

## Can we teach children with autism to understand emotions, belief, or pretence?

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### Abstract

Previous studies have revealed a "theory of mind" impairment in children with autism. The aim of this study was to assess whether it is possible to intervene by teaching children with autism to understand the mental states of emotion, belief, or pretence. Results showed that it is possible to teach children with autism to pass tasks that assess emotion and belief understanding. Introducing unfamiliar materials in structurally similar tasks did not adversely influence teaching effects, either immediately after teaching, or 2 months later. However, teaching effects did not generalize to tasks in domains where children received no teaching. In addition, no significant progress in spontaneous pretend play resulted from teaching. These results indicate that children may be passing tasks using rules rather than any genuine understanding of the concepts involved.

The ability to understand mental state occurs quite spontaneously in childhood (As-

tington, Harris, & Olson, 1988; Perner, 1991; Wellman, 1990). An increasing number of studies show, however, that children with autism have specific difficulties in reasoning about mental states, and have suggested that these difficulties underlie the children's social and communication abnormalities (see Baron-Cohen, 1995, for a recent review). In other words, unlike normal children, children with autism do not develop an understanding of mental state concepts in the natural course of development. In this article, we report a study that aimed to establish whether it is possible to teach children with autism to understand mental states. To explore this possibility, three areas of difficulty were targeted for teaching: understanding emotion, understanding belief, and the production of pretend play.

Previous studies reveal autism-specific deficits in each of the three areas of teaching. Thus, with respect to emotion, evidence suggests that children with autism fail to understand some aspects of emotion. For example, recognition of facial expressions

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of emotion may be impaired, especially the "complex" emotions like surprise (Baron-Cohen, Spitz, & Cross, 1993; Hobson, 1986a, 1986b). In addition, children with autism have difficulty in predicting a person's emotion on the basis of their beliefs (Baron-Cohen, 1991a).

There is also evidence for deficits in understanding belief in autism. For example, children with autism have difficulty understanding the role of seeing in knowledge acquisition (Baron-Cohen & Goodhart, 1994; Perner, Frith, Leslie, & Leekam, 1989). Additionally, they have problems predicting someone's action on the basis of that person's knowledge (Leslie & Frith, 1988). Furthermore, the majority of children with autism make errors in predicting a character's behavior on the basis of that person's false belief (Baron-Cohen, Leslie, & Frith, 1985; Perner, Frith, Leslie, & Leekam, 1989). Consistent with these reports is the observation that children with autism use few cognitive mental state terms in their speech—terms such as *think*, *imagine*, or *know* (Tager-Flusberg, 1992).

With respect to the third area of teaching, pretend play, autism-specific deficits have also been found. Normally, pretend play is present from around 18 months of age (Fein, 1981; Leslie, 1987). In comparison, children with autism with a verbal mental age (VMA) well above 18 months show little or no spontaneous pretence (Baron-Cohen, 1987; Gould, 1986; Ungerer & Sigman, 1981).

A number of recent studies have aimed to teach children with autism to understand mental states. These have focused on teaching children to understand false belief (Bowler, Stromm, & Urquhart, 1993; Ozonoff & Miller, 1995; Swettenham, in press; Swettenham, Gomez, & Walsh, in press; Whiten, Irving, & Macintyre, 1993), or to distinguish appearance and reality (Starr, 1993). Teaching in these studies was presented through a variety of media, including computers (Swettenham, in press), photographs (Swettenham et al., in press), and real actors (Whiten et al., 1993). In addition, Bowler et al. (1993) used behavioral

and emotional cues to help children understand false belief, while Starr (1993) utilized a direct instruction approach to teach the appearance-reality distinction. These studies (except for Bowler et al., 1993) used repetition of the task, plus feedback, and the results were remarkably consistent. Almost all children with autism were able to learn to pass the tasks and, in some cases, maintain what they had learned over a period of 2 months or more. There was little evidence, however, that children could generalize what they had learned when tested on similar tasks presented in different paradigms.

The teaching approach adopted in this investigation aimed to extend these previous studies in a number of ways. First, teaching was aimed at a wider set of mental state concepts including emotion, belief, and pretence. Secondly, the aim was to make learning as natural as possible. This was achieved in two ways: Each of the concepts was ordered into five successive levels of understanding; Level 1 was the simplest level, and Level 5 was the most difficult. This, we hoped, might mirror some of the steps that normal children progress through in acquiring these concepts; We also aimed to achieve a natural learning environment by using a broad range of methods, which included play, pictures, and games. Additionally, children were provided with *general principles* to help them generalize specific mental state concepts (Baron-Cohen & Howlin, 1993). Evidence suggests that teaching children about the principles that underlie concepts is more effective than simple instruction, as it helps children to generalize what they learn more effectively (Perry, 1991). In this way, an attempt was made to formalize and make explicit principles that in normal development are presumably implicit.

Children were taught in one of three areas: emotion, belief, or pretence. There were four broad teaching aims. The first aim was simply to establish at what level to begin teaching. The second was to assess the immediate effects of teaching within each group. The third and fourth aims con-

cerned the wider effects of teaching. If teaching did have a positive effect, then would the introduction of novel materials have any influence on this effect? (Near generalization.) Finally, did teaching in one area of mental state understanding have beneficial effects for understanding in areas where no teaching was given? (Distant generalization.)

## Method

### *Participants*

Thirty children with autism took part in the study. Children were drawn from two sources. Fifteen children had responded to an advertisement in *Communication* (the parent magazine of the National Autistic Society, U.K.) requesting volunteer families to take part in this research project. The remaining children were drawn from local schools for children with autism and related disabilities. Children were randomly allocated to one of the three teaching groups; emotion, belief, or play, making 10 children in each group. Twenty-nine children were Caucasian, and 1 child (in the play group) was of Asian origin. Information on parental status was obtained for 20 children<sup>1</sup> (6 children in the emotion group, 7 in the belief group and 6 in the play group). Of these, 2 children (in the belief group) lived with their biological mother only. The remaining 18 children lived in families where both biological parents were present. Nine mothers (3 in each teaching group) were employed: 3 mothers were medical personnel; 3 were educational workers; 2 were in business; and 1 mother was a secretary. All 18 fathers were employed: 8 were businessmen; 2 were in the armed forces; 1 was an educational worker; 3 were skilled laborers, and 1 was a general laborer; the final 2 fathers included a fireman and a taxi driver. The information on these 20 children indicates that the sample was of mixed socioeconomic status.

