Autism and theory of mind in everyday life
Uta Frith¹, Francesca Happé & Frances Siddons

Abstract
The theory of mind account of autism suggests that the key social, communicative and imaginative impairments which characterise this disorder result from an inability to represent mental states. While this account has been largely confirmed by experimental work, there has, as yet, been little examination of autistic children’s theory of mind outside the laboratory. The present study used the Vineland Adaptive Behavior Scales to measure real life social adaptation, through the report of caregivers. In particular, we were interested to find out more about the real life competence of those few autistic subjects who do pass tests of theory of mind. Autistic, mentally handicapped and normally developing children were tested with two standard theory of mind tasks. Groups of subjects who passed or failed these tasks were contrasted. We supplemented the Vineland Scales with items designed to distinguish social behaviour which necessitates theory of mind (termed Interactive) and social behaviour which could be learned (Active). We also asked about maladaptive behaviour of two sorts: Bizarre behaviour typical of autism, and Antisocial behaviour at least some of which would appear to require consideration of beliefs (e.g. deception). We found that the normally developing and mentally handicapped children showed a great deal of evidence of “mind-reading” in their everyday lives, regardless of theory of mind task performance. By contrast, in the autistic group, only those individuals who passed the false belief tasks showed insightful Interactive and Antisocial behaviour. These passers also had better verbal and communication abilities. The autistic subjects who failed the laboratory tasks showed little or no evidence of understanding mental states in their everyday lives, but many did show a high degree of simple Active sociability. Closer analysis showed that only some of the passers showed good evidence of theory of mind in their real life behaviour, and that even these were somewhat impaired relative to their age and developmental level. Implications for the theory of mind account of autism are discussed.

Keywords: Autism; theory of mind; social adaptation.

We appreciate the cooperation of the staff and pupils of Broomhayes School, Castlebar School, Cavendish School, Doucecroft School, Heathlands School, Ramsden Infants and Junior Schools and Special Unit, Springhallow School, St. John’s School and Sybil Elgar School. We thank Rebekah Anokhina and Rosie Rizq for their assistance in data collection. Special thanks are due to Alison Gallagher for carrying out the statistical analysis of the data. Address for correspondence: MRC Cognitive Development Unit, 4 Taviton Street, London WC1H 0BT, UK.

© Basil Blackwell Ltd. 1994. Published by Blackwell Publishers, 108 Cowley Road, Oxford OX4 1JF, UK and 238 Main Street, Cambridge, MA 02142, USA.
Introduction

Social impairment is the defining characteristic of autism. Both Kanner (1943) and Asperger (1944) highlighted disturbances of social contact and communication in their original descriptions of this profound developmental disorder. However, while all individuals with autism show social impairment, not all socially impaired people have autism. Non-autistic children may also show poor social competence, relative to that expected from their chronological age, for example as a result of mental handicap. The Vineland Adaptive Behavior Scales (Sparrow, Balla & Cichetti, 1984) have been used with considerable success in differentiating autistic and non-autistic learning disabled people in terms of the nature of their social impairment (Volkmar et al., 1987; Freeman et al., 1991; Perry & Factor, 1989; Burack & Volkmar, 1992; Capps, Yirmiya & Sigman, 1992). Comparisons between individuals with autism and those with Down Syndrome have also been carried out (Loveland & Kelley, 1988; Rodrigue, Morgan & Geffken, 1991). All these studies suggest that there is a distinctive profile of social adaptive behaviour in autism, which differs from that obtained for other impaired individuals who do not suffer from autism. Selective deficits have been shown in the Vineland domains of Socialisation and Communication, where autistic subjects have been found to function, on average, at almost four years below their mental age (Volkmar et al., 1987). By contrast, in the domain of Daily Living Skills the autistic and control subjects did not differ. Recently, Klin, Volkmar and Sparrow (1992), using a fine-grained analysis of Vineland items, found significant differences between autistic children of preschool age and developmentally disabled controls, on a subset of early emerging social behaviours (e.g., shows affection toward familiar people; plays simple interaction games with others).

Social impairment out of line with developmental level also emerges as the key characteristic of autism in Wing and Gould’s (1979) epidemiological study of handicapped children. These authors identified two groups. In one of these groups social adaptation was appropriate for mental age, while in the other social impairment was more severe than expected from developmental level. The socially impaired group also showed striking difficulties in verbal and nonverbal communication and in imaginative play. This “triad” of impairments was found to be independent of other handicaps and level of intelligence. The manifestation of the core problems varied with age and ability and included impaired social relations of several different types (aloof, passive, active but odd). The triad has been found to characterise a whole spectrum of autistic disorders (Wing, 1988), and this has greatly influenced current diagnostic criteria (Gillberg, 1992; DSM-III-R, APA, 1987).

