Communicative competence and theory of mind in autism: A test of relevance theory

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Abstract

Sperber and Wilson’s (1986) relevance theory makes explicit the role of the comprehension of intentions in human communication. Autistic people have been hypothesized to suffer from a specific and characteristic impairment in the ability to attribute such mental states (e.g., beliefs, intentions); a lack of “theory of mind”. According to relevance theory, then, autistic people should have specific difficulties with the use of language for communication. Relevance theory allows precise predictions about the levels of communicative competence that should be possible with either no, first-order only, or second-order theory of mind ability. Three experiments are reported which tested predictions following from the analysis of figurative language in terms of relevance and theory of mind, in able autistic and normal young subjects. The results lend support to relevance theory. In addition, the findings suggest that some autistic subjects are eventually able to attribute mental states. Lastly, the results demonstrate close links between social and communicative understanding in autism and normal development.

Introduction

Research into the autistic child’s theory of mind (Baron-Cohen, Leslie & Frith, 1985) has found a severe impairment in most autistic subjects’ ability to
comprehend another person’s false belief. Leslie (1987, 1988) has suggested that representing such mental states – along with pretence – requires metarepresentation. This level of secondary or metarepresentation seems to be lacking in the autistic person’s processing of social situations (e.g., Happé & Frith, in press; Sodian & Frith, 1992).

This impairment should have serious consequences for communication, if, as Sperber and Wilson (1987) claim, “communication exploits the well-known ability of humans to attribute intentions to each other” (p. 699). For people with autism, then, ostensive-inferential communication – which requires the recognition of intentions – may be an unattainable goal. What might be available, however, even to an individual with “mind-blindness”, would be coded communication. Indeed, coded communication would appear to approximate well the sort of simple, instrumental use of words (Fay & Schuler, 1980) and gestures (Baron-Cohen, 1989a) seen in many autistic individuals.

Without the ability to recognize the intention to inform, many autistic people may be unable to distinguish ostensive from non-ostensive behavior. Thus autistic children have been reported to show particular deficits in joint attention (Loveland & Landry, 1986; Mundy & Sigman, 1989; Mundy, Sigman, & Kasari, 1993), which can be linked theoretically to their other communication difficulties (Leslie & Happé, 1989). A failure to discriminate ostensive behaviour might go some way towards explaining the apparent “deafness” and delay in language learning seen in many autistic children – who (unlike normally developing children) do not orient to speech, but seem to treat it as part of the background noise (Kanner, 1943; Klin, 1991; Paul, 1987).

If a failure to represent intentions underlies the autistic communication handicap, what of the minority of autistic children who do pass first-order false belief tasks? While the possibility remains that these subjects are using some compensatory strategy and do not have a theory of mind (Frith, Morton, & Leslie, 1991), it is also plausible that a minority of autistic people do develop some sort of metarepresentational ability (Bowler, 1992; Happé, in preparation). These individuals will show peculiarities of communication (Frith, Happé & Siddons, submitted) and these require explanation.

It may be that some of this able minority understand first-order intentions, but not second-order intentions (intentions about others’ mental states). Baron-Cohen (1989b), for example, found that even the small minority of able autistic subjects who could attribute a first-order false belief failed a test requiring attribution of a second-order false belief (“Mary doesn’t know that John knows . . .”). A person who was able to attribute first- but not second-order mental states would be capable of recognizing a speaker’s informative intention, but not their communicative intention – which is a second-order intention

\[ ^1\text{To make mutually manifest the information X.} \]
\[ ^2\text{To inform the hearer of his intention to make X mutually manifest.} \]
This inability should, according to relevance theory, prevent them from mastering the small-talk which is so common in normal social life, and which is only relevant because it conveys the second-order communicative intention. In this respect, the account put forward here is interestingly different from other analyses of the role of theory of mind in communication. For example, Tager-Flusberg (1993), suggests that it is the autistic inability to use language to transmit information which is the paradigm area of communication breakdown: “autistic children do not seem to develop the understanding that conversations ought to entail the exchange of information. This appears to be at the heart of what makes communication with autistic people so difficult” (p. 153). By contrast, the account presented here (and more fully in Happé, 1991) suggests that the quintessential case of failure of communication due to lack of theory of mind will occur precisely where nothing but the intention to communicate is conveyed. In addition to this failure with phatic speech, an inability to represent thoughts about thoughts would preclude certain other sorts of speech acts – utterances which, according to Sperber and Wilson, are interpretations of the speaker’s thought about an attributed or desirable thought.