1. Complete information was not available for the whole sample.

All children had some expressive language. Furthermore, four of the children had a VMA near or greater than their chronological age. These four children comprised one child in each of the pretend and belief teaching groups and two children in the emotion group. For all other children, their VMA (expressive and receptive) was below their chronological age. Details of the subjects for each teaching group are shown in Table 1.<sup>2</sup> All children met conventional criteria for the diagnosis of autism (Rutter, 1978; American Psychiatric Association, 1987).

### *Procedure and design*

An overview of the experimental design is shown in Table 2. On Day 1, children were given a pretest. The pretest assessed children's understanding of belief and emotion concepts and recorded their level of play. Children were then given teaching (Day 2 to Day 9) in one of the three areas: emotion, belief, or play.<sup>3</sup> Teaching lasted for eight, consecutive, daily, half-hour sessions, or until children reached criterion (see below). Immediately after the eight sessions' teaching period, children were given a posttest on Day 10 to reassess their understanding in all three areas (emotion, belief, and play). Children were tested again approximately 2 months later to assess the maintenance of teaching effects over time.

### **Assessment, teaching content, and teaching strategies in each group**

#### *Assessment*

*Assessing emotion and belief understanding.* To assess children's understanding of emotion and belief, both were split into five

2. Expressive and receptive VMA was not significantly different across the three teaching groups ( $F(2, 30) = 2.59, p = .094$  for expressive VMA, and  $F(2, 29) = 1.14, p = .33$  for receptive VMA).

3. The decision to teach children in only one area of mental state understanding, rather than in all three areas, was made to address the empirical question of whether a specific domain is more amenable to change. This range of domains adds to the findings of previous teaching studies.

**Table 1.** Chronological age (CA) and verbal mental age (VMA) of children in each teaching group

	Teaching Group		
	Emotion	Belief	Play
<i>N</i> (male/female)	10 (9/1)	10 (10/0)	10 (8/2)
CA			
Mean	9.02	9.02	9.03
SD	2.09	2.06	2.04
Range	4.08–9.06	5.03–13.07	4.04–13.03
VMA			
TROG <sup>a</sup> (Test for the Reception of Grammar)			
Mean	5.08	5.02	5.00*
SD	2.05	1.05	1.06
Range	3.03–11.0	2.00–8.00	3.03–9.00
EO-WPVT <sup>b</sup> (Expressive One-Word Picture Vocabulary Test)			
Mean	7.01	4.55	4.07
SD	3.01	1.55	1.04
Range	3.05–12.00	2.75–8.41	3.01–7.02

Note: No two groups differ at the  $p = .05$  level, for either of the VMA measures given above.

<sup>a</sup>Bishop (1979).

<sup>b</sup>Gardner (1979).

\* $N = 9$ .

**Table 2.** Overview of the design

Pretest	Teaching	Posttest	Follow-up
Session 1 Day 1	Sessions 2–9 More than 8 days	Session 10 Immediately	Session 11 ~2 months later

developmental levels, in which Level 1 was the simplest level of understanding, and Level 5 the most complex. Assessment of emotion and belief understanding started at Level 1 and progressed up to Level 5. Assessment stopped when children failed two consecutive levels. For each level, children were required to demonstrate a satisfactory understanding of the concept being tested. This involved passing four tasks in a row.<sup>4</sup> To reach criterion children had to pass the tasks at Level 5.

*Assessing play.* To assess play, children were given a set of toys to play with for 10

min, and the play session was videorecorded. The initial recording was used to establish children's level of pretence. Five levels were created and these reflected both the quality and the quantity of children's play.

#### *Teaching content*

A summary of the five assessment and teaching levels for emotion, belief, and play is shown in Table 3.

*Teaching emotional understanding.* Teaching emotion centered on children's understanding of aspects of others' emotions. The progression of teaching levels in the emotion group was based on the development of

4. The exceptions to this were Levels 1, 2, and 4 for belief understanding where children only had to pass three tasks in a row.

**Table 3.** *The five teaching levels in each group*

	Emotion	Belief	Pretence
Level 1	Photographic facial recognition (happy/sad/angry/afraid)	Simple perspective taking	Sensorimotor play
Level 2	Schematic facial recognition (happy/sad/angry/afraid)	Complex perspective taking	Functional play ( $\leq 2$ examples)
Level 3	Situation-based emotions (happy/sad/angry/afraid)	Seeing leads to knowing (self/other)	Functional play ( $> 2$ examples)
Level 4	Desire-based emotions (happy/sad)	True belief/action prediction	Pretend play ( $\leq 2$ examples)
Level 5	Belief-based emotions (happy/sad)	False belief	Pretend play ( $> 2$ examples)

emotional understanding from the normal literature (Smiley & Huttenlocher, 1989). The first three emotion levels, therefore, focused on teaching external indicators of others' emotions. The final two levels aimed to teach children the idea that emotions can have internal, cognitive causes (Ortony & Clore, 1988).

At Level 1, children were taught to recognize four photographic facial expressions of emotion: happy, sad, anger, and fear (from Ekman, Friesen, & Ellsworth, 1972). Level 2 taught children to recognize the same expressions, this time depicted in black and white facial cartoons (based on illustrations from Hobson, 1986a).

Typical *situations* as causes of happiness, sadness, anger, or fear were taught at Level 3. Situational understanding of emotion of normally present by the age of 3 years (Harris, 1989). Children were shown an "emotional picture" and given an appropriate description, and were asked how the story character felt. Children would either reply orally, or alternatively point to one of the four cartoon faces to indicate how the protagonist felt. Here, "happy situations" described someone being given something nice, or being involved in an exciting situation. "Sad situations" included someone breaking something, being separated from someone, or losing something special. "Fear situations" involved frightening animals, or a harmful event. Finally, "Anger situations" described one story character deliberately provoking another; for example, one char-

acter deliberately destroying or stealing another character's belongings, or intentionally blocking his or her goal (Stein & Levine, 1989).

Level 4 of emotional understanding taught children about *desires* as causes of emotion. Desire-based emotion is usually understood by the age of 3 years (Yuill, 1984). Two pictures were used for each story. The first picture presented a protagonist along with a pictorial representation of his or her desire. The second picture revealed the story outcome. Children were asked to predict whether the protagonist would feel happy or sad. Outcomes were equally attractive and varied only in terms of whether or not they fulfilled characters' desires.

Finally, Level 5 of emotion taught children to understand that *beliefs* can cause emotion. Belief-based emotion is normally understood by 5 to 6 years of age (Hadwin & Perner, 1991; Harris, Johnson, Hutton, Andrews, & Cooke, 1989). Stories at this level were presented in three pictures. The first picture showed the actual situation. The protagonist was portrayed in the second picture along with two pictorial representations, one showing the character's desire and one showing his/her belief. The protagonist's belief was either true or false. Similarly, the protagonist's desire was either fulfilled or not fulfilled. The possible combinations of belief and desire resulted in four different stories: true belief and fulfilled desires; true belief and unfulfilled

desires; false belief and fulfilled desire; or false belief and unfulfilled desire. The final picture revealed the protagonist in the actual situation, and children were asked to predict how he or she felt. Examples of the emotion stories for assessment and teaching at each level are shown in Appendix A.

