Can Autistic Children Distinguish Lies from Jokes? A Second Look at Second-order Belief Attribution

Susan R. Leekam* and Margot Prior†

Abstract—Previous studies show that autistic children fail tests of second-order belief attribution. They also fail tests of lying and deception. The present study used Leekam’s (1988) joke–lie distinction task to test (a) understanding of second-order mental states (intention and belief) and (b) the ability to judge these acts as lies or jokes. Seventeen normal and 16 autistic children took part. Eight of the autistic children had previously passed a test of first-order false belief. Results showed that six autistic subjects (37.5%), all of whom are false belief “passers”, gave consistently correct answers to second-order mental state questions. Neither normal nor autistic children found second-order intention easier than second-order belief. However, normal children found the ability to judge another person’s mental state easier than labelling whether the person was lying or joking, supporting previous evidence. In contrast, there was no difference in these two judgements for autistic children. Overall these results qualify previous evidence by showing that autistic children can use second-order reasoning and can distinguish lies from jokes. Observational data on these children, however, suggest that their competence on the comprehension of these hypothetical situations was not matched by an ability to use lying and joking in real life. Methodological, language and diagnostic factors are discussed as providing possible explanations for the results.

Keywords: Second-order intention, second-order belief, lies, jokes

Introduction

There is now a growing body of evidence showing that autistic children have difficulty understanding mental states such as ignorance and belief (Baron-Cohen, Leslie & Frith, 1985; Leslie & Frith, 1988; Perner, Frith, Leslie & Leekam, 1989; Prior, Dahlstrom & Squires, 1990). In addition to their difficulty understanding first-order
mental states (i.e., “he thinks”), these children have even more difficulty understanding second-order mental states (i.e., “he thinks that she thinks”) (Baron-Cohen, 1989; Ozonoff, Pennington & Rogers, 1991a). Several recent studies, however, have found certain individuals with autism who have been able to pass tests of second-order understanding (Happe, 1991; Ozonoff et al., 1991a,b; Bowler, 1992). Despite this ability, it has been reported that these individuals still seem to transfer this knowledge to real-life social situations where sensitivity to other people’s mental states is required. Apart from these observations, we know very little about how reasoning about second-order mental states is related to the ability to make appropriate social or moral judgements. One objective of the present study was to examine the relationship between second-order reasoning and social judgement by investigating the child’s ability to recognise and label a situation as a lie or a joke.

Joking and lying are interesting phenomena to study with respect to autistic children. Not only are autistic children known to be ‘literal’ in their interpretation of jokes of humour, there is also evidence that autistic children are impaired in their ability to deceive (Russell, Mauthner, Sharpe & Tidswell, 1991) and to lie (Sodian & Frith, 1992) and that this is strongly related to their understanding of false beliefs. The deception tasks in the above studies however, refer to first-order mental state attribution (e.g. leading an opponent to a false belief). The ability to distinguish a lie from a joke or joking lie, however, involves deciding whether a person wants to be believed. This is a second-order mental state and it is this understanding that was tested in the present study.

Our joke–lie stories in this study give us the opportunity to examine the relationship between judgements of second-order mental state (whether one person wants another to believe) and social judgements (whether a person is lying or joking). In two separate studies with normal children, Leekam (1988) and Winner and Leekam (1991) found that performance on these two types of comprehension measure was strongly related. However, where there was a difference in performance across measures, children found the attribution of a second-order mental state (i.e. intention about belief) easier than the judgement of acts as lies or jokes (Leekam, 1991) or judging the speaker’s attitude (Winner & Leekam, 1991). This seems to be particularly the case for younger children. The present study tested whether autistic children might follow the same pattern as normal children. If so, when autistic children become able to attribute second-order beliefs, they may still fail to make social judgements such as recognising an act as a lie or a joke.

Our second objective in this study was to examine autistic children’s understanding of second-order intentions as well as second-order beliefs. Previous studies of second-order reasoning have all tested second-order false beliefs, in which one person mistakenly believes that another person believes something. In the present study we were able to compare understanding of second-order intentions (“A wants B to think”) with second-order beliefs (“A thinks that B thinks”). It was predicted that second-order intentions might be easier than second-order beliefs, given the evidence on first-order mental states. It has been found that understanding of desire and intention (Aastington & Gopnik, 1991; Wellman, 1990) in normal development and understanding of desire in autism (Baron-Cohen, 1991; Tan & Harris, 1991) developmentally precede the understanding of first-order false belief.