If most autistic individuals cannot represent a speaker’s intention, then communication should break down most noticeably where the speaker’s attitude must be taken into account in modifying the literal meaning of the utterance. Without the principle of relevance to guide them, the transparency of intentions that allows humans to use language in a truly flexible way is not open to autistic communicators. In the face of the puzzle that ostensive communication must pose them, they may have no choice but to adopt a rigid interpretation – a default value of the propositional form of the utterance.

It is widely reported (e.g., Happé, 1991; Tantam, 1991) that even the most verbally able autistic people fail to understand non-literal speech such as irony, joking and metaphorical expressions. From Sperber and Wilson’s theory it follows that these autistic people must also be peculiar in their understanding of non-figurative utterances. Indeed there is anecdotal evidence for this; able autistic speakers are often inappropriately pedantic in their communication (Szatmari, Bartolucci, Bremner, Bond, & Rich, 1989) and fail to recognize the connotations behind words (Frith, 1989; Happé, 1991).

Predictions from relevance theory: simile, metaphor and irony

According to relevance theory, *similes* can be understood at a purely literal level – saying, “He was like a lion” is no different from saying “He was like his father”. In both cases the hearer is set the task of deciding in what respect there is a similarity. The prediction is, therefore, that even autistic speakers who lack a theory of mind should be capable of using and understanding similes – since a literal interpretation will suffice.
Metaphor, on the other hand, requires some understanding of intentions. In a metaphor the propositional form of the utterance is a more or less loose interpretation of the speaker’s thought. Therefore metaphors cannot be fully understood or properly used without a first-order theory of mind – using a default value of literalness will not work. A parallel can be drawn with false belief tests. Just as in the false belief situation (but not the true belief case) the actor’s mental state (belief) is crucial, and reality alone is no guide to action, so in metaphor (but not simile) the speaker’s mental state (intention) is vital, and working with “reality” in the form of the literal meaning of the utterance is not sufficient for comprehension.

Lastly, irony is more demanding still, requiring as it does an understanding of second-order metarepresentation (a thought about an attributed thought). Sperber and Wilson (1981, 1986) argue that ironic utterances quote or refer to an attributed thought. When we exclaim, “Well, that’s very clever isn’t it!”, we are mentioning a possible thought and expressing our attitude towards it – an attitude of mockery. This argument is quite different from that made by classical theories (e.g., Grice, 1975), which have suggested that the literal meaning of an ironic utterance is first computed, and if this interpretation does not fit the context then the opposite meaning will be accessed. Under this analysis, understanding irony would not necessitate any ability that understanding metaphor does not also require, and so classical accounts of irony would predict success by subjects with only first-order theory of mind ability.

Relevance theory, then, can find a test case in autism. The theory leads to non-trivial and non-intuitive predictions about autistic language use, which are distinct from those of other linguistic theories. Combining theory of mind explanations of autism and relevance theory may help us to understand many of the features of even the most able autistic person’s communication.

**Subjects**

Subjects for this study had previously taken part in another experiment where their theory of mind abilities were assessed using a battery of tasks (Happe, in preparation). The battery consisted of false belief and deception tasks at two levels of difficulty: first-order tasks which required attribution of false beliefs about the world, and second-order tasks requiring attribution of false beliefs about beliefs. From the autistic subjects tested on the theory of mind battery, the most consistent were selected to form two groups: 6 subjects who passed all and only first-order tasks (referred to as “first-order ToM” autistics), and 6 subjects who performed most successfully on second-order tasks, scoring at least 6/8 on performance questions (“second-order ToM” autistics). In addition, 6 of the most able autistic subjects who had been tested during the search for subjects for the
Table 1. Subject characteristics for relevance battery (group means, (ranges) and standard deviations)