*Teaching belief understanding.* In this group it was assumed that a critical precursor for belief understanding is perception (Baron-Cohen, 1991b; Gopnik, Slaughter, & Meltzoff, 1994). In other words, before children can understand that people can have different beliefs, they have to understand that people can see different things. Similarly, if children are to understand that people can have different beliefs about one situation, they have to understand that people can have different perspectives of the same object. For this reason, perspective taking tasks were taught before belief tasks.

At Level 1, simple perspective taking was taught, that is, teaching children that different people can see different things. This is normally understood by 2-year-olds (Flavell, 1978; Flavell, Everett, Croft, & Flavell, 1981). Level 2 taught complex perspective taking, that is, teaching the child to judge not only what people can see, but how it appears to them. This is normally understood by the age of 4 years (Flavell, Everett, Croft, & Flavell, 1981).

Level 3 taught children the principle that "seeing leads to knowing." For example, one of a pair of objects was hidden in a box and only one person was allowed to see which of the objects it was. The child had to recognize that only the person who looked in the box would know what was in there. This is normally understood by the age of 4 years (see for example, Pratt & Bryant, 1990).

Level 4 taught children to extend the link between seeing and knowing, to predict a character's action. Here, two identical objects were shown in two separate locations, but a story character has only seen one of the objects. Children were asked to predict where the story character would go to find the object. Children should appreciate that

the story character will search for the object in the location where they had last seen it, since that is where they will think it is. This is normally understood by the age of 3 to 4 years (Wellman, 1990).

Finally, Level 5 taught children about their own, or another person's false belief. Two variants of false belief tasks were used. The first was the unexpected transfer task (Wimmer & Perner, 1983; Baron-Cohen, Leslie, & Frith, 1985). The second paradigm used was the unexpected contents task (Perner, Leekam, & Wimmer, 1987; Perner, Frith, Leslie, & Leekam, 1989). Children normally understand these by 4 years of age (Perner, 1991). Examples of the stories used to assess and teach belief understanding are shown in Appendix B.

*Teaching play.* The levels in this group reflected both the quality and quantity of play. For the purpose of assessing children's play (while playing on their own), children were given a Level 1 score if their play was simply *sensorimotor*. This level would include behaviors such as banging, sucking, or lining up toys. Children were scored at either Level 2 or 3 if some *functional play* was shown, where this involved using toys in socially conventional ways. If children showed two or fewer examples of functional play, they were scored at Level 2; while if they showed more than two examples, they received a Level 3 score. Levels 4 and 5 were reached if children produced any spontaneous *pretend play*. Pretend play was scored using Leslie's (1987) criteria. Here pretence is characterized as "acting as if something is the case when it is not." (Leslie, 1987, p. 414) and is split into three types of play behavior. These are *object substitution* (e.g., pretending a shell is a cat<sup>5</sup>), *attribution of pretend properties* (e.g., pretending a doll's [clean] face is dirty), and the use of *imaginary objects* (e.g., pretending a spoon is there when it is not). Differences between Levels 4 and 5 reflect the quantity of pretend play. Level 4 was scored if two or fewer

5. All the examples of pretend play are borrowed from Leslie's paper (see Leslie, 1987, p. 414).

examples of pretence were produced overall, while Level 5 was scored when more than two examples of pretence were shown.

In the play group, teaching began at a functional level (Levels 2 and 3) and pretend play (Levels 4 and 5) was gradually introduced into the play context. To assess children's play *during teaching*, a distinction was made between spontaneous play and elicited play (this distinction is explained below under teaching strategies).

#### *Teaching strategies*

*Starting to teach, and moving up the levels.* The pretest assessment served to indicate at which level teaching should begin. Within each group teaching began at the level where the child first failed any given task. Teaching was carried out by one of two experimenters (JH or KH).

*Teaching strategies in the emotion and belief groups.* Daily teaching session began with an assessment of the level of understanding currently being taught. This assessment served to indicate whether children were now able to pass tasks taught the previous day. If children passed all the tasks at their current level, then the teacher moved on to the next level of teaching. When children passed one level they were immediately assessed on their ability to pass tasks at the next level, before teaching began. If children were unable to pass tasks at a specific level, even after teaching, then teaching continued at the same level. In this way children either moved upwards from one level to the next or remained at the current teaching level.

In both the emotion and belief groups, teaching consisted of a question-answer structure with corrective feedback. The aim of teaching was to highlight those aspects of the situation that were most significant for understanding. Moreover, the teacher explicitly stated a general principle governing the understanding of the mental state. The general principles used for each level of belief and emotional understanding are

shown with the teaching examples in Appendixes A and B.

*Teaching strategies in the play group.* To achieve the aim of a natural teaching environment for this group, a play setting that was spontaneous and unstructured was used. A combination of "modeling" and "verbal guidance" was used to teach children to play (Christie, 1986). Modeling involved the teacher taking on a pretend role and being actively involved in children's play. In addition, verbal guidance was used whereby the teacher made comments and suggestions to encourage children to play. Initial teaching within any session involved functional play (Levels 2 and 3), but the overall aim of teaching was to encourage children to produce and participate in pretend play acts (Levels 4 and 5). Four sets of toys were used to teach children, based on four play themes. These sets were rotated from one day to the next. Although play was based around these materials, it was up to the experimenter to use her own imagination and flexibility in introducing other pretend themes as required, especially ones that fitted in with a child's particular interests. An example of part of a play teaching session is shown in Appendix C.

The approach to teaching in the play group was very different from teaching in the emotion and belief groups. In the emotion and belief groups the same stories and materials at any particular teaching level were used from day-to-day in exactly the same way. The teaching was, therefore, highly structured and repetitive. In contrast, children in the play group only saw the same set of toys twice in a 2-week period and saw a different set of toys from one day to the next. In this group teaching was not structured, and the previous day's play was not repeated the following day. The objective was to capture the spirit of play, hence daily activities were varied and diverse.

The aim of teaching pretence was to assess its effects on children's level of spontaneous pretend play. In this respect children were given 10 min of solitary and uninter-

rupted play daily before teaching began. This provided a measure of the effects of teaching play from one day to the next. In addition, a record of children's play during each teaching session provided a separate recording of whether or not play could be *elicited* in children with autism during any teaching session. Elicited play is that which children show only in direct response to instruction from the teacher.