Perner and Wimmer’s original study (1985) of second-order belief comprehension
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found that children understood second-order beliefs by 7 years. In contrast, two recent studies (Leekam, 1991; Winner & Leekam, 1991) show that normal children understand second-order intentions at 5 years. However, it cannot be concluded from these studies that second-order intentions precede beliefs in the same way as for first-order mental states because both studies used a different methodology from that of Perner & Wimmer*. They also tested understanding of second-order intentions only. The present study adopted Leekam’s paired story paradigm to test whether there would be a difference in understanding second-order intentions and beliefs.

Finally, our third objective was to examine more closely the particular characteristics of autistic children who do have a 'second-order theory of mind' in order to consider why some high-functioning individuals pass second-order tests while others fail. Ozonoff et al. (1991b) suggested that verbal IQ may be an important factor influencing performance on second-order state tasks, a finding which has also been shown in studies of first-order belief understanding (Baron-Cohen, 1989; Prior et al., 1990; Eisenmajer & Prior, 1991; Leekam & Perner, 1991). This may explain why people with Asperger’s syndrome, a subgroup of the autistic continuum showing a high level of language and cognitive ability, are particularly adept at passing tests of second-order reasoning (Happe, 1991; Bowler, 1992) and may even be discriminated from other high-functioning autistic children in this ability (Ozonoff et al., 1991b). To explore language and diagnostic variables further therefore, we had background data on two aspects of language ability; (a) verbal mental age and (b) performance on a test of pragmatic functioning (Eisenmajer & Prior, 1991). We also had information on the diagnosis of each child.

Method

Subjects

Thirty-three subjects participated, 16 autistic children and 17, 4 and 5-year olds. One autistic child originally included, withdrew after the first two stories.

Autistic subjects

The autistic group had taken part in previous studies (Prior et al., 1990; Eisenmajer & Prior, 1991) and were selected on the basis of their mental age and ability to comprehend the requirements of the false belief task. Unlike Baron-Cohen (1989), we included both false belief passers and failers in our study provided that they had a high verbal ability, as it was possible that with our methodology some children might be able to make second-order intention judgements despite earlier failure on false belief tasks.

Table 1 gives the chronological and verbal mental ages of those who had previously passed and those who had previously failed the False Belief Test when tested one year earlier. The Peabody Picture Vocabulary Test was readministered immediately before the experimental task. All subjects had a verbal mental age above 5 years. Although the difference in the mean mental age of "passers" (10 years, 6 months) and "failers" (7 years, 3 months) did not reach statistical significance ($t (14) = 2.01$), there were several very high scores amongst the group of "passers". Four of the eight "passers" had mental ages above 11 years and the mental age of two of these subjects was above 15 years (in both cases above their chronological age). All but one child in the sample had also been tested on The Test of Pragmatic Skills (Shulman, 1986) 1 year previously (see Eisenmajer & Prior, 1991 for details of test). The mean pragmatic score of 'false' belief 'passers' was higher than 'failers' ($t (13) = 2.68, p < .02$).

*It is possible that the methodology of the Perner and Wimmer study may have underestimated competence. Research by Nunez and Riviere (1991) shows that with a simpler method 5- to 6-year-olds can pass second-order belief.
Table 1. Chronological age (CA) and mental age (MA) of autistic subjects according to their previous performance on False Belief (FB) Test (pass/fail)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>CA</th>
<th>Verbal MA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FB Pass</td>
<td>8</td>
<td>9;3–15;0</td>
<td>5;3–16;5</td>
</tr>
<tr>
<td>FB Fail</td>
<td>8</td>
<td>7;1–17;3</td>
<td>5;9–10;8</td>
</tr>
<tr>
<td>Total autistic</td>
<td>16</td>
<td>7;1–17;3</td>
<td>5;3–16;5</td>
</tr>
<tr>
<td>Normal</td>
<td>17</td>
<td>4;0–5;11</td>
<td>---</td>
</tr>
</tbody>
</table>

All the subjects in the autistic sample had an unequivocal diagnosis of autism in their early years. The behaviour of four of the group of “passers” had improved considerably in their later childhood and these children could now be considered in the “residual” category according to DSM III-R (APA, 1987). One child was currently described as “mildly autistic”. Interviews with parents and inspection of medical and psychological reports established that there had been no doubt about the initial diagnosis of these children.