Why should the three core impairments in socialisation, communication and imagination cluster together? Baron-Cohen, Leslie and Frith (1985) suggested that the triad could be explained by a single cognitive deficit: an inability to represent mental states. Why is this inability so devastating, or, conversely, why is the ability to represent mental states so important? Briefly, we need to be able to represent mental states, such as belief and desire, if we are to understand and predict other people’s behaviour. The term “theory of mind” (Premack & Woodruff, 1978) is often used to refer to the (quite unconscious) ability to attribute mental states, and to use these invisible postulates to explain behaviour in everyday
life. So, for example, if you see a colleague bent over a drawer, taking out and replacing papers, you are likely to explain this activity by assuming that she wants a document which she believes is in there. Importantly, you will understand her activity even if you know that the document she wants is elsewhere - that is, you understand that her behaviour is driven by her belief about the world, even if this belief is false.

The theory as it relates to autism, at its simplest, can be expressed in the following way: In the normally developing child the computational capacity to represent mental states has an innate neurological basis. In the autistic child, neurological damage to a circumscribed system of the brain has occurred, and this prevents the normal operation of the critical cognitive mechanism (Frith, Morton & Leslie, 1991). The ability to represent mental states would appear to be crucial for normal reciprocal social interaction, for understanding of speaker's intended meaning in communication, and for understanding the contrast between real and imaginary events (Frith, 1989). In non-autistic children the innate mechanism which allows appreciation of others' thoughts and feelings is manifest early in life, in joint attention, mental state language and pretend play.

The triad of impairments seems to be well explained by the hypothesis that autistic people lack a theory of mind. This hypothesis was tested using a paradigm introduced by Wimmer and Perner (1983), requiring the ability to attribute a false belief to another person. In the "Sally-Ann" task, Ann moves Sally's marble from the basket where she placed it to another hiding place while Sally is out of the room. The child is asked where Sally will look when she returns. Wimmer and Perner found that almost all children of 4 years were able to pass this test, correctly attributing a false belief to Sally, and predicting her search in the original location (i.e. where she thinks it is). Baron-Cohen, Leslie and Frith (1985) found that, by contrast, only 20% of a sample of autistic children were able to pass this test, despite mental ages well over 4 years. This problem with attributing false belief was specific to the autistic children: 85% of Down Syndrome children of rather lower verbal ability passed the false belief task. Subsequent studies have confirmed that autistic children have great difficulty on a variety of tasks designed to tap "theory of mind" ability (for recent reviews see Happé & Frith, in press; Baron-Cohen, Tager-Flusberg & Cohen, 1993). Thus there is much support for the view that autistic children are impaired in their ability to understand their own and other people's mental states. However, as yet few attempts have been made to link this impairment directly to daily life social behaviour.

While the notion of a theory of mind deficit gives a unifying explanation for the core symptoms of autism, one puzzling fact emerges from all the empirical studies: not all autistic children fail theory of mind tasks. An important question that remains unanswered is whether those individuals who pass such tasks are in fact interestingly different from the majority of autistic individuals who fail. It has been suggested (Frith, Morton & Leslie, 1991) that some people with autism may pass false belief tasks, not because they have "mentalizing" ability, but because they use a non-theory of mind strategy ("hacking"). On a strong version of this hypothesis, "passers" would not be expected to show insightful social behaviour in real life (e.g. empathy or deception), the strategy for task success being too narrow to allow generalisation beyond the experimental situation.

This hypothesis can be contrasted with the possibility that at least some autistic
people eventually acquire the ability to represent mental states, albeit with a gross delay (Baron-Cohen, 1989; Happé, 1991, 1993). If this were the case, then passing theory of mind tasks should signal the presence of social insight, demonstrated also in everyday life behaviour. An interesting possibility is that both the hacking and the mentalizing explanations of task success may be true for different subgroups of autistic individuals.

Some attempts to explore the relation between performance on social-cognitive measures and competence in everyday adaptation in autism have already been made, with somewhat equivocal results. Dawson and Fernald (1987) found that conceptual role taking (e.g. the ability to choose appropriate gifts), but not perceptual or affective role taking, correlated with caregiver reports of social skill. Oswald and Ollendick (1989) found a significant correlation between performance on a penny-hiding game (likely to involve mentalizing) and degree of social adaptation on the Vineland Scales. However, Prior, Dahlstrom and Squires (1990) failed to find a relationship between performance on false belief tasks and caregiver's judgement of social skills.

In the present study, we used the Vineland Adaptive Behavior Scales (VABS) with some additionally devised items, in order to see whether individuals with autism who pass standard theory of mind tasks show better social skill in real life than those who fail. For purposes of comparison we also looked at young normal children and children with general learning difficulties. Each group contained subjects who passed and subjects who failed false belief tasks. In normally-developing and in non-autistic handicapped children, failure and success on false belief tasks appear to be merely steps in an inexorable developmental progression. Clearly, the normal 3-year-old who fails false belief tasks does not entirely lack the ability to represent mental states; he/she can understand true beliefs, can pretend and distinguish mental from physical entities, can use mental state terms correctly, and can pass non-standard theory of mind tasks (Wellman, 1993). These social abilities are also manifest in non-autistic learning disabled individuals, but are strikingly absent in individuals with autism (Baron-Cohen, 1989). No specific prediction in relation to false belief task success and social adaptation in everyday life could therefore be made for the non-autistic children. In contrast, on the basis of the mentalizing hypothesis we predicted that passers and failers in the autistic group would be distinguished specifically in terms of social behaviour which requires mentalizing.