#### *Teaching materials*

*Emotion materials.* For Level 1, materials included four photographs depicting the four facial expressions: happy, sad, anger, and fear. For Level 2, four black and white cartoons of the same four facial expressions were used. Twelve other examples of facial expressions of happy, anger, sad, and fear were used for Level 1 and Level 2 teaching. For Levels 3 to 5, black and white drawings were used to portray emotion pictures as well as protagonists and their desires and beliefs. For each level, 48 stories were available for teaching purposes. Sliding "doors" were used to conceal the protagonist's face where appropriate. Once a child had made his or her emotion prediction, these could then be pulled back to reveal the correct facial expressions. These, along with the full set of materials used for this study, are collated in our teaching manual (Howlin, Baron-Cohen, Hadwin, & Swettenham, 1995).

*Belief materials.* These materials varied depending on the level being taught. For Levels 1 and 2, simple and complex perspective taking, large colored pictures of objects were presented to the child. For the simple perspective taking, this included one piece of card with a picture on each side ("What do you see/I see?," Flavell et al., 1981). For the complex perspective taking, the card had only a picture on one side ("How does it look to you?"). Twelve pictures were available for teaching purposes in each of these levels (see Howlin et al., 1995).

For Level 3, teaching the principle that "seeing leads to knowing," 12 pairs of ob-

jects and 6 hiding containers were used. Each pair of objects varied in either size or color, but were otherwise identical. In addition, two dolls were used for looking into and hiding things in boxes. For Level 4, teaching action-prediction based on knowledge, a doll's house was used consisting of two furnished rooms, a bedroom and a kitchen, along with 12 pairs of identical objects. Again a doll was used as the story protagonist. Finally, Level 5 teaching materials were appropriate for teaching the unexpected transfer task, or the unexpected contents task. To teach the former, the doll's house was used along with six objects that could be hidden in and transferred from one location to another. Additionally, a pair of different-colored containers was also used so that objects could be transferred between them. A computer version of this transfer task was also available to teach children false belief understanding (adapted from Swettenham, in press). For the unexpected contents task, very familiar containers, such as a toothpaste box, or a crayon box, were used for teaching. Some boxes held the regular contents and others contained unusual items, such as a key or a shoelace.

*Play materials.* Four play themes were used, each of which had relevant toys. The play themes were: dinner-time, shopping, in the park and dressing-up. In addition to topic-related toys, a box with junk material was also available for children to incorporate into their play themes.

#### *Materials for assessing near generalization and follow-up*

For the purposes of assessing near generalization, novel materials were introduced into the structured teaching tasks. In the emotion group, children saw new photographic pictures of facial expressions at Level 1. (Level 2 remained the same.) For Levels 3 to 5, new protagonists in new situations, with new desires, beliefs, and outcomes were introduced. In the belief group, novel colored pictures were used to assess



simple and complex perspective taking at Levels 1 and 2. For Levels 3, 4, and 5 new objects were used for the hiding and transfer games (hiding locations used during teaching were kept the same). Additionally, at Level 5, containers that children had not seen before were used for the unexpected contents task. In the play group, children were given a new set of toys to play with. These followed an "on the farm" theme. The junk materials used during teaching were also available for children to play with for the purposes of assessing near generalization. Materials used for assessing near generalization were also used to assess the effects of time at follow-up.

### Results

The results are discussed in relation to the four key questions behind this study. The first question concerns the level teaching began for each child. The second question concerns the immediate effects of teaching within each group. With teaching, were children able to move from one level to the next? In other words, was there a difference between the level at which teaching began on Day 2 and the level children reached by the final teaching day? The third and fourth questions concern the wider effects of teaching. Did any improvements made during teaching generalize to similar tasks, with different materials? (Near generalization.) In relation to this question, were any teaching effects maintained over time? Finally, did teaching in one area of mental state understanding advance children's understanding of mental states in other areas? (Distant generalization.)

It is also important to address whether particular children learned more with teaching than did other children. If there were individual differences in improvement, what could account for these differences? The final part of the results' section addresses this question.

(i) *Where did teaching begin?* Table 4 shows the variation in levels at which teaching began in all three groups. It can be assumed

**Table 4.** The number of children who began teaching at each level of understanding in each teaching group

Level	Teaching Group		
	Emotion	Belief	Play
1	2	2	1
2	1 <sup>a</sup>	7	4
3	3 <sup>b,c</sup>	1	5
4	3	0	0
5	1	0	0

<sup>a</sup>This child failed Level 2 (where teaching began) but passed Level 3.

<sup>b</sup>This child failed Level 3 (where teaching began) but passed Level 4.

<sup>c</sup>This child failed Level 3 (where teaching began) but passed Levels 4 and 5.

that if teaching began at a specified level, then all levels below this were passed, and the two levels immediately above this failed.<sup>6</sup> This table shows that for the emotion group the majority of children begin teaching at Level 3 (situation-based understanding of emotion) or Level 4 (desire-based understanding) of emotion. For the belief group, most children were initially taught at Level 2 (complex perspective taking) or below. In the play group, nearly all children had shown one or two examples of functional play. Teaching in this group generally began with functional play (Levels 2 and 3).

(ii) *Effects of teaching?* Was the number of levels that children passed in the pretest significantly different from the number of levels eventually passed on the final teaching day? In other words, could children learn to pass tasks at one level of understanding and move onto the next level? To assess any change, the mean number of levels that children passed on day one was

6. Three children in the emotion group were exceptions to this: One child failed Level 2 of emotion understanding but passed Level 3; A second child failed Level 3 but passed Level 4 and Level 5; Finally, one child failed Level 3 but passed Level 4. The level at which teaching began for these children is shown in Table 4.

**Table 5.** The mean number and standard deviation of levels passed in each group at pretest and the cumulative mean number and standard deviation of levels passed on the final teaching day

Time	Teaching Group		
	Emotion	Belief	Play
Pretest	2.50 ± 1.43	0.9 ± 0.57	2.40 ± 0.70
Final day	4.60* ± 0.70	3.10* ± 1.45	3.20 ± 1.40

Note: Values are mean ± SD. The final teaching day is the day that children reached criteria, i.e. passed Level 5. The mean number in the play group refers to the mean play level at pretest and the mean play level on the final teaching day.

\*Pretest to final teaching day,  $p < .01$ .

compared to the mean level passed with teaching. Table 5 shows the mean number of levels that children passed within their respective teaching groups for the pretest, and the mean number they passed by the final teaching day.

Considering groups separately, a significant difference was found between the mean number of levels passed in the pretest compared with the mean number passed at the final teaching day for the emotion group ( $t(9) = 6.68, p < .001$ ). A similar difference was found between the mean number passed in the pretest and the final teaching day for the belief group ( $t(9) = 6.00, p < .001$ ).