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Age</th>
<th>VIQ</th>
<th>PIQ</th>
<th>FIQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLD mean</td>
<td>14</td>
<td>19.9</td>
<td>55.6*</td>
<td>8.9</td>
<td>17.7</td>
</tr>
<tr>
<td>(range)</td>
<td></td>
<td>(12-38)</td>
<td>(40-89)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>s.d.</td>
<td>8.9</td>
<td></td>
<td></td>
<td>17.7</td>
<td></td>
</tr>
<tr>
<td>No-ToM autistics</td>
<td>6</td>
<td>17.6</td>
<td>62.3*</td>
<td>78.5</td>
<td>67.5</td>
</tr>
<tr>
<td>(10-28)</td>
<td></td>
<td>(52-76)</td>
<td>(46-112)</td>
<td></td>
<td>(45-90)</td>
</tr>
<tr>
<td></td>
<td>5.9</td>
<td></td>
<td>10.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st-ToM autistics</td>
<td>6</td>
<td>15.8</td>
<td>81.5</td>
<td>87.5</td>
<td>82.8</td>
</tr>
<tr>
<td>(9-25)</td>
<td></td>
<td>(64-100)</td>
<td>(64-106)</td>
<td></td>
<td>(64-102)</td>
</tr>
<tr>
<td></td>
<td>5.5</td>
<td></td>
<td>16.1</td>
<td>12.9</td>
<td>12.9</td>
</tr>
<tr>
<td>2nd-ToM autistics</td>
<td>6</td>
<td>17.5</td>
<td>89.5*</td>
<td>94.3</td>
<td>90.2</td>
</tr>
<tr>
<td>(11-26)</td>
<td></td>
<td>(58-101)</td>
<td>(79-123)</td>
<td></td>
<td>(69-112)</td>
</tr>
<tr>
<td></td>
<td>4.7</td>
<td></td>
<td>16.1</td>
<td>17.5</td>
<td>14.8</td>
</tr>
</tbody>
</table>

*From British Picture Vocabulary Scale.

*Significant difference between no-ToM and second-order ToM autistics on VIQ; ANOVA, $F(2, 16) = 5.35, p < .017$; Tukey studentized range method, $p < .05$.

theory of mind battery study, but who had failed first-order false belief tasks, were also included ("no-ToM" group). Subject characteristics for these three groups are shown in Table 1.

Every attempt was made to equate the three ToM groups for age and ability, and the groups did not differ on Wechsler performance IQ (ANOVA $F(2, 16) = 1.01, p < .39$) or full-scale IQ (ANOVA $F(2, 16) = 3.2, p < .07$). However, as can be seen from Table 1, the groups were not matched for verbal IQ (VIQ). The no-ToM group was significantly less able than the second-order group in terms of VIQ. There are many possible reasons for this. For instance, the verbal subtests of the WAIS and WISC-R may make greater pragmatic demands on the subject than do the performance subtests, and it may be this pragmatic competence that is revealed as being superior in those autistic subjects who pass theory of mind tasks.

In the results set out below, the comparison of interest is between the three autistic groups of different levels of theory of mind. However, a control group of individuals with moderate learning difficulties (MLD) were also tested, and their results are reported where relevant. All of these subjects passed both first- and second-order theory of mind tasks. Their characteristics are also included in Table 1 to show the relative advantage in verbal ability of all but the no-ToM autistic group. Since the no-ToM autistics are matched with the MLD controls for VIQ, any difference in performance between these groups is unlikely to be due to general intellectual impairment. Since the first- and second-order ToM groups did not differ significantly in VIQ, differences between these two groups on the
relevance battery tasks are also unlikely to be accounted for by general intellectual impairments.

**EXPERIMENT 1: SIMILE VERSUS METAPHOR**

The first prediction made above was that autistic people with no theory of mind and no understanding of intentions would fail to appreciate “loose usages”. These individuals could only operate with language, it was suggested, by taking the implicature of the utterance to be its literal meaning—leading to pedantic expression and a failure to understand figurative language. This inability to recognize the speaker’s thought behind the utterance, and that thought’s more or less loose relation to the utterance, has very severe implications. It means that such autistic people are *never* communicating like normal people. However, this difference will be more or less obvious according to the type of utterance used. So, when language is used purely literally (a surprisingly rare occurrence in normal communication, where indirect utterances are common), autistic people without a theory of mind may get by fairly well. However, when a literal interpretation will not suffice, the real communication handicap these people suffer should become evident.