Two children were attending special schools for children with learning difficulties and were tested at school. The other 15 were integrated into mainstream schools in the Melbourne area (mainstreaming of handicapped children is government policy in Australia). One was seen at school and the others were all seen in a quiet room in their home.

Normal subjects

Subjects ranged from 4 years 0 months to 5 years 11 months, but only one child was above 5 years 6 months. Thirteen subjects attended a university creche and were tested individually there. The other four attended regular school and were seen at home. Normal children were not tested on the Peabody Picture Vocabulary Test. It was assumed that their chronological and mental age matched each other.

Materials

Stories were always presented in story pairs. There were three story pairs; the painting, animal and ice cream stories. The painting and animal stories were based on Leekam’s (1988) story task. This task was designed to test children’s understanding of the distinction between joking and deceitful lies in terms of the speakers’ second-order mental state. For our experiment a new version of the task was devised to test second-order beliefs (belief about listener’s belief) as distinct from second-order intentions (intentions about listener’s belief). The painting story in both belief and intention version is described in Table 2(a). The animal story had the same structure and also appeared in both a belief and intention version. The third story pair appeared in only one version; second-order beliefs. This was the ice cream story originally devised by Perner and Wimmer (1985) and given to autistic subjects in a study by Baron-Cohen (1989). We kept as closely as possible to Baron-Cohen’s wording but asked the Test Questions after Episode 3 of the story as in Perner & Wimmer’s experiments. We also put this story into a story format as shown in Table 2(b) with illustrations for each story episode.

Design and procedure

There were two conditions: second-order intention and second-order belief, presented in counterbalanced order. The ice-cream story pair however was always given as the third story pair, creating two main orders: (a) intention–belief–belief and (b) belief–intention–belief. Within these orders half the subjects had the painting story pair first and half had the animal story pair first. Stories within each pair were also presented in counterbalanced order. Illustrations for the first half of the story pair were always presented on the left-hand side of the subject and illustrations for the second half on the right-hand side.

The testing session began with the story illustrations for both stories covered over with two sheets of card. Children were shown pictures of two boys and told they would listen to a story about each boy and then answer some questions about them. The experimenter placed the pictures of the two boys at the top of each covering sheet and started telling the first story, gradually removing the sheet to reveal the illustrations at points shown on Table 2(a and b).

As the experimenter told the story she asked prompt questions to ensure attention to the important parts...
Here are two boys. I'm going to tell you some stories about them.

**Episode 1 (Illustration 1)**
The first/second story is about this boy. This boy's mother comes to collect him from school. On their way out they pass a beautiful picture hanging on the wall. The boy points to the beautiful picture and says, "I painted that picture". (Prompt: What did the boy say?) His mother is very pleased and says "Well done, you are a clever boy to paint such a lovely picture". But the boy is making it up. He knew that a girl in his class had really painted the picture. (Prompts: Who really painted the picture? But the mother doesn't know that does she? And the boy has just told her that HE did it. So who does the mother think painted the picture? So does she believe what he says?)

<table>
<thead>
<tr>
<th>Joking</th>
<th>Deceitful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Episode 2 (Illustration 2)</strong>&lt;br&gt;Now the boy shows his mother that he didn't paint the picture at all really. He takes his mother right up close and points to the corner of the picture to show her that there’s a girl’s name written there. So now the mother knows that it was a girl in the class who did the picture and not the boy at all.</td>
<td><strong>Episode 2 (Illustration 2)</strong>&lt;br&gt;Now it is the next day. The boy is still in the classroom.&lt;br&gt;(Illustration 2)&lt;br&gt;The boy’s mother comes to collect him from school, and she passes the lovely picture again. She goes up close to have a better look. But now the teacher has written the girl’s name on the picture, so now the mother knows that it was a girl</td>
</tr>
</tbody>
</table>

**Episode 3 (Illustration 3)**<br>*Second-Order Intention*<br>And the boy is standing right next to her so he can see that his mother is looking at the girl’s name on the picture.<br>*Second-Order Belief*<br>And the boy is standing right next to her so he can see that his mother is looking at the girl’s name on the picture.
(Prompts: Now what does the mother think? Does she still think the boy painted the picture? So does she still believe what the boy said? How does she know the girl did it? Did the boy show his mother or did she find out on her own?)