In the play group an increase was seen between the play level<sup>7</sup> at pretest and the final teaching day (as measured by the daily assessment), but this was not significant ( $t(9) = 1.63, p = .137$ ). The amount of spontaneous play shown by children did not increase significantly during the teaching period. All children did, however, show

elicited pretend play acts during the teaching period.

*Spontaneous and elicited pretence.* During teaching all children showed some elicited pretence (pretend play prompted by the teacher during a teaching session) and two children showed spontaneous pretence (pretend play that was not promoted by the teacher within a teaching session). Of the 10 children in the play group, 5 children showed no examples of spontaneous pretend play. These children responded to play suggestions and were willing to copy the experimenter's modeled play when prompted. However, for these children, their play acts were never genuinely *playful*. That is, these play acts were isolated copies of the teacher's play act, or a response to the teacher's suggestion. Unlike play in normal children, no obvious pleasure or excitement was revealed. Of the five remaining children, three children showed pretend play on a daily basis. For two of these children, however, their play was focused on a specific theme, in a highly preservative manner. The third child showed only one pretend act (throwing imaginary water over the experimenter) on a daily basis. Thus, for these children, examples of pretence, although evident, were rigid and repetitive.

The remaining two children in this group initially revealed pretend play during teach-

7. A description of play was recorded for each child at the pretest and the posttest. These descriptions were used to assign each child a play level from 1 to 5, at these two time points. The reliability of the play level assigned to each child was assessed. Twenty-four percent of the play levels assigned at the pre- and posttests were checked for interrater reliability across two raters. (Cohen's kappa,  $\kappa = .9406$ .)

**Table 6.** The mean number and standard deviation of emotion and belief levels passed and the mean play level for each group at pretest, posttest, and at follow-up

	Teaching Group		
	Emotion	Belief	Play
Emotion levels			
Pretest	2.50 ± 1.43	1.10 ± 1.29	1.60 ± 1.71
Posttest	3.70 <sup>a</sup> ± 1.34	1.30 ± 1.42	1.60 ± 1.96
Follow-up	3.30 <sup>b</sup> ± 0.67	1.30 ± 1.70	1.70 ± 1.77
Belief levels			
Pretest	1.90 ± 1.79	0.90 ± 0.57	1.20 ± 1.81
Posttest	2.00 ± 1.70	2.10 <sup>a</sup> ± 1.66	1.60 ± 1.90
Follow-up	2.10 ± 1.85	1.60 <sup>c</sup> ± 1.17	1.70 ± 1.95
Play level			
Pretest	3.50 ± 0.67	3.50 ± 1.27	2.40 ± 0.70
Posttest	3.30 ± 1.49	3.80 ± 1.40	3.30 ± 1.49
Follow-up	3.30 ± 1.42	3.10 ± 1.20	3.00 ± 1.15

Note: Values are mean ± SD. No group differences were found on the number of belief or emotion tasks passed in the initial pretest assessment ( $p > .01$  for group comparisons on these two measures). A difference was found for the pretest play level between the emotion and belief groups with the play group ( $p = .031$ ).

<sup>a</sup>Pretest to posttest,  $p < .025$ .

<sup>b</sup>Pretest to follow-up,  $p = .037$ .

<sup>c</sup>Pretest to follow-up,  $p = .025$ .

ing, but after a number of days did this spontaneously while playing on their own. Here, play was spirited and variable and hence differed from the other eight children in this group. It is not clear why these children showed some elements of spontaneous pretence. One possibility is that the play topics these two children revealed were those that were encouraged at home or in school. Unfortunately, no check was made to confirm any external influences of play in these two children.

(iii) *Generalization to untaught materials and maintenance (near generalization)*. Table 6 shows the mean number of emotion and belief levels that children passed and the level of play at the pretest, posttest, and follow-up for each of the three teaching groups. Again considering groups separately, a repeated measures ANOVA was carried out for each of the three groups across pretest, posttest, and follow-up. This analysis revealed a significant time differ-

ence for the emotion group ( $F(2, 10) = 8.54, p = .002$ ) and the belief group ( $F(2, 10) = 7.27, p = .008$ ). There was no significant difference over time for the play group ( $F(2, 10) = 4.20, p = .120$ ).

Further analysis was carried out to pinpoint the significant time difference in the emotion and belief groups. Comparisons were made between the mean number of levels passed at the pretest compared to the mean number passed at posttest and at follow-up. For each group the  $p$  value was adjusted to take into account the two comparisons (pretest to posttest and pretest to follow-up). (Bonferroni correction,  $p < .025$ .) This analysis revealed significant time differences for the emotion group between the pretest and the posttest ( $t(9) = 4.81, p = .001$ ) and a marginally significant difference between the pretest and the follow-up ( $t(9) = 2.45, p = .037$ ). A similar pattern was seen for the belief group with significant differences between the pretest and the posttest ( $t(9) = 2.71, p = .024$ ), and

between pretest and follow-up ( $t(9) = 2.69$ ,  $p = .025$ ).

The results indicate that children could be taught to pass tasks. Furthermore, this effect is not influenced by the introduction of novel materials presented within structurally similar tasks either immediately after teaching, or 2 months later.

(iv) *Indirect effects of teaching (distant generalization)*. Did teaching in one area of mental state understanding lead to improvements in areas where no teaching was given? Did children in the emotion group show any improvements in passing belief tasks, or in their production of play? Similarly, did teaching belief have a positive effect on passing emotion tasks or on the production of play? Finally, did teaching play lead to improvements in passing emotion or belief tasks. The mean levels for each teaching group for all tasks is shown in Table 6.

Considering the emotion group first, a repeated measures ANOVA was carried out for the emotion group between the mean number of belief levels passed and the mean play level at pretest and posttest. This analysis showed no improvement from the pretest to the posttest in passing belief tasks, or in the play level ( $p > .05$ ). The results indicate that teaching emotion does not lead to task improvements in belief or in an increased rate of play. A similar analysis was carried out for effects of teaching belief or play on other tasks. Analysis showed that teaching belief had no significant positive effect on passing emotion tasks or on the level of play. Additionally, teaching play did not lead to significant improvements in passing emotion or belief tasks. (For all analyses,  $p > .05$ .)

*Teaching and individual differences*. The data show that children started teaching at different levels in each group (Table 4). This difference could have been due to differences in VMA. Furthermore, children with a high VMA may have benefited more from teaching compared to those with a low VMA. To address these two questions, expressive and receptive VMA were correlated

with the number of emotion and belief levels passed and the play level at pretest, posttest, and at follow-up. Table 7 shows the correlation between expressive and receptive language with the mean number of levels of emotion and belief and the mean play level at the pretest, posttest, and follow-up in each teaching group.