Method

Subjects

Table 1 shows the subject characteristics of the three groups who participated in this study. The 24 subjects with autism (17 boys and 7 girls) came from four special schools, two of which were day schools and two residential. All these subjects had been diagnosed according to DSM-III-R (APA 1987) criteria. The 15 normal four-year-olds came from two mainstream London schools. There were 5 boys and 10 girls in this group. Seven of the 11 moderately learning disabled (MLD) children came from a special school, while 4 came from a special unit attached to the same school from which some of the normal control group were drawn. The learning disabled group consisted of 7 boys and 4 girls.
Table 1. Subject characteristics: Means, Sds in months, and ranges

<table>
<thead>
<tr>
<th>Theory-of-Mind Pass</th>
<th>Theory-of-Mind Fail</th>
<th>Chronological Age</th>
<th>BPVS MA</th>
<th>BPVS Verbal IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
<td>SD</td>
</tr>
<tr>
<td>8</td>
<td>16</td>
<td>15y</td>
<td>3.27</td>
<td>6:7y</td>
</tr>
<tr>
<td>Range 7:10–19</td>
<td></td>
<td></td>
<td>4:1–10:1</td>
<td>14.98</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>4:8y</td>
<td>11.59</td>
<td>4:2y</td>
</tr>
<tr>
<td>Range 4:0–5:1</td>
<td></td>
<td></td>
<td>2:9–7:4</td>
<td>11.58</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>8:9y</td>
<td>33.38</td>
<td>4:6y</td>
</tr>
<tr>
<td>Range 7:2–10:1</td>
<td></td>
<td></td>
<td>20.99</td>
<td>3:7–6:3</td>
</tr>
</tbody>
</table>

The three groups were very different in chronological age, with the autistic group having an advantage of several years over the other two groups. They also had a higher (Scheffe-test, p < 0.01) verbal mental age (VMA). The young normal and MLD groups were of equivalent VMA, while the MLD and autistic groups were of equivalent verbal IQ. The three groups were constructed to contain both subjects who succeeded on and subjects who failed the theory of mind tasks. A subject was deemed to be a “passer” if he/she passed both theory of mind tasks. The search for passers among the autistic sample and for failers in the control groups, resulted in groups which did not reflect the naturally occurring incidence of success and failure in these populations.

Procedure

Each child was tested on the British Picture Vocabulary Scales (Dunn et al., 1982) and on two standard theory of mind tasks. The care-giver or teacher who knew each child best was interviewed using the Vineland Adaptive Behavior Scales (survey form) with supplementary items.

Theory of Mind Tasks. Two false belief tasks were used. The “Smarties” test was based on Perner, Frith, Leslie and Leekam (1989). In this task, the child is shown a typical tube of a certain brand of sweets, smarties, and asked what he/she thinks is inside. After guessing “smarties”, the child is shown to his/her surprise and disappointment that the tube does not contain sweets, but a pencil. The child is then asked what another child will guess is inside when shown the closed smarties tube.

The “Three Boxes” test was a version of the Sally-Anne task used by Baron-Cohen, Leslie and Frith (1985), where actors take the place of the dolls (Leslie & Frith, 1988). Two experimenters participated in the task, with one taking the role of the ‘tricker’ and one of the ‘tricked’. Experimenter 1 hid a coin in one of three boxes, and then left the room on some pretext. Experimenter 2 then moved the coin to a different box. After establishing that the child understood that Experimenter 1 could not see what they had done, the child was asked where Experimenter 1 would look for the coin when he/she returned.
Vineland Adaptive Behavior Scales. The Vineland Adaptive Behavior Scales (VABS) provide a standardized, norm-referenced assessment instrument, measuring a wide range of social and non-social behaviours (Sparrow, Balla & Cichetti, 1984). For each individual in the present study a teacher or care-giver supplied information about the child’s actual level of functioning, that is, his/her habitual behaviour rather than peak performance. Ratings on the VABS range from 0 to 2 for each item, where 0 indicates that a behaviour is never seen, 1 that it is sometimes or partially performed, and 2 that it is a regular occurrence. The survey form, which was used in the present study, contains 225 items designed to assess the strengths and weaknesses of an individual across a wide range of behaviours in the domains of Communication, Daily Living Skills and Socialisation.