In this experiment, two types of figurative language were used: simile and metaphor. These have been considered equivalent by many researchers (Miller, 1979; Ortony, 1979), and may well be treated much the same by normal communicators. Similes, by including the terms “as” or “like”, render the comparison they express *literally* interpretable. Metaphors, on the other hand, by omitting this term, are rarely literally true. So for example, it makes sense literally to say, “he was like a tree”, but it does not make literal sense to say “he was a tree”. Can the word “like” make so much difference? Not to normal communicators, who divine in either case the speaker’s intention (which might be exactly the same in the two examples above). To autistic people without theory of mind, however, the prediction is that the difference will be tremendous.

**Method**

The task materials can be seen in the Appendix. Each subject received three conditions: simile, metaphor and synonym. The synonym condition was a control condition to check that subjects could understand the task: it involved only literal, semantic word knowledge. In each condition the subject was asked to choose a word from a list of target words, to finish each of five sentences. The list of target words contained six items, that is, the five target words plus one distracter item.
Subjects were not prevented from using the same word twice, and no item could be worked out through a process of elimination. The sentences that the subjects had to complete were read out to the subject as often as desired and were in full view throughout the task. The subject’s choice for each sentence was recorded, and a score out of 5 given for each condition. The sentences themselves were balanced for condition, appearing equally often in each of the three conditions. The order of the conditions was counterbalanced across subjects.

Results

The results can be seen in Table 2, and graphically in Fig. 1. A repeated-measures ANOVA showed a significant group by condition interaction \((F(4, 30) = 4.39, p < .007)\). Although the no-ToM group was worse than the other groups on the synonym and simile conditions, these differences were not significant (Tukey, \(p < .1\)). The no-ToM group differed significantly, however, from the first- and second-order ToM autistics on the metaphor condition. In addition, a Wilcoxon signed-ranks test showed that the no-ToM group’s performance on the metaphor task was significantly worse than their performance on the simile condition \((p < .05)\), while there was clearly no such difference for the other two groups. In addition, the results of the no-ToM autistic group can be compared with those from the MLD controls, who were matched with them on verbal ability (see Table 3).

The no-ToM autistic group’s performance did not differ from the MLD controls in either the synonym (one-way ANOVA, \(F(1, 17) = 0.83, p = .375\)) or the simile condition (ANOVA, \(F(1, 17) = 3.30, p = .087\)). However, these autistic subjects did perform significantly less well than the controls in the metaphor condition. This pattern of findings suggests that the no-ToM autistic subjects’ failure with metaphor was not simply due to a general lack of verbal ability.

Table 2. *Sentence completion task: results from autistic subjects in three ToM groups*

<table>
<thead>
<tr>
<th>Group</th>
<th>Synonym Mean (s.d.)</th>
<th>Simile Mean (s.d.)</th>
<th>Metaphor Mean (s.d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-ToM autistics</td>
<td>3.67 (0.82)</td>
<td>2.83 (1.33)</td>
<td>1.50* (1.05)</td>
</tr>
<tr>
<td>1st-ToM autistics</td>
<td>4.17 (0.75)</td>
<td>4.33 (0.82)</td>
<td>4.17 (0.75)</td>
</tr>
<tr>
<td>2nd-ToM autistics</td>
<td>4.67 (0.82)</td>
<td>4.33 (0.82)</td>
<td>4.50 (0.55)</td>
</tr>
</tbody>
</table>

*No-ToM group perform significantly worse than other two groups, ANOVA \(F(2, 15) = 24.75, p < .000\); Tukey studentized range method, \(p < .01\).*
Table 3. *Sentence completion task: results from MLD controls and autistic subjects in no-ToM group*

<table>
<thead>
<tr>
<th>Group</th>
<th>Synonym Mean (s.d.)</th>
<th>Simile Mean (s.d.)</th>
<th>Metaphor Mean (s.d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-ToM autistics</td>
<td>3.67 (0.82)</td>
<td>2.83 (1.33)</td>
<td>1.50* (1.05)</td>
</tr>
<tr>
<td>MLD controls</td>
<td>4.00 (0.71)</td>
<td>3.69 (0.75)</td>
<td>3.39* (0.65)</td>
</tr>
</tbody>
</table>

*ANOVA, subject group by task type, $F(2, 34) = 4.86$, $p < .014$. Tukey studentized range method, $p < .01$.