Table 7 shows that the number of belief tasks that children in the emotion group passed ( $N = 10$ ) was positively correlated with receptive language ( $r = .817$ ,  $r = .814$ ,  $r = .889$  for pretest, posttest, and follow-up respectively). In other words, children with a higher receptive VMA passed more belief tasks at each assessment (pretest, posttest, and follow-up) than children with a low VMA. This persistent pattern between passing belief tasks and receptive VMA was not found in the belief and play groups. Table 7 also shows one correlation between expressive VMA and play in the play group at posttest. No other correlation in any group showed any relationship between VMA and play. Two correlations were found between receptive and expressive VMA and emotion tasks at follow-up for the belief group and play group, respectively.

Table 7 also shows no correlation between receptive and expressive VMA with the number of levels that children progressed through with teaching in any of the teaching groups.

## Discussion

The results of this study reveal that it is possible to teach children with autism to pass emotion and belief tasks. Children learned to pass simple tasks and were able to move on to more complex tasks in these areas. Children's ability to pass tasks was not adversely affected with the introduction of novel materials into these tasks. Additionally, teaching effects were present 2 months later. However, there was no evidence that children generalized their learning to a wider range of tasks. Within their respective groups, children did not apply their understanding of simple aspects of

**Table 7.** The correlations of expressive (X) and receptive (R) language with the number of emotion and belief levels passed and the play level for pretest, posttest, and follow-up and with the overall number of levels progressed through in each group

	Teaching Group and Language Measure					
	Emotion		Belief		Play	
	X	R	X	R	X	R
Emotion levels						
Pretest	.739	.588	.600	.706	.512	.379
Posttest	.757	.702	.657	.711	.658	.434
Follow-up	.556	.389	.666	.813*	.813*	.652
Belief levels						
Pretest	.503	.817*	.314	.699	.540	.707
Posttest	.478	.814*	.405	.653	.510	.778
Follow-up	.423	.889*	.630	.880**	.619	.790
Play level						
Pretest	.582	.127	.250	.042	-.148	-.291
Posttest	.258	-.513	.571	.708	.807*	.470
Follow-up	.197	-.034	.067	.415	.749	-.313
Progression	-.011	.046	.380	.480	.199	.129

Note: Progression equals the mean number of levels that children progressed through as a result of teaching.

\* $p < .01$ ; \*\* $p < .001$ .

emotion or belief to comprehend more complex ideas. Furthermore, there was no evidence that an improvement in children's understanding of mental states in one area of teaching generalized to understanding mental states in nonteaching areas. It appears then that, notwithstanding substantial efforts to make learning about mental states as simple as possible, and despite providing children with general principles from which to abstract the concepts involved in the tasks, there was little evidence that children could generalize what they had been taught.

Results also show that there was no significant improvement in the overall production of children's spontaneous pretend play as a result of teaching. Some children did show spontaneous pretence, but this was highly repetitive and lacked the imaginative variability of play seen in normal children. Two children showed exceptions to this and revealed different examples of spontaneous pretence on a number of occasions. It was possible to elicit pretence from all children using verbal requests or modeling. This replicates previous findings in eliciting pretend

play in children with autism (e.g., Jarrold, Smith, & Boucher, 1993; Charman & Baron-Cohen, in press).

With respect to teaching and generalizing, a relevant question to ask is, would the results be any different for a group of young mainstream children or for clinical groups other than autism? The answer to this question is an empirical one. The use of control groups in this study would have been necessary to answer this question. One previous study has taught mainstream 3-year-olds to understand theory of mind (Gopnik et al., 1994). The results of our study showed, for example, that passing visual perspective-taking tasks did not facilitate belief understanding. In contrast, Gopnik et al. (1994) found that children taught on perception tasks showed a better understanding of belief than children taught on conceptually unrelated tasks. Gopnik et al. suggested that, on the basis of their results, perception is a conceptual precursor to understanding the mind.

If children in our teaching study did not acquire concepts of emotion and belief,

what did they learn? One possibility is that children in the emotion and belief groups learned to pass the tasks they were taught without understanding the concepts behind them. That is, they may have simply extracted rules to pass tasks (Frith, Morton, & Leslie, 1991; Swettenham, in press; Swettenham et al., in press). The fact that children did not show any distant generalization would support this interpretation. One further means of assessing teaching effects would be to measure children's social behavior before and after teaching. This measure would provide an assessment of the impact of teaching in an experimental environment on social interaction in the real world. If children did learn only to pass tasks, it might be expected that their new "knowledge" would have little impact on their social behavior.

Some research has suggested that passing theory of mind tasks leads to enhanced social skills (Frith, Happé, & Siddons, 1994; Astington & Jenkins, 1995). In these instances, people with autism appear to acquire an ability to pass theory of mind tasks during the course of development. If there is a specific developmental delay in passing theory of mind tasks (Baron-Cohen, 1989), then it is conceivable that those people with autism who acquire this ability naturally may also develop some improved social skills. It is not, however, clear that successful teaching would accelerate development, reduce any developmental delay, and automatically lead to more effective social skills. A comparison of the social skills of children who have passed theory of mind tasks within short-term teaching programs and those who have acquired it in the course of development would shed further light on the effect of teaching studies and the theory of mind deficit in autism.

What could explain the results of teaching in the play group? Why was play more resistant to change than emotion or belief? Even if the teaching effects in the emotion or belief groups were achieved using rules, why could a similar strategy not be used in the play group? Several hypotheses might explain this finding. First, this result may simply relate to the nature of pretence and

the necessity to teach play in an unstructured way. Unlike teaching in the other two domains, pretending involved generativity (production of novel actions) and imagination. In the belief and emotion groups, assessment was structured within tasks and could be passed by applying rules to these tasks. It may be that an application of rule-based strategies to generate pretend play acts is not possible. This interpretation would support the suggestion that the generativity and imagination deficiencies are a central part of the deficit in autism (Baron-Cohen, 1990; Jarrold, Boucher, & Smith, 1994).

A second possibility that may explain group differences is variations in ability across the three groups. It is possible that children in the emotion and belief groups were more able than children in the play group and that this difference could explain the variation in results across the three groups. Although there was no pretest difference in the number of belief and emotion tasks passed across the three groups, the emotion and belief groups did show a higher pretest play score than the play group.<sup>8</sup> Was this difference in play level a result of VMA variations across the three groups? There was no statistical significant difference in expressive or receptive age across the three groups (Table 1). The emotion group was consistently higher than the belief or play group on both expressive and receptive vocabularies, but likewise the belief and play groups were almost identical in mean VMA. Additionally, the data do not show any evidence that improvements in passing tasks with teaching is linked to either expressive or receptive VMA. There appears to be no obvious relationship between group and ability (measured in VMA) and improvements in teaching.