Supplementary social and maladaptive items. We screened the expanded and survey forms of the VABS, to identify those items which appeared to rely upon the understanding of mental states, as well as those which seemed possible without such understanding. We supplemented these items with additional items, theoretically derived, that could be scored in the same way. An example of a behaviour thought not to necessitate theory of mind is playing simple board games, which is a learnt social behaviour. By contrast, engaging in make-believe play was considered to be a behaviour reliant on the ability to appreciate mental states. Of course, judgements of this type are to some extent subjective and open to debate: a more contentious example of behaviour judged not to necessitate theory of mind is recognizing happiness and sadness. While the normal child’s understanding of these emotions is almost certainly built on an appreciation of inner states, it is possible to learn to recognize and label the outward signs of happiness and sadness (smile, tears) without understanding the underlying thoughts and feelings. Such a behavioural route would be less easy for the recognition of complex emotions, such as surprise and embarrassment, comprehension of which may depend more heavily on an understanding of (false) beliefs.

Seventy items were compiled in this way, and these were given to a group of undergraduate students with the request to categorise the items into two sets: items which seem to require the attribution of independent mental states (a theory of mind), and those which do not. The only training given to the students consisted of the passage reproduced in the appendix. Based on the judgements of the students, a subset of items which received the most consistent ratings (inter-rater agreement greater than 75%) was selected. This set was then categorized again by five experts in the area of theory of mind. From this classification, the present sets were formed, consisting of 16 items of each type which received the same rating by at least 4 of the 5 experts. These are shown in the appendix.

The “Active Sociability” items refer to behaviour which could be performed without the ability to mentalize, while the “Interactive Sociability” items refer to behaviour which (in the raters’ opinion) could not be performed without this ability. As a further check a more strictly defined subset of Active and Interactive behaviours was compiled. Seven items of each type, in the opinion of the authors, seemed particularly trustworthy. Not only did they seem to fit strict criteria for either requiring (Interactive) or not requiring (Active) the ability to attribute mental states, but they also appeared to be less subject to ambiguity of interpretation and misunderstanding in the interview itself. These (shown in italics in the appendix) were intended to verify the 16-item sets.

We also used the optional Maladaptive Behaviour domain of the VABS, from
which selected items were analyzed separately (shown in the appendix). Items selected fell into two categories: behaviours which are frankly antisocial, and behaviours which are bizarre but known to be common in autism. Seven items for each category were chosen as being clear cut examples of the two types of problem behaviour. Two of the Antisocial items, "lies, cheats or steals" and "teases or bullies", appear to involve an understanding of mental states.

The supplementary items make up four sets of behaviours, which were not matched for developmental level. The construction of the sets was theoretically motivated, and it is an empirical matter to establish whether these different types of behaviour develop in parallel, or whether they characterize different developmental phases. Although very desirable, grading the sets for age of first appearance, age of peak performance, and so forth, was not attempted at this stage.

Results

Figure 1 shows the profiles of the three groups according to the major domains covered by the VABS. Domain scores are standardized (with a mean of 100 and sd of 15) and so are directly comparable across groups (regardless of CA differences). The mean VABS composite score for the normal group was 108, suggesting that the data can be well compared with the North American norms. Both the autistic and the learning disabled groups scored three standard deviations below these norms.

Inspection of the profiles in figure 1 suggests that the pattern of scores for the learning disabled children runs parallel to that of the young normal children although all the scores are significantly lower (p < 0.01). Relative to the MLD group, who they match in VIQ, the autistic group were similar on Communication and Daily Living Skills, but their profile shows a characteristic dip in the domain of Socialization (F (2, 47) = 114.38, P < .001; post hoc Scheffé tests indicated that autistic subjects scored less than MLD subjects at the 0.01 level).

Relation of VABS to theory of mind performance

Table 2 shows the background variables and the standardized domain scores for the three subject groups, each divided into those who passed and those who failed the false belief tasks. In the normal and MLD groups the passers and failers did not differ significantly on any variable. However, differences were apparent for the autistic group. Using t-tests, differences on two measures reached significance: verbal MA (t = 2.62, df 22, p < 0.016), and Communication domain scores (t = 2.95, df 22, p < 0.01). On an analysis of subdomain scores, autistic passers scored significantly higher than failers on the Play and Leisure subdomain (t = 2.30, df 22, p < 0.05), although differences on the Socialization domain as a whole failed to reach significance (t = 1.28).

Active and Interactive Sociability

As table 3 shows, the sets of Active and Interactive items are far from equal in difficulty and therefore cannot be compared directly with each other. Because of non-homogeneity of variance, parametric tests were supplemented with non-parametric comparisons. The Active items showed a significant difference by theory of
mind performance only in the young normal group ($t = 2.45$, $df$ 13, $p < 0.05$; Mann-Whitney U-test, $z = 2.11$, $p = 0.03$). For the Interactive items, a significant difference was found only in the autistic group ($t = 243$, $df$ 22, $p < 0.05$; Mann-Whitney U-test, $z = 1.94$, $p = 0.05$): autistic subjects who passed the false belief tasks scored higher than those who failed.