**Discussion**

As predicted, the simple insertion of the word “like” rather than “really was” had a tremendous effect on the performance of the autistic subjects in the no-ToM group. That this group managed (on average) to choose the right term to complete a simile in around three of the five sentences is surprising and impressive. Their performance is not perfect; it is likely that understanding the speaker’s intention helps in deciding the point of comparison in a simile, even if it is not essential. The results tell us about the abilities and deficits behind the common observation of literal understanding of figurative language in autism: it is only when an utterance must be understood as an expression of a thought that autistic subjects without theory of mind are at a disadvantage compared with other, non-autistic, mentally handicapped individuals.

Since they fulfil the predictions made by relevance theory about the necessity of
representing intention for understanding metaphor, these results add weight to the claim that the three autistic groups are meaningfully different. Dividing the autistic subjects on the basis of their performance on theory of mind tasks created groups that performed very differently on a quite distinct task. This supports the validity of theory of mind tasks, and suggests that at least the no-ToM group really differs from the two groups who pass theory of mind tasks, in their understanding of mental states, in particular intention. The results also support the distinction between metaphor and simile which relevance theory (in contrast to other linguistic theories, e.g., Grice, 1975) allows.

EXPERIMENT 2: METAPHOR VERSUS IRONY

Irony may be defined as the use of words to express something other than, and especially the opposite of, the literal meaning of an utterance. An ironic utterance usually is, but need not be, also an instance of sarcasm, that is, a bitter or wounding remark. Work in the developmental literature on the understanding of irony has suggested that children as old as 13 cannot reliably interpret irony, and tend to misjudge it as deception (Demorest, Meyer, Phelps, Gardner, & Winner, 1984; Demorest, Silberstein, Gardner, & Winner, 1983). Other studies place this achievement at a younger age (Winner, 1988), although most authors agree that children under 6 years consistently fail (Ackerman, 1983, 1986). The analyses in most of the developmental literature are quite different from Sperber and Wilson's (1981, 1986; Sperber, 1984) theory of irony. Sperber and Wilson suggest that irony involves mentioning some attributed thought, with a mocking attitude. Gibbs (1986) has explored this "echoic mention theory" in normal adult subjects. From the results of three reading-time studies, Gibbs concludes that subjects do not need to process the literal meaning of a sarcastic utterance before deriving their non-literal interpretation, and that ease of processing and memory for irony depends on how explicitly the speaker's utterance echoes a putative belief, opinion or statement. These findings, and those of Jorgensen, Miller, and Sperber (1984), lend support to Sperber and Wilson's theory. However, the theory has not yet been tested developmentally.

The echoic mention theory of irony suggests that irony is different from other figurative language in requiring the recognition of a thought about an attributed thought - second-order metarepresentation. As such, irony should present problems of interpretation to subjects with only first-order theory of mind skills, be they autistic or young normal subjects. The relation between metarepresentational capacity and irony comprehension has received some attention from Winner and Leekam (1991), who predicted that second-order belief attribution ability would be necessary to distinguish irony from deception. They found that, as predicted, ability to judge the emotional tone of an utterance was dependent on
ability to judge the speaker's desire about the hearer's belief. The authors did not, however, test theory of mind understanding outside their irony/white lie stories. In the following two experiments, the prediction that comprehension of irony requires representation of second-order metarepresentations was tested in autistic and young normal subjects.

EXPERIMENT 2.1: UNDERSTANDING OF METAPHOR VERSUS IRONY IN AUTISTIC SUBJECTS GROUPED BY THEORY OF MIND PERFORMANCE

Method

Subjects (as above) were tested individually, and were read five stories like the example shown in the Appendix. They were asked what the story characters meant by their ironic or metaphorical utterance and were prompted, following their reply, with forced-choice questions. Results are reported for the subjects' answers to the forced-choice questions. Performance was scored out of 5 for metaphor and 5 for irony, the correct answer in each case being that implied by the story.