Should the results for the emotion and

8. However, there was still no overall correlation between receptive or expressive VMA and the production of pretend play. A correlation between VMA and play has been found in other studies (see Jarrold et al., 1993) and the absence of any relationship here is difficult to explain. The results do, however, partially replicate previous findings of a relationship between passing belief tasks and VMA.

belief groups be taken as a basis for encouraging teaching with special education programmes for autism? Teachers should be cautious in assuming that these methods are going to lead to fundamental changes in a child. This research demonstrates that with the use of focused and intensive short-term teaching methods, children with autism pass emotion and belief tasks that they were unable to pass before teaching. The problem of generalization, however, indicates that children may have learned rules to pass tasks rather than understanding the concepts underlying the tasks. It cannot be concluded from this study that improved performance necessarily reflects a change in the underlying deficits in emotion and belief understanding. Furthermore, the negative result in the play group suggests that whatever did shift, aspects of the core cognitive deficit remains unchanged by our methods. The use of control groups and measurement of teaching effects outside the experimental setting would go some way to enlighten our understanding of the full extent of teaching effects and to understand more fully the nature of the deficit in autism.

The duration of teaching in this study

was short. Future research should assess the benefits of teaching mental state concepts to children over a longer period, as part of a school curriculum, for example. Indications of the effectiveness of a longer term approach come from a study from Prior, Dahlstromm, and Squires (1990). They tested children on a number of theory of mind tasks and found a higher rate of passing than has been previously found. The authors suggested that one reason for this may have been that all children who took part in the study were pupils of a school where emphasis was placed on talking about and responding to other people's thoughts and feelings. The authors concluded that such training might provide the conditions that are needed to show an understanding of mental states and emotions.

In conclusion, this study shows that, following relative brief intervention procedures, children with autism are able to pass emotion and belief tasks. However their ability to generalize what they learn has proved to be problematic. Whether this reflects methodological issues in teaching, or whether it has a deeper etiological basis, requires further research.

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## Appendix A

### *Assessment and teaching in the emotion group*

*Level 1.* Photographic facial recognition (happy/sad/angry/afraid).

*Level 2.* Schematic facial recognition (happy/sad/angry/afraid).

#### *Level 1 and Level 2 teaching*

Let's put the four faces here. There is happy, sad, angry, and afraid.

I have some more faces for you to look at. Can you put these with the pictures that look the same?

This one is happy. Where should we put the happy face?

Yes, that's right, that face is happy too! etc.

*Level 3.* Situation-based emotion judgments (happy/sad/angry/afraid).

*Example of a happy story.* Look, Thomas sees the clowns at the circus.

*Emotion Question.* How will Thomas feel when he sees the clowns?

**PROMPT.** Will he feel, happy, sad, angry, or frightened?

Let's see how Thomas feels.

Look, Thomas is happy.

*Why Question.* Why is he happy?

#### *Teaching*

*Emotion Question.* For an incorrect response.

Let's have a look and see how Thomas feels.

Look, Thomas is happy. Point to Thomas's face.

He is happy because he sees the clowns. Points to the clowns.

Thomas is happy because he sees the clowns at the circus. Point to Thomas.

Then teach the general principle:

*When you do something exciting, then you feel happy.*

*Level 4.* Desire-based emotions (happy/sad).

*Example of a desire-based happy story.*

*Picture One.* Look, this is Katie. This picture

tells us what Katie wants. Katie wants to catch a fish.

*Picture Two.* Look Katie catches a big fish in the sea.

*Desire Question.* What did Katie want?

*Emotion Question.* How will Katie feel when she catches the fish?

**PROMPT.** Will she feel, happy or sad?

Let's see how Katie feels.

Look, Katie is happy.

*Why Question.* Why is she happy?

#### *Teaching*

*Emotion Question.* For a incorrect response

Let's have a look and see how Katie feels.

Look Katie is happy. Point to the protagonist's face.

Katie wanted to catch a fish. Point to the protagonist's desire.

Katie catches a fish in the sea. Point to the story outcome.

Katie is happy because she got what she wanted.

Then teach the general principle:

*When people get what they want they are happy. When they don't get what they want they are sad.*

*Level 5.* Belief-based emotion (happy/sad).

*Example of a belief-based emotion story.*

*Picture One.* Look, Matthew's brother has a toy airplane for him.

*Picture Two.* This is Matthew. This little picture tells us what Matthew wants and this picture tells us what Matthew thinks.

Matthew wants a toy train. Matthew doesn't know about the aeroplane. He thinks his brother has bought a train.

*Desire Question.* What does Matthew want?

*Belief Question.* What does Matthew think his brother has for him?

*Emotion Question.* How will Matthew feel when he thinks his brother has a train for him? Can you point to one of the faces?

Look, let's see how Matthew feels

Look, Matthew is happy.

*Justification (1).* Why is he happy?

*Picture Three.* Look, Matthew's brother gives him the aeroplane.

*Outcome-Emotion Question.* How will Matthew feel when his brother gives him the aeroplane?

Let's see how Matthew feels. Look, Matthew is sad.

*Justification Question (2).* Why will Matthew feel sad?

#### *Teaching*

*Belief-based emotion questions.* For an incorrect Response.

Let's have a look and see how Matthew feels. Look, Matthew is happy.

Matthew wants a toy train. Point to Matthew's desire.

Matthew doesn't know about the aeroplane. Point to Picture One.

He thinks his brother has bought a train. Point to the Matthew's belief.

Matthew is happy because he wants a toy train, and he thinks his brother has bought a train.

*Outcome-emotion question.* For an incorrect Response.

Let's have a look and see how Matthew feels. Look, Matthew is sad.

Matthew wants a toy train. Point to Matthew's desire.

Matthew's brother gives him an aeroplane. Point to the story outcome.

Matthew is sad because he didn't want an aeroplane. He wanted a train.

Then teach the general principles:

*If someone thinks they have got what they want, they will feel happy, even if they have not got what they want. If someone thinks they have not got what they want, they will feel sad, even if they did get what they wanted.*

## Appendix B

### *Assessment and teaching in the belief group*

#### *Level 1. Simple perspective taking.*

##### *Example:*

*Self-perception Question.* "What can you see?"

*Other perception Question.* "What can I see?"

##### *Teaching*

*Other Perception Question.* For an incorrect response.

You can see the pen, can't you? The pen is on your side of the card. Point to the picture facing the child.

But look! What is on my side of the card? What can I see? Show the child the other side of the card.