The results from the strict set of seven items of each type corresponded well with the full 16 item sets: autistic passers exceeded failers on the Interactive items but not on the Active items. From a total possible score of 14, autistic passers achieved a moderately high mean Active score of 9.38 ($sd$ 3.20), and failers a similar score of 8.56 ($sd$ 3.78). However, extremely low levels of Interactive behaviours were shown by those autistic subjects who failed false belief tasks, mean 0.25 ($sd$ 0.45). Passers scored a mean of 3.00 ($sd$ 3.55) which was significantly higher (Mann-Whitney U-test $z = 2.27$, $p = 0.02$).

Looking at individual scores, only three of the autistic passers achieved moderately high interactive scores (11, 15 and 22, out of a maximum of 32 on the 16 item sets), while the other five obtained scores in the range 1 to 8. Scores in the range of 4 to 8 were also obtained from 7 of the 16 failers, while the rest of the failers scored less than 4. By comparison, no normal 4-year-old scored less than 4. Scores on the strict 7-item sets confirmed that the same three passers obtained moderately high scores (5, 7 and 9 out of 14), while the other passers scored between 0 and 2. All the autistic failers obtained scores of either 0 or 1 on this strict set.

![Figure 1](image)

Figure 1. Profile of VABS domain scores for autistic, young normal and learning disabled groups.

© Basil Blackwell Ltd. 1994

Social Development, 3, 2, 1994
Table 2. Relation of Success and Failure on Theory-of-mind tasks to subject characteristics and VABS domain scores: Means and Sds (in italics)

<table>
<thead>
<tr>
<th></th>
<th>Autistic Pass</th>
<th>Fail</th>
<th>Young Normal Pass</th>
<th>Fail</th>
<th>Learning Disabled Pass</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>14:7y</td>
<td>15:2y</td>
<td>4:9y</td>
<td>4:7y</td>
<td>8:8y</td>
<td>8:9y</td>
</tr>
<tr>
<td></td>
<td>31.9m</td>
<td>34.9m</td>
<td>2.4m</td>
<td>3.9m</td>
<td>14.7m</td>
<td>8.1m</td>
</tr>
<tr>
<td>BPVS Verbal</td>
<td>7:9y</td>
<td>6:0y</td>
<td>4:2y</td>
<td>3:11y</td>
<td>4:7y</td>
<td>4:4y</td>
</tr>
<tr>
<td>Mental Age</td>
<td>20:5m</td>
<td>17.8m</td>
<td>15:4m</td>
<td>15.4m</td>
<td>12.8m</td>
<td>11.1m</td>
</tr>
<tr>
<td>VIQ</td>
<td>58.0</td>
<td>48.4</td>
<td>93.4</td>
<td>92.2</td>
<td>60.3</td>
<td>55.0</td>
</tr>
<tr>
<td></td>
<td>9.8</td>
<td>13.9</td>
<td>12.6</td>
<td>13.1</td>
<td>15.1</td>
<td>9.3</td>
</tr>
<tr>
<td>VABS Total</td>
<td>49.0</td>
<td>38.0</td>
<td>109.1</td>
<td>108.0</td>
<td>52.5</td>
<td>52.2</td>
</tr>
<tr>
<td></td>
<td>16.7</td>
<td>13.9</td>
<td>10.6</td>
<td>14.8</td>
<td>20.0</td>
<td>18.6</td>
</tr>
<tr>
<td>– Communication</td>
<td>59.2</td>
<td>35.8</td>
<td>99.9</td>
<td>108.0</td>
<td>53.3</td>
<td>55.2</td>
</tr>
<tr>
<td></td>
<td>21.4</td>
<td>16.8</td>
<td>14.4</td>
<td>22.8</td>
<td>15.2</td>
<td>15.2</td>
</tr>
<tr>
<td>– Daily Living</td>
<td>56.4</td>
<td>52.7</td>
<td>102.6</td>
<td>102.7</td>
<td>65.3</td>
<td>53.2</td>
</tr>
<tr>
<td></td>
<td>30.1</td>
<td>23.0</td>
<td>7.7</td>
<td>5.3</td>
<td>20.0</td>
<td>24.9</td>
</tr>
<tr>
<td>– Socialization</td>
<td>43.6</td>
<td>35.2</td>
<td>113.4</td>
<td>109.5</td>
<td>71.0</td>
<td>67.0</td>
</tr>
<tr>
<td></td>
<td>16.9</td>
<td>14.4</td>
<td>12.7</td>
<td>13.2</td>
<td>15.6</td>
<td>18.6</td>
</tr>
</tbody>
</table>

Antisocial and Bizarre behaviour

The incidence of maladaptive behaviour in the young normal group was negligible. On the Maladaptive Domain as a whole, 10 of the 15 young normal children scored zero, 4 scored between 1 and 3, and one child (who failed the false belief tasks) scored 18 out of a possible total of 72. The MLD group also had low scores for the Maladaptive Domain, ranging from 3 to 16 with a mean of 8.4 (sd