**Comprehension Questions:** In both stories who really painted the picture? But at the beginning (E points to Illustration 1.) What did the boy say in both the stories? Yes, so his mother thought he had done it! (E points to Illustration 2; first story). Does this mother still think the boy painted the picture? (E points to Illustration 2; second story). Does this mother still think the boy painted the picture? Which mother knows that a girl did it because the boy shows her. Which mother finds out when she's on her own?

**Test Questions:**
1. **Mental state question**—At first the mother thinks that a boy painted the picture. But now she knows that a girl really painted it . . .
   - Belief version—But one of these boys still thinks that his mother *doesn’t know* that a girl really painted the picture. Which one?  
   - Intent version—But one of these boys *didn’t want* his mother to know that a girl really painted the picture. Which one?
2. **Joke-lie question**—One of these boys was joking and one of these boys was lying. Which one was
Table 2(b). Ice-cream story

Introduction (picture of story characters)
Here are two boys. I'm going to tell you some stories about them.

Episode 1 (Illustration 1)
The first story is about this boy. This boy is at the park with his friend. Look the ice-cream man is at the park. The girl wants to buy an ice-cream but she has left her money at home. So she is very sad. "Don't worry" says the ice-cream man "you can go home and get your money and buy some ice-cream later. I'll be here at the park all afternoon". "Oh good", says the girl. "I'll be back in the afternoon to buy an ice-cream".
(Prompt: Where did the ice-cream man say to the girl he would be all afternoon?)
So the girl goes home. She lives in this house.

Episode 2 (Illustration 2)
Now the ice-cream man says to the boy "I'm going to drive my van to the church to sell ice-cream there instead".
(Prompt: Where did the ice-cream man say he was going? Who did he say that to? Where is the church? So did the girl hear the ice-cream man say that to the boy?)

<table>
<thead>
<tr>
<th>Boy knows</th>
<th>Girl knows</th>
<th>Boy thinks girl doesn't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now the ice-cream man drives over to the church. The boy walks behind.</td>
<td>Now the boy goes home. He lives in this house. Now the ice-cream man drives over to the church.</td>
<td></td>
</tr>
</tbody>
</table>

Episode 3 (Illustration 3)
On the way the ice-cream man passes the girl's house. The girl sees the ice-cream man and comes out of her house, "Where are you going?" she asks. The ice-cream man says "I'm going to sell ice-cream at the church instead".

And the boy is right behind so he can hear the ice-cream man talking to the girl and telling her he's going to the church. And the boy is still in his house so he can't hear the ice-cream man talking to the girl and telling her he's going to the church.
(Prompt: Where did the ice-cream man tell the girl he was going? Does the boy know the ice-cream man talked to the girl?)

Comprehension Questions:
At the beginning in both stories, what did the ice-cream man say to both the girl and the boy (E points to Illustration 1). Yes, so they think he will stay there! (E points to Illustration 2; both stories). Here's the ice-cream man telling the boy he's going to the church. So does the boy know the ice-cream man is going to the church? (E points to Illustration 3; both stories). Now here's the ice-cream man telling the girl he's going to the church. So does the girl know the ice-cream man is going to the church? (Illustration 3; separate stories). Does this boy know that the ice-cream man talked to the girl? (Repeat). Which boy knows that the ice-cream man talked to the girl? Which boy doesn't know that the ice-cream man talked to the girl?

Test Questions:
Mental state: At first the girl and the boy think that the ice-cream man will stay in the park all afternoon. But now the boy knows he's going to the church and the girl knows he's going to the church. But one of these boys still thinks that the girl will go to the park when she goes out to get her ice-cream. Which one?
Justification: Why does he think she will go there?
of the story. Any incorrect answers to these questions were corrected. At the end of the first story, the covering sheet was replaced and the second story was started. At the end of the complete story pair, a set of Story Comprehension Questions were asked which referred to both stories. These concerned first-order mental states (e.g. Does the girl/mother think/know?) and actions (e.g. Which boy showed? Which mother found out?) These comprehension questions were followed by the Test Questions shown in Table 2 (a and b). A Justification Question was also asked after the Test Questions in the ice-cream story. The three-story pairs were given to the autistic children in one session. The youngest 4- and 5-year-olds were given the stories in either 1, 2 or 3 separate sessions according to subjects' wishes.

