metarepresentational capacity. In contrast, simulation theory holds that we need only imagine ourselves, as a person in Fred's situation, thinking ‘y’ (as opposed to thinking “Fred thinks ‘y’”) in order to predict what Fred will do (or think) – and that is, Fred will do (or think) what we imagine ourselves, as a person in Fred's shoes, doing (or thinking) consequent to having thought ‘y’.

To date, child development and autism studies have been the primary source of

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