Table 3. Relation of Success and Failure on Theory-of-mind tasks to Active and Interactive Behaviour: Means, Sds (in italics)

<table>
<thead>
<tr>
<th></th>
<th>Autistic Pass</th>
<th>Fail</th>
<th>Young Normal Pass</th>
<th>Fail</th>
<th>Learning Disabled Pass</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>20.0</td>
<td>16.8</td>
<td>22.4</td>
<td>19.0</td>
<td>18.0</td>
<td>17.8</td>
</tr>
<tr>
<td>max = 32</td>
<td>6.7</td>
<td>7.5</td>
<td>3.0</td>
<td>2.0</td>
<td>2.4</td>
<td>4.8</td>
</tr>
<tr>
<td>Interactive</td>
<td>8.8</td>
<td>3.8</td>
<td>9.8</td>
<td>7.7</td>
<td>7.8</td>
<td>7.0</td>
</tr>
<tr>
<td>max = 32</td>
<td>6.9</td>
<td>3.3</td>
<td>1.4</td>
<td>2.8</td>
<td>5.8</td>
<td>7.5</td>
</tr>
</tbody>
</table>
4.4), which is close to the reported mean score (7.3) of the standardization sample of children aged 7 to 9:11. In contrast, the incidence of maladaptive behaviours in the autistic group was high, with a mean of 21 (sd 11, range 5 to 44).

Table 4 shows the subjects' scores on the selected Antisocial and Bizarre behaviour items. As mentioned already, these were not equated for developmental level and therefore cannot be compared with each other. Passers and failers were only distinguished in the autistic group: subjects who passed showed significantly higher Antisocial scores \( (t = 2.13, df 22, p < 0.05) \) than those who failed. In particular, 4 of the 8 autistic passers but only 1 of the 16 failers were said to show the key theory of mind behaviours "lying and cheating" and "teasing and bullying". On the Bizarre items autistic passers and failers did not differ \( (t = 0.29) \), nor did they differ on total Maladaptive domain score.

**Discussion**

The results of the present study may provide some answers to the vexed question of what underlies theory of mind task success in some subjects with autism. We found that, overall, those autistic subjects who passed false belief tasks showed

<table>
<thead>
<tr>
<th></th>
<th>Autistic Pass</th>
<th>Autistic Fail</th>
<th>Young Normal Pass</th>
<th>Young Normal Fail</th>
<th>Learning Disabled Pass</th>
<th>Learning Disabled Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maladaptive</td>
<td>24.4</td>
<td>18.2</td>
<td>0.78</td>
<td>4.2</td>
<td>8.2</td>
<td>8.6</td>
</tr>
<tr>
<td>max = 72</td>
<td>11.2</td>
<td>9.7</td>
<td>1.72</td>
<td>6.91</td>
<td>4.2</td>
<td>5.3</td>
</tr>
<tr>
<td>Antisocial</td>
<td>6.13</td>
<td>2.80</td>
<td>N/A</td>
<td>N/A</td>
<td>1.67</td>
<td>1.40</td>
</tr>
<tr>
<td>max = 14</td>
<td>3.72</td>
<td>3.62</td>
<td></td>
<td></td>
<td>2.25</td>
<td>1.6</td>
</tr>
<tr>
<td>Bizarre</td>
<td>5.13</td>
<td>4.75</td>
<td>N/A</td>
<td>N/A</td>
<td>0.67</td>
<td>0.80</td>
</tr>
<tr>
<td>max = 14</td>
<td>2.48</td>
<td>3.22</td>
<td></td>
<td></td>
<td>1.03</td>
<td>1.10</td>
</tr>
</tbody>
</table>

more everyday social insight, but not more simple sociability, than those who failed. Likewise, the passers showed more antisocial behaviour than the failers, but the same amount of Bizarre behaviour.

Do the autistic subjects who pass theory of mind tasks, then, have mentalizing ability? Before we can answer this question we must deal with one important and potentially confounding problem. Autistic passers were found to have significantly higher verbal ability than autistic failers. This is in line with several past studies (Eisenmajer & Prior, 1991; Sodian & Frith, 1992; Prior et al., 1990; Happé, 1993, submitted). In our sample, all autistic subjects with VMA below 5 years 5 months failed the false belief tasks. This was true for our normal children aged below 3:3, and for learning disabled children with VMA below 3:7. A minimum verbal mental age criterion is not, then, unique to autism. However, what is puzzling and
specific is the very high VMA a child needs in order to pass theory of mind tasks if, and only if, he/she has autism. Could it be that it is simply verbal impairment which holds back subjects with autism from theory of mind task success? This seems unlikely. Even those autistic subjects who fail have much higher VMA than young normal passers, and individual autistic children exist who fail theory of mind tasks but have high verbal mental age (Frith, Morton & Leslie, 1991).