That's right. I can see the key. Face the card so the child can see the pen again.

I can't see the pen, only you can see the pen.

Then teach the general principle:

*People do not always see the same thing.*

#### *Level 2. Complex perspective taking.*

##### *Example:*

*Other perception question:* "When I look at the picture, is Mickey the right way up, or upside down?"

##### *Teaching*

*Other perception question.* For an incorrect response.

Look, when you look at Mickey, he is the right way up.

But, when I look at Mickey he is upside down. Watch what happens when I turn the card around. Turn the card around so that to the child Mickey is upside down and to you he is the right way around.

Now, when I look at Mickey he is the right way around, but when you look at him he is upside down. (Another method of teaching utilized was for the picture to remain in the same position and the child and experimenter changed seats in order to highlight the different perspectives.)

Then teach the general principle:

*People can see the same thing in different ways.*

#### *Level 3. Seeing leads to knowing.*

##### *Example. Self-judgment*

Let's play a hiding game with this box.

Look at these crayons. This crayon is big and this crayon is small.

I am going to hide one of these crayons in the box.

Can you close your eyes so you can't see which one I put in there.

*Knowledge Question.* Do you know which crayon is in the box?

*Justification.* How do you know/Why don't you know which crayon is in there?

*Teaching*

*Knowledge Question.* For an incorrect response.

You didn't see which crayon I put in the box, so you don't know that the big crayon is in there. If you don't see then you don't know!

Then teach the general principle:

*People only know about things they have seen.*

*If they can't see something, then they don't know about it.*

*Level 4.* True belief and action prediction.

*Example.*

Let's play a game with this house and Bill.

Look, there is a ball on the bed and there is a ball on the table.

Here is Bill, this morning Bill saw the ball on the bed. Bill didn't see the ball on the table.

*Action Question.* Where will Bill go to get the ball?

*Justification Question.* Why does he think it is on the bed?

*Check Question.* Where did Bill see the ball?

*Teaching*

*Action Question.* For an incorrect response.

Remember, Bill saw the ball on the bed, so Bill will look for the ball on the bed.

Bill didn't see the ball on the table so he won't look there.

## Appendix C

### *Teaching pretend play*

Billy<sup>1</sup> is a very able young boy aged nine and a half years. His verbal mental age is 9 years.

*A brief description of Billy's 10-min spontaneous play before the teaching started*

Billy got the swing from the box and pushed it to and fro. Billy then spun the roundabout to

1. For the purposes of this example, Billy is a fictitious name.

Then teach the general principle:

*People think things are where they saw them.*

*If they didn't see something then they won't know they are there.*

*Level 5.* False Belief

Example. Unexpected transfer.

Let's play a game with Claire.

Look Claire has a penny.

Here are two purses, a black purse and a red purse.

Claire puts her penny into the black purse.

Claire is going out to play now.

Claire has gone out. She can't see what we are doing.

Shall we play a trick on Claire? We'll take the penny out of the black purse and put it in the red purse!

Here comes Claire, back from the playground.

*Belief Question.* Where does Claire think the penny is?

*Justification Question.* Why does Claire think it is in the [black/red] purse?

*Check Question.* Where did Claire put the penny?

*Teaching*

*Belief Question.* For an incorrect response.

Remember, Claire didn't see us hide the penny in the red purse, so Claire doesn't know there is a penny in the red purse. She won't think it is in there.

Claire will think the penny is in the black purse, because she put the penny in the black purse.

Then teach the general principle:

*If people don't know that things have changed then they will think things are just the same.*

make it go round and round. Billy took some plastic buttons from the "junk" box and threw them up into the air and caught them. Billy picked up one of the play dolls and tried to put a hat on it. Billy then picked up a straw and blew through it. Billy took some plastic rings from the "junk" box, threw them up and caught them. He then picked up a cardboard circle and fanned himself with it before throwing it up into the air and catching it. Billy spun the roundabout again, he then picked the roundabout up and spun it while holding it. Billy threw the plastic rings up again and caught them, he then rolled

one of them across the table catching it and spinning it on his finger. Billy threw some plastic buttons up again and caught them, he then looked through the junk box in search of more buttons. Unable to find buttons, Billy picked out some cardboard and then replaced it in the box. Billy went back to the toys, putting the baby doll into the pram. He picked up a plastic circle again and spun it on his finger.

### Teaching play

Below is a clip from the second half of the play teaching session that followed the above spontaneous play. This is presented as the dialogue that takes place between the teacher and Billy. During the first half of the play session play focused on the *functional* aspects of the objects. During this second half, the teacher introduces more symbolic play with the use of the junk materials available. Explanatory notes have been added to the transcript in order to make the pragmatic aspects of the play situation clear.

#### Transcription of the dialogue between the teacher and Billy

T . . . What shall we do next then? What would you like to do? Shall we make a pond?  
 B Shall we do that?  
 T Shall we? What could we use as a pond?  
 B Shall we? Can you help me?  
 T I'll help you.  
 B Look!  
 T Shall we use that as a pond?  
 B Don't!  
 T Shall we use that as a pond?  
 B I like blowing wind.  
 T Oh do you? Is it a windy day today? What could we use as a pond?  
 B I like blowing things, I like using different things for blowing wind.  
 T Oh do you?  
 B I'd like to go home soon.  
 T Shall we use this as a pond? Shall we finish playing this and then we'll go home? Shall we use this as a pond?  
 B Look!  
 T Oooo! Put that down! What else do we need in a pond? Can you find some ducks? What could we use as a duck?  
 B I'll find something.  
 T What's this Billy? "Quack, quack, quack, quack, quack."  
 B Can I stick this together?  
 T Are you going to use that to make another duck? Shall we make two ducks? Would you like to?  
 B I can't see any more.

#### Explanatory notes

The teacher has used all the play park equipment in a functional capacity. The teacher moves away from the functional properties of the toys and, with the use of the junk box, introduces more pretence.

Billy goes to the junk box and begins to rummage through it. He finds a rectangle-shaped card and wafts it in the air towards the teacher's face. The teacher immediately brings this card into the play context- by asking if it is a windy day.

Billy starts to waft the card at his own face.

The teacher directs Billy's attention away from the card/home and suggests that they use a green circle as a pond.

Billy takes the circle and puts it on the floor. He then picks up a straw and puts it in his mouth - asking the teacher to look at him.

The teacher brings his attention back to the task and Billy responds by looking for a "duck" in the junk box. Billy finds the rectangle again and begins to waft it. The teacher makes a duck from some plasticine. Billy finds some more plasticine. The teacher suggests that he use this plasticine to make another duck.

The teacher helps Billy to find more plasticine.