Results

Subjects' performance on the five metaphor and five irony questions can be seen in Table 4 and Fig. 2. The lack of variance in the scores of the second-order TOM autistics meant that an ANOVA could not be performed. Instead, Kruskal–Wallis tests showed that there were significant group differences on both the metaphor and irony questions ($H = 10.6$, d.f. = 2, $p < .01$). Follow-up comparisons of the two closest groups, using Mann–Whitney tests, showed that the

<table>
<thead>
<tr>
<th>Group</th>
<th>Metaphor (max. = 5)</th>
<th>Irony (max. = 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (s.d.)</td>
<td>Mean (s.d.)</td>
</tr>
<tr>
<td>No-TOM autistics</td>
<td>2.33 (0.82)</td>
<td>1.33 (0.52)</td>
</tr>
<tr>
<td>1st-TOM autistics</td>
<td>4.67 (0.82)</td>
<td>2.50 (1.76)</td>
</tr>
<tr>
<td>2nd-TOM autistics</td>
<td>5.00 (0.00)</td>
<td>5.00 (0.00)</td>
</tr>
</tbody>
</table>

*aNo-ToM group worse than first-order group, $p < .005$ (first- and second-order groups not significantly different, $U = 15$).

*bSecond-order ToM group better than first-order group, $p < .01$ (no-ToM and first-order groups not significantly different, $U = 10$).
significant differences lay between the no-ToM group and the first-order group for metaphor ($U = 1.5$, $p < .005$, one-tailed), and between the first- and second-order ToM groups for irony ($U = 3$, $p < .001$ one-tailed).

The no-ToM autistics differed from both first- and second-order ToM autistics on the metaphor task, while the two groups with some theory of mind did not differ. This confirms the finding in Experiment 1, that first-order theory of mind is vital for the comprehension of metaphor. The first-order autistic subjects differ from the second-order ToM subjects, however, in their understanding of irony, being significantly worse at choosing the correct, non-literal interpretation of ironic utterances.

The first-order ToM autistics did not differ from the MLD controls on metaphor, but were significantly worse than the controls on irony (see Table 5). Since the MLD subjects had rather lower VIQ than these autistic subjects, this

Table 5. *Metaphor versus irony task: results from first-order ToM autistic subjects and MLD controls*

<table>
<thead>
<tr>
<th>Group</th>
<th>Metaphor (max. = 5)</th>
<th>Irony (max. = 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (s.d.)</td>
<td>Mean (s.d.)</td>
</tr>
<tr>
<td>1st-ToM autistics</td>
<td>4.67 (0.82)</td>
<td>2.50* (1.76)</td>
</tr>
<tr>
<td>MLD controls</td>
<td>4.71 (0.47)</td>
<td>4.36* (0.63)</td>
</tr>
</tbody>
</table>

*MLOs perform significantly better than first-order ToM autistics (ANOVA, group by task, $F(1, 18) = 20.55$, $p < .000$).
finding rules out the possibility that the autistics' poor performance on irony questions was due to low general verbal ability. Despite a quite low VIQ, subjects in the MLD group, all of whom showed second-order theory of mind ability, were able to interpret ironic utterances in a story context.

Discussion

The prediction that second-order metarepresentation is necessary to comprehend irony as an expression of speaker's attitude to an attributed thought was confirmed in the autistic subjects. The tendency towards literal interpretation of metaphoric and/or ironic utterances, shown by some of the autistic subjects, is once again striking. Numerous studies now exist to support the contention that the literal form of such utterances is not processed by normal adult listeners. Gibbs (1984) reviews much of this research and concludes that for normal communicators "the distinction between literal and metaphoric meanings . . . [has] little psychological validity" (p. 275).

EXPERIMENT 2.2: METAPHOR AND IRONY IN YOUNG NORMALLY DEVELOPING CHILDREN WITH OR WITHOUT SECOND-ORDER THEORY OF MIND

Subjects

The subjects for this experiment came from a large comprehensive school in outer London. Subject characteristics are shown in Table 6. The two groups were equated for both age and verbal ability. The only feature that distinguished the children – as far as could be seen – was second-order theory of mind understanding.