Language competence and theory of mind would appear to be closely linked in development. Much of language learning is dependent on joint attention, orientation to ostension and recognition of speaker's intention (e.g. Tomasello, 1988). Thus, to some extent, even vocabulary tests may inadvertently measure an autistic child's level of mentalizing ability. The fact that most autistic children have extremely delayed language development, and some do not speak at all, may attest to the severe impact of a mentalizing deficit on language learning. It is interesting, then, that in the present sample the Communication Domain scores distinguished autistic subjects who passed theory of mind tasks from those who failed.

Does the higher verbal ability and theory of mind task success of our passers, then, prove that these autistic subjects have the ability to think about thoughts? Or are these abilities nothing to do with theory of mind, but merely part and parcel of higher general ability and compensation via non-theory of mind strategies? Such strategies ("hacking") would enable individuals to solve false belief attribution tasks, but probably would not generalize to the large variety of mentalizing situations encountered in real life. This strong version of the "hacking" hypothesis would predict absolutely nothing for such passers' real life social competence. If, on the other hand, the passers did have genuine mentalizing ability, at least to some extent, then they should score higher than failers on precisely those real life items which depend on the ability to attribute mental states. In other words, they should show a selective advantage, relative to failers, on Interactive items. This was indeed found in our sample. Furthermore, the mentalizing hypothesis can explain why there was more Antisocial behaviour in passers than in failers. Items such as "lies, cheats, or steals" require insight into other minds -- although, of course, this insight does not cause (but merely facilitates) these behaviours. The mentalizing hypothesis is neutral as regards Active sociability and Bizarre behaviour. In fact, on both measures the autistic subjects in the passing and failing groups did not differ.

Overall, our results appear to fit the predictions of the mentalizing hypothesis. Can we conclude that all those autistic children who passed the two theory of mind tasks showed evidence of mentalizing in their everyday lives? Focusing on individual results, this may be so for only three of the eight passers. These individuals exhibit relatively high Interactive sociability, while having variable Active sociability scores. At the other extreme, the 16 failers showed very low Interactive scores, and equally variable Active sociability scores. These two extreme groups fit the mentalizing predictions exactly. On the strict set of Interactive items, not a shred of evidence was found for any behaviour requiring mentalizing in the everyday lives of those autistic subjects who failed the false belief tasks -- suggesting that it is indeed possible to sharpen this set to distinguish those who can mentalize from those who cannot. A group of 5 autistic subjects passed theory of mind tasks but still obtained very low Interactive scores (0 to 2 out of 14, on the strict set of 7 items). This group of autistic passers did not appear to differ from the
failers, and gave little evidence of mentalizing in their everyday life behaviour. We suggest that these subjects managed to solve the false belief tasks by means of local strategies, which do not spill over into real life. This subgroup conform to the “hacking” hypothesis. Our results, then, suggest the existence of subgroups within the autistic spectrum. The majority have no understanding of other minds, and demonstrate this “mind-blindness” in the laboratory as well as in everyday life. Then there are those who have learned limited strategies sufficient to pass highly structured artificial tests of theory of mind, but still show no evidence of mentalizing in real life. In addition, our results suggest that there is a third subgroup who appear to be able, to some extent, to represent mental states. They show evidence of this not only in the laboratory, but also in real life. Nevertheless, it is important to note that their social adaptation is still poor. Which of these groups a child belongs to may be difficult to determine. Certainly, it would be necessary to administer more than a single false belief task. Only by comparing performance across a whole battery of different mentalizing tasks and on behaviours across different domains (socialization, communication, imagination), can we be sure about the existence of the underlying ability to mentalize in the truly “talented minority” (Happé, 1993).

The above analysis applies only to autism. The clear social handicaps that autistic subjects show in everyday life make it important to ask what it means when a minority succeeds on theory of mind tasks. For the mentally handicapped and young normal groups, who show social adaptation appropriate for their developmental level, the important question is: what does it mean to fail on theory of mind tasks? In our learning disabled group, performance on the false belief task did not relate to real life functioning in any way. The pattern of results suggests that some children with general learning disabilities perform poorly on false belief tasks not because they lack mentalizing ability, but for some other as yet unknown reason. False belief task performance, then, appears to underestimate this group’s mentalizing competence, which is amply demonstrated in real-life. It is important to recall also, that, in contrast to autistic subjects, most individuals with learning difficulties pass theory of mind tasks (e.g. Baron-Cohen, 1989).

In the case of the young normal controls, the group we tested covered the age range at which children normally make the transition from failing to attribute a false belief to fully understanding the protagonist’s belief in the standard false belief tasks. A number of studies have shown that small variations in task details affect the ease with which normal children understand theory of mind tasks (Siegal & Beattie, 1991; Freeman, Lewis & Doherty, 1991). However, by the age of 5 most normally developing children pass standard false belief tasks (Astonington & Gopnik, 1991). We assume, therefore, that it is only a matter of time before 100% of our young normal control group can pass the tasks. Nevertheless, it is interesting to consider what might be the difference between those children who pass false belief tasks early and those who pass later. In the present study, no differences were found on any background variable or VABS domain. However, there was a significant advantage in Active sociability (and a non-significant advantage in Interactive sociability) for children who passed. It appears, then, that normal 4-year-olds who pass false belief tasks are more socially orientated than those who fail. Our data do not allow us to say, however, which is cause and which is effect. It is possible that a third factor, related perhaps to social experience, is responsible for the differences in real life social orientation and in
false belief performance. One interesting suggestion for such a factor has recently been made by Perner, Ruffman and Leekam (unpublished) who found that children with more siblings passed standard false belief tasks at an earlier age.