Results

Preliminary analysis of the three story themes (ice-cream, painting, animal) showed that the ice-cream story was easier than the other second-order belief stories for autistic children (binomial test \(N = 5, x = 0, p < .04\)) though not for the normal children (binomial test \(N = 7, x = 3, p < .50\)). We therefore analysed responses to the ice-cream story separately.

<table>
<thead>
<tr>
<th>Table 3. Number of subjects giving correct answers to mental state and story comprehension questions in ice-cream version of second-order belief task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autistic (N = 16)</td>
</tr>
<tr>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Correct answer to mental state</td>
</tr>
<tr>
<td>Justification</td>
</tr>
<tr>
<td>Not know/thought—know</td>
</tr>
<tr>
<td>Not know/thought—told</td>
</tr>
<tr>
<td>Not see—tell</td>
</tr>
<tr>
<td>Knew (first order)</td>
</tr>
<tr>
<td>Other “‘man said’”</td>
</tr>
<tr>
<td>“‘told her’”</td>
</tr>
<tr>
<td>“‘Man said he’d stay’”</td>
</tr>
<tr>
<td>“‘Man didn’t tell her’”</td>
</tr>
<tr>
<td>“Boy told secret to girl’”</td>
</tr>
<tr>
<td>Don’t know “‘unclassifiable’”</td>
</tr>
</tbody>
</table>

*An additional two autistic subjects made errors on comprehension questions, but passed mental state questions and gave justifications referring to mental states.

Second-order belief—ice-cream story

There was no difference between normal and autistic children’s performance on the Test Questions (chi-squared test; \(\chi^2 = 0.737\), n.s.). Autistic subjects gave virtually ceiling performance on this story version (15/16 correct answers to belief question) and 12 normal children gave correct answers. To correct for the likelihood of an artefact we removed from the analysis those subjects who failed any of the Story Comprehension Questions. This left only nine of the original 16 in the autistic group and 10 in the normal group who passed both the Test Questions and Story Comprehension Questions. Table 3 shows the justifications of these subjects’ answers.
according to Perner & Wimmer's (1985, p. 447) criteria. Four of the autistic subjects gave second-order reasoning in their answers and another two referred to first-order mental states (including seeing and telling). A further two subjects who made an error on the comprehension questions but passed the Test Questions, also gave mental reasoning; one at the second-order level “he doesn’t know that the girl knows he’s at the church” and one which indirectly refers to the boys first-order knowledge “he hasn’t been told that the girl is going to the park”. Although these subjects failed at least one comprehension question, they did pass the critical final one which referred to a mental state (“which boy knew that the ice-cream man talked to the girl”). Their sophisticated justifications suggest that they understood the story and could make inferences from it. If these two are added to the six subjects above, this makes a total of eight (50%) who gave both correct Test Question answers and first- or second-order mental justifications. These results contrast with the Test Question results obtained by Baron-Cohen (1989) and the Justification Question results obtained by Bowler (1992) using the same story scenario.

There was a significant difference between the eight autistic second-order passers and failers in terms of both verbal mental age \( t(14) = 2.39, p < .03 \) and previous pragmatic test score \( t(13) = 2.68, p < .02 \) (one second-order passer was not previously tested on Shulman’s pragmatic test). Seven of the eight second-order passers had previously passed and one had failed the False Belief test.

Second-order intention and belief—painting and animal stories

There were no effects of story theme (animal vs. painting) or order of presentation (belief vs. intention first).

(a) Belief and intention questions. Table 4 gives the contingency of correct answers for Second-order Belief and Second-order Intention Questions.

Contrary to expectation neither the autistic nor the normal group performed better on the intention version than on the belief version. The majority of normal children (12 or 71%) gave correct answers in both versions. This is greater than would be expected by chance (chance level at 25%) \( \chi^2 = 17.85, \text{ d.f.} = 1, p < .001 \).

Further analysis of these data showed that all six autistic children and 10 of the 12 normal children who passed both the Test Questions also passed the Story Comprehension Questions. The two normal children who passed the test questions but failed the comprehension questions were the two youngest in the sample (age 4 and 4 years, 1 month). Analysis of responses to the Story Comprehension Questions indicated that comprehension of first-order mental states as tested in these questions was related to success on the second-order question. In the autistic group, eight passed the Story Comprehension Questions for both story pairs, most of whom (six) also passed the Test Questions. In the normal group, 12 children passed the Story Comprehension questions, 10 of whom passed the Test Questions.