Table 6. Subject characteristics for normal children in metaphor/irony task.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Age Mean</th>
<th>Age Range</th>
<th>VIQ Mean</th>
<th>VIQ Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failers</td>
<td>9</td>
<td>5.4</td>
<td>4.10–5.8</td>
<td>99.7</td>
<td>92–124</td>
</tr>
<tr>
<td>Passers</td>
<td>5</td>
<td>5.3</td>
<td>4.9–5.8</td>
<td>97.6</td>
<td>84–108</td>
</tr>
</tbody>
</table>

"Subjects grouped according to performance on second-order false belief tasks."
Method

Subjects were tested individually in a quiet room, as described above. In addition to the five stories, these subjects were given the British Picture Vocabulary Scale (BPVS) and both first- and second-order false belief tasks from the theory of mind battery. All subjects passed the first-order task. They were allotted to the "passers" or "failers" groups on the basis of their performance on the second-order task. Subjects were asked for justifications in the latter task, but these were not used for grouping the subjects, since verbal justification appears to underestimate competence in normal subjects (Bowler, 1992; Happé, in preparation).

Results

The results for the young normals grouped by performance on the second-order theory of mind task are shown in Table 7, and graphically in Fig. 3. Statistical analysis was unnecessary for these results, since there was no overlap between the performance of the passers and failers on irony. All the second-order theory of mind passers scored near-perfectly on irony (4 or 5 out of 5), while the failers scored no more than 3 out of 5. Both groups were at ceiling on metaphor comprehension, however, supporting the claim that first-order theory of mind alone is necessary for understanding metaphor.

Discussion

In young normal children, as in the autistic sample, performance on second-order theory of mind tasks is a very good predictor of comprehension of irony. The finding in both experiments, that only second-order theory of mind passers understand irony, supports Sperber and Wilson's echoic theory of irony. The results also support the validity of the subgroups, which are distinguished only by theory of mind task performance. Whatever differs in the second-order passers

<table>
<thead>
<tr>
<th>Group</th>
<th>Metaphor</th>
<th>Irony</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>(range)</td>
</tr>
<tr>
<td>Failers</td>
<td>4.7</td>
<td>(4-5)</td>
</tr>
<tr>
<td>Passers</td>
<td>4.6</td>
<td>(3-5)</td>
</tr>
</tbody>
</table>

Table 7. Metaphor/irony task results for young normal children (group means and ranges)
versus failers has a demonstrable association with communicative competence, as tested here.

The success of the normal young passers on the irony task is surprising in view of the developmental literature, which rarely credits children under 6 with comprehension of irony. The earlier than usual success may be in part due to the forced-choice prompt question, and to the minimal memory component in the present task. The subjects here were also fairly young to be passing second-order theory of mind tasks. Perner and Wimmer (1985) found that few children passed such a task before their sixth year (57% of 4–6-year-olds, and 86% of 6–9-year-olds passed both their second-order tasks). However, here passing was judged on the child's answer to the "where" question, and a correct mental state justification was not required. In addition, efforts were made to find children of the same age who passed and who failed. Thus the children included were probably just at the turning point between first-order only and second-order theory of mind ability. This makes the dramatic difference found in understanding irony all the more striking.

GENERAL DISCUSSION

In this study, relevance theory was used as a framework for understanding the specific communicative impairment found in autistic people of different ability.
levels. This theory helps us to understand the autistic communication handicap by showing how a theory of mind, and specifically the ability to represent intentions, may be vital for normal ostensive-inferential communication. Relevance theory allows us to reason from the now well-known work showing a deficit in autistic subjects' theory of mind to the well-documented autistic communication handicap (Frith, 1989; Schopler & Mesibov, 1985). It goes further than this, too, in relating degree of metarepresentational ability to degree of communicative ability in a quite specific way. The application of relevance theory to autism, therefore, both generates testable predictions about the nature of the autistic communication handicap, and leads to a possible method of testing relevance theory. Sperber and Wilson have regretted the fact that, “the view developed in ‘Relevance’ is very speculative and, as it stands, too general to determine . . . specific experimental tests” (Sperber & Wilson, 1987, pp. 709–710). Autistic communication, then, may serve as a valuable test-case for relevance theory.