Finally, how do our findings relate to the existing investigations of social competence in autistic children? Our study confirmed once again that autistic children are in the very lowest percentile of the general population in terms of overall social adaptation. As in previous studies, our autistic sample showed a characteristic dip in the Social Domain, relative to their Communication and Daily Living Skill Domain scores. The learning disabled children, by contrast, did not show such a dip, rather their profile on the VABS domains paralleled that of the young normal children. Volkmar et al. (1987) found a significant dip also in the Communication Domain for autistic children. Interestingly, our data show such a dip only for those individuals who failed theory of mind tasks, who on this domain scored significantly worse than individuals who passed theory of mind tasks. This parallels the difference between these two groups in terms of verbal mental age as assessed by the BPVS, and lends validity to this test, not only as a measure of VMA, but also as a sensitive indicator of communicative competence in everyday life.

While other studies have had variable success in relating theory of mind performance to real-life social adaptation, our own study suggests that this variability may be due, at least in part, to the existence of subgroups in the spectrum of autistic disorders. The present results indicate that there is a need for greater awareness of the difference between competence and performance in subjects who are successful on theory of mind tasks. Hidden amongst this group is the “talented minority”, who appear to have gained at least some competence in thinking about thoughts. The nature of their abilities and continuing real life handicaps is a challenge for future research.

References


© Basil Blackwell Ltd. 1994

Social Development, 3, 2, 1994


Perner, J., Ruffman, T. & Leekam, S. (unpublished manuscript) Theory of mind is contagious: you catch it from your sibs.


**Appendix A**

*Instructions to students rating behaviour items*

Why do you need to reason about the social world?

People are not only physical bodies, they are psychological entities. They have minds. You need to have a notion that mental states exist: on this basis you can develop a ‘theory of mind’.

Many social behaviours depend on recognising and manipulating other people’s mental states. Take, for example, Jane, who appears at a friend’s party in a particularly hideous dress – which she is clearly delighted with. She asks Mary, her friend, what she thinks of the new dress. Mary, realising how upset Jane would be if she was told her new dress was ugly, says she thinks it’s a lovely colour. Mary’s behaviour can best be understood by assuming that she has a ‘theory of mind’.

However, not all social behaviour involves a ‘theory of mind’. Many types of behaviour can simply be the result of learning social rules: for example, the automatic ‘sorry!’ that slips out when you accidentally tread on someone’s foot – or the polite ‘how do you do?’ on meeting someone for the first time. Clearly these behaviours do not necessarily involve reference to other people’s mental states and so do not require a ‘theory of mind’.

We are interested in which of the following behaviours you think *either* require a ‘theory of mind’ or *are* only learned social activities (i.e. do *not* require a theory of mind).

Please put a T next to those examples you think *definitely require* a theory of mind, and an L next to those which *definitely do not require* a theory of mind.
Appendix B

Supplementary items

Active Sociability

Behaviours probably not requiring theory of mind
(strict set items in italics)

Shows a desire to please
Takes turns in conversation
Shares toys when asked
Recognises happiness and sadness in others
Initiates social contacts
Initiates fixed small talk
Uses appropriate table manners
Delivers simple message
Says please when asking for something
Names favourite TV programmes and times
Asks permission to play with a toy
Plays board games
Follows time limits set by care-giver
Responds appropriately when introduced
Apologises for errors
Returns borrowed items

Interactive Sociability

Behaviours probably requiring theory of mind
(strict set items in italics)

Chooses appropriate presents
Responds to hints and indirect cues in conversation
Makes confidences
Recognises surprise and embarrassment in others
Initiates conversation of interest to others
Initiates flexible small talk
Supplies important missing information
Expresses ideas in more than one way
Refrains from statements that might embarrass
Engages in elaborate make-believe activities
Knows behavior appropriate for different people
Plays hide and seek or cheat appropriately
Has realistic long-range goals and plans
Keeps secrets for as long as appropriate
Apologises for hurting other’s feelings
Weighs consequences of actions
Appendix C

Bizarre Items

Uses bizarre speech
Rocks back and forth
Extremely peculiar mannerisms
Excessive/peculiar preoccupations
Self-injurious behaviour
Expresses thoughts that are not sensible
Cries or laughs too easily

Antisocial items

Lies, cheats or steals
Shows lack of consideration
Teases or bullies
Is negativistic or defiant
Intentionally destroys property
Is too physically aggressive
Has temper tantrums