(b) Joke–lie questions. The question form (“which boy was lying?” vs. “which boy is joking?”) had no effect on responding and the data for both question forms were therefore collapsed for analysis Table 5 (a) and (b) give the number of subjects passing both the joke–lie questions and both the mental-state questions and the contingency between them. The results for all subjects are shown first followed by the results for
Second-order beliefs

Table 4. Contingency between correct answers on intent and belief questions

<table>
<thead>
<tr>
<th>Correct on</th>
<th>Autistic</th>
<th>Non-autistic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both tasks</td>
<td>6</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Intent only</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Belief only</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Neither</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>N</td>
<td>16</td>
<td>17</td>
<td>33</td>
</tr>
</tbody>
</table>

only those subjects who passed the Story Comprehension Questions. Results show that normal children passed both the mental state questions without passing both the joke–lie questions, but rarely gave the opposite pattern. This pattern was found in both analyses (8 vs. 1: binomial test, \( N = 9, X = 1, p < .02 \)) (6 vs. 0; binomial test, \( N = 6, X = 0, p < .02 \)). The same pattern was not found for autistic children who seemed either to pass both types of question or fail them both.

The chronological age (CA) [and assumed mental age (MA)] of normal children who passed both intention and belief questions and both joke–lie questions (Table 5a) was significantly higher than the CA of those who made at least one error \( (t (15) = 2.42, p < .03) \) (passers \( \bar{X} 5;6 \), failers \( \bar{X} 4;6 \)). The CA of autistic children who passed both sets of questions was not significantly different from the CA of those who failed at least one \( (t (14) = -0.02, \text{n.s.}) \). However, those who passed all the mental state and joke–lie questions were of significantly higher MA than those who failed \( (t (14) = 3.52, p < .003) \) \( (X \text{ MA passers} = 12.4, X \text{ MA failers} = 7.6) \).

Relationship between second-order tasks, false belief, mental age, pragmatic test scores and diagnosis

All five autistic subjects in Table 5 (b) who passed comprehension questions, mental state questions and joke–lie questions had previously passed the False Belief Test. These five had also given correct answers and mental state justifications for the ice-cream story. Three of these subjects had the highest mental ages in the sample (13;1, 15;1, 16;5). The other two had mental ages of 7 years, 4 months and 9 years, 8 months. Another false belief ‘passer’ (MA 11;3) did extremely well, passing all the comprehension and second-order mental state questions in the three story pairs. He also gave an appropriate justification in the ice-cream story but he failed one of the joke–lie questions. These six subjects had significantly higher verbal MA \( (t (14) = 4.00, p < .01) \) and pragmatic language scores \( (t (13) = 2.31, p < .05) \) than the other autistic children in the sample (pragmatic score for one second-order passer unavailable). However, it should be noted that the pragmatic language scores of our second-order “passers” whilst higher than our second-order ‘failers’ still fell below what would be expected in a normal population, with only two above the 10 centile, and all showed ‘oddness’ in their conversations (see Eisenmajer & Prior, 1991). In addition to these six subjects there were two other ‘partial’ passers who passed the comprehension questions for the ice-cream task only. One had previously passed and one had failed the false belief task. With these subjects included with the six second-order passers above, the
Table 5. Contingency between second-order mental state and joke–lie question (correct on both story pairs)

<table>
<thead>
<tr>
<th>Correct on</th>
<th>Autistic</th>
<th>Non-autistic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) All subjects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both questions*</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Mental state only</td>
<td>1</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Joke–lie only</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Neither</td>
<td>7</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>(b) Subjects passing comprehension questions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both questions*</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Mental state only</td>
<td>1</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Joke–lie</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Neither</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

*Two correct answers to mental state questions and two correct answers to joke–lie questions.

Discussion

This study showed that a substantial proportion of our autistic children (37.5%) could attribute second-order mental states by giving correct answers to the second-order mental state questions across three tasks, and an appropriate justification in the ice-cream story task. If we add the two 'partial' passers who passed the ice-cream story task this makes 50%. Our background data on these children showed that these children had a significantly higher verbal mental age and better pragmatic test scores than the rest of the group. Whilst they differed from the rest of the group in terms of language ability, however, they did not differ in terms of diagnostic history. The diagnostic data on these children showed a pattern of early classical autism. Nevertheless, if their current diagnosis was reviewed, four would seem to have recovered to ‘residual state’. These data support those of Ozonoff et al. (1991b) and Bowler (1992) showing that the least impaired on the autistic spectrum do have a second-order theory of mind, even where the developmental histories of these individuals show earlier classic signs of autistic impairment such as lack of pretend play and joint attention (Bowler, 1992). Our results also support previous findings showing that second-order mental state reasoning is associated with a high level of language ability (Ozonoff et al., 1991b) and that theory of mind development is delayed relative to the mental age of normal children (Baron-Cohen, 1989).