The predictions about the degree of theory of mind necessary for understanding simile, metaphor and irony were confirmed in the present study. The sample sizes were small, due to the rarity of autism and the verbal ability and theory of mind requirements. The significant results are therefore all the more surprising, but will require replication. Autistic subjects who failed all the theory of mind tasks were found to have significantly lower VIQ than those who passed. Despite this, they were able to complete sentences involving a simile, but failed when the phrase “was like” was replaced by “really was”. Autistic subjects of the same age and ability, but who passed first-order theory of mind tasks, were able to complete and comprehend metaphors, in two separate tests, but failed to understand ironic utterances, attributing a sincere/literal meaning to the speaker. Autistic subjects who passed second-order theory of mind tasks, however, comprehended not only similes and metaphors, but also irony. In a small sample of normal children, divided on the basis of performance on a second-order false belief task, theory of mind performance was again predictive of performance on the metaphor/irony task. The results support Sperber and Wilson’s analysis of figurative language. For example, the results of the irony task were predicted by these authors’ echoic theory but not by classical theories of irony.

In summarising the findings so far, an attempt has been made to refer only to theory of mind task performance, and not to theory of mind itself (i.e., underlying competence). The issue of delay versus deviance has received much discussion in the study of autism (Burack, 1992; Baron-Cohen, 1992). Frith, Morton, and Leslie (1991) and Happé (in preparation) have discussed this issue with respect to the success of a minority of autistic subjects on theory of mind tasks. What is different about those autistic people who come to pass theory of mind tasks? Are they simply better problem-solvers, more able to devise a strategy to answer the theory of mind questions – thanks perhaps to more experience, higher IQ or a more sociable disposition? Or are passers and failers
distinguished by a real difference in the ability to represent and manipulate mental states?

From the results of the experiments presented here some tentative conclusions can be reached about this question. Whatever distinguishes the autistic subjects in the three theory of mind groups has a direct and particular association with the comprehension of figurative language. In the absence of other differences, the confirmation of the predictions made would seem to suggest a real difference among the groups in underlying theory of mind competence. The results from the normal subjects reinforce this conclusion. The obvious question for future research, then, must be to explain the persisting social and non-social impairments seen in even those autistic subjects who appear to have developed the ability to think about thoughts.

References


Happe, F.G.E. (in preparation). Does the autistic child ever have a theory of mind?


APPENDIX

Experiment 1: simile versus metaphor task materials

Synonym condition

(1) The oak tree was so knarled and crooked. It really was . . .
(2) Jane was so pale and quiet. She really was . . .
(3) Sarah was so beautiful. She really was . . .
(4) Steve was always rushing around, leaving everything in a mess. He really was . . .
(5) Everyone found it hard to make friends with Penny. She really was . . .

Choose one item from the following list to complete each sentence:

lovely unwell energetic ancient generous unapproachable

Simile condition

(1) The dog was so wet. It was like . . .
(2) Carol glared at Nicola. She was so cross. Her eyes were like . . .
(3) The night sky was so clear. The stars were like . . .
(4) Simon just couldn't make Lucy understand. She was like . . .
(5) Caroline was so embarrassed. Her face was like . . .

Choose one item from the following list to complete each sentence:

a brick wall dresses daggers a beetroot a walking puddle diamonds

Metaphor condition

(1) The dancer was so graceful. She really was . . .
(2) Father was very very cross. He really was . . .
(3) Michael was so cold. His nose really was . . .
(4) Ian was very clever and tricky. He really was . . .
(5) Ann always felt safe with Tom. He really was . . .

Choose one item from the following list to complete each sentence:

an icicle a fox a safe harbour a hat a swan a volcano

N.B. Each set of five sentences appeared equally often in each of the three conditions.

Experiment 2: example of the metaphor versus irony task materials

Cake story

David is helping his mother make a cake. She leaves him to add the eggs to the flour and sugar. But silly David doesn’t break the eggs first – he just puts them in the bowl, shells and all! What a silly thing to do! When mother comes back and sees what David has done, she says:

“Your head is made out of wood!”*

Q: What does David’s mother mean? Does she mean David is clever↑ or silly↓?

Just then father comes in. He sees what David has done and he says:

“What a clever boy you are, David!”*

Q: What does David’s father mean? Does he mean David is clever↑ or silly↓?

*The order of presentation of the metaphorical and ironic utterances was varied systematically in all stories.
↑The order of the alternatives presented was varied systematically in all stories.