These language and diagnostic factors give important information on the characteristics of autistic children who pass second-order mental state tasks. However, they do not explain the good performance of both autistic and normal children in this
Second-order beliefs

In their original series of experiments, Perner and Wimmer (1985) showed that normal children did not develop a second-order theory of mind until aged 6–7 years, 2 years after understanding first-order beliefs. The normal subjects in our study, however, were only aged 4 and 5 years. Yet by 5 years, the majority of these subjects were able to reason about second-order beliefs and intentions. Furthermore, our data on previous false belief performance and performance on the comprehension questions showed a close correspondence between understanding first- and second-order mental states. This suggests that once children understand first-order mental states they may also begin to understand second-order mental states.

In order to examine this finding in more detail, it may first help to review earlier theoretical explanations for why second-order understanding develops several years later than first-order understanding. Perner and Wimmer's original proposal was that second-order beliefs were more difficult for young children than first-order beliefs because they form a doubly embedded proposition. [i.e. he thinks that (she thinks that . . .).] However, later studies on second-order intentions showed that even 5-year-old children could represent doubly embedded propositions of the form (he wants (her to think)), Leekam (1991) therefore suggested that the difficulty with second-order beliefs may be a problem of representing recursive representational states. Support for this idea came from research on first-order mental states showing that understanding of desire and intention precedes understanding of belief. The claim here is that intention is easier to grasp because unlike belief it does not require an understanding of mental states as representational (Perner, 1991; Astington, 1991). Our results from the present study, however, showed that unlike first-order mental state understanding, there is no difference in the understanding of intention and belief at the second-order level. Instead, it seems that normal and autistic children understand both false belief and second-order mental states at around the same time.

As children do not seem to have special difficulty with either doubly embedded propositions or with second-order beliefs over second-order intentions, we need to consider how our new methodology may have contributed to the results. Our results, like those of Nunez and Riviere (1991), show that when a simpler method is used, children of 5–6 years can pass tests of second-order belief attribution. Our particular methodology may have been beneficial for several reasons. First, it may be that presenting the child with two alternatives and asking “Which one?” is easier for them conceptually than presenting one scenario with different options. Pratt and Bryant (1990) found that this kind of method was easier when testing children on “which one knows?”, although the direct contrast paradigm used by Lewis and Freeman (1992) for false beliefs did not improve performance over the standard task.

However, another possibility is raised by Hughes and Russell (1992) with respect to first-order tasks. This is that an impairment in executive functioning ability in autistic children leads them to have difficulty in disengaging from objects in false belief tasks. Therefore, they cannot help themselves pointing to where the object is. This might apply to second-order tasks too. In the standard second-order belief task used by Baron-Cohen (1989) and Bowler (1992), the ice-cream van was positioned at the church when children were asked the Test Questions. In our tasks, however, there were no objects, only two pictures to be directly compared. In addition, the final picture in both stories in the pair, had the ice-cream van positioned midway between the park and church.
Further research is needed to pin down how the present methodology may be related to a conceptual problem with understanding higher order beliefs.

In addition to contributing to existing evidence on normal and autistic children's understanding of second-order mental states, however, the main aim of this study was to investigate the relationship between second-order reasoning and social judgements by testing the ability to label a social situation as a lie or a joke. Previous work has shown that normal children first become able to grasp second-order mental states and only later become able to apply this understanding to their judgements of the speaker's attitude behind the statement—i.e. whether a speaker is lying, joking, being mean, etc. (Leekam, 1991; Winner & Leekam, 1991). The present study replicated this finding for normal children. However, unlike normal children, autistic children tended to perform equally well on both second-order mental state judgements and joke–lie judgements. The older MA of the autistic children may account for this. The lag in understanding mental state compared with joke–lie judgements occurs only in normal children at the age of 5–7 years but once normal children are 8 or 9 years they also succeed on both tasks (Leekam, 1991).

The fact that some of our autistic sample were able to correctly label acts as jokes and lies all seems quite surprising given that humour and deception are usually considered to be beyond the comprehension of most autistic children (Frith, 1989). In addition, even where researchers have reported success on tests of second-order belief attribution, they have still commented that these successful individuals continue to lack social ability to a noticeable degree (Happe, 1991; Ozonoff et al., 1991b).

The present study shows that theory of mind “passers” can extend their understanding beyond mental states to the labelling of social situations. The next question is whether they can apply this understanding, not only to the hypothetical situations shown here, but also to everyday situations. We had the opportunity to make a direct comparison between their understanding of lies and jokes in a test situation and their understanding of lies and jokes in real life, by interviewing the parents of our autistic subjects and asking them for examples (if any) of their child’s ability to participate in jokes or tell lies.

The information given for lying showed that children did not tell lies and if they did, they immediately “told” on themselves, thus negating the effect. Parents reported that their children were “embarrassingly honest”, “not sly enough”, “would not know what a white lie was”. Most parents reported that their children did not lie at all. However, there were some reports of using rule-of-thumb ‘lies’, such as saying, “I didn’t do it, x did it”, when accused of doing something wrong (even if x had not been there), but there were no instances of intention to deceive in terms of taking account of another’s beliefs. There were no difference between second-order ‘passers’ and ‘failers’ in parents’ reports of lying behaviour. It was striking that all but one of the second-order passers were reported not to lie at all.

The information given for joking also showed no differences between second-order passers and failers. Parents reported that the use of jokes tended to involve the retelling or imitation of simple jokes or else rather basic teasing. Parents said their children’s humour was restricted to “only blatant or slapstick humour”, “tells jokes but they don’t make sense”. One parent reported that their child had learned a rule for dealing with other people’s jokes. “He knows you laugh at the end of one. He looks at your face for
Second-order beliefs

cues". There were occasional reports of "tricking" and "fooling around" to get a
reaction of surprise or annoyance, but no evidence of subtlety, irony or concept of joke
in terms of playing with another's disbelief. This finding supports very recent evidence
(St James, 1993) that although children with autism may show humour, very little of
this humour demonstrates any understanding of mental states.

These results indicate that even those autistic children who understand the distinction
between jokes and lies in theory, may not be effective at joking and lying in everyday
life. This is interesting in contrast to the literature on normal children’s lying and
joking. Parents of normal children tend to report the sudden appearance of deliberate
lies when the child approaches the age of 4 years (Stouthamer-Loeber, 1986; cited in
Perner, 1991) especially when these lies concern knowledge of mental states (McKenzie
& Hoogenraad, 1992). This coincides with the age that children acquire an
understanding of false beliefs. Some signs of deceptive and testing behaviour, however,
are found much earlier, before the child understands false beliefs (Reddy, 1991; Newton,
Reddy & Bull, 1992) and several studies also suggest that setting the false belief task
within a deceptive context may itself facilitate performance on this task (Hala,

Our study has shown that autistic children with high verbal MA can attribute first-
and second-order mental states, and can make appropriate social judgements about lies
and jokes. Yet, even if their language ability can account for their grasp of these mental
and social concepts, it does not seem to be related to the ability to engage in lying or
joking in their everyday life. This raises the question of how the development of mental
and social concepts relates to social and communicative ability. One possibility is that
while normal children can apply their developing mental and social concepts to
everyday situations, autistic children have difficulty in generalising or applying their
conceptual knowledge (Bowler, 1992; Frith, 1989). As social encounters are embedded
in context, the task of applying existing conceptual knowledge and extracting
meaningful information maybe what is difficult for them.

Before investigating this possibility it might be interesting to discover more about
how normal children use conceptual knowledge in a social situation. Whilst normal
children may benefit from applying their knowledge of the mind to social situations,
this does not mean that understanding deception and communication and engaging in
these acts depends on knowledge of mental states. There may be many aspects of social
life that do not rely on this knowledge and therefore many social abilities developing
independently or in parallel to theory of mind. Future research may need to compare
social abilities that do not require mental state understanding with those that do and
also investigate what facilitates the development of both. While the level of verbal ability
may play an important role in comprehending mental states, engagement in social
interaction itself may provide an essential basis for learning about social and
communicative events, and it is this social interactional basis of learning that autistic
children miss out on.

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