

## Children's Developing Knowledge of the Relationship Between Mental Awareness and Pretense

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This study investigated 3- and 4-year-olds' understanding of the relationship between pretense and mental awareness. In Experiments 1 and 2, only a subset of 4-year-olds recognized that sleeping characters and characters ignorant of their appearance were not pretending. However, these experiments had certain linguistic demands, which potentially influenced performance. In Experiments 3, these demand characteristics were reduced; under these circumstances, 3- and 4-year-olds recognized that pretenders were aware of their actions or appearance. However, Experiment 4 showed that even using this modified procedure, 3- and 4-year-olds do not completely understand the relationship between pretense and awareness. These data support the hypotheses that by the age of 4, children have some, but not a complete, understanding of the relationship between pretense and mental awareness.

Researchers interested in theory of mind have closely examined what children know about pretending and mental representation (e.g., see Leslie, 1987). The representational abilities necessary to engage in and understand another's pretense are similar to the representational abilities necessary to respond correctly on a false-belief task: In both pretense and false belief, one must put aside a true representation of the world in favor of a false one (Lillard, 1993, 2001a). However, the ages at which these abilities emerge are different. Children begin pretending at approximately 18 months (Piaget, 1962) and recognize that others are engaging in pretense by 28 months (Harris & Kavanaugh, 1993). They do not succeed on standard measures of false belief until approximately age 4 (Wellman, Cross, & Watson, 2001).

Several correlational studies suggest that there is a relationship between children's understanding of pretense and their success on other tasks involving mental representation. Children who pretend more during free block play, children who demonstrate more sophisticated functional object play, and children who have stable imaginary companions all

tend to succeed earlier on theory-of-mind tasks (Astington & Jenkins, 1995; Lalonde & Chandler, 1995; Lillard, 2001b; Taylor & Carlson, 1997). Based on these findings and the results of several other investigations, many researchers have proposed that by age 4, children recognize that pretending involves mental representations and use that knowledge to guide their understanding of belief (Bruell & Woolley, 1998; Custer, 1996; Ferguson & Gopnik, 1988; Hickling, Wellman, & Gottfried, 1997; Woolley, 1995).

However, there is some empirical evidence against this position. Lillard (1993) has argued that if children recognize that mental representation is a defining feature of pretense, they should recognize that a character could not pretend to be something it could not mentally represent. She presented 4-year-olds with a troll doll—Moe—who was “hopping just like a kangaroo.” Children were then told that Moe did not know anything about kangaroos—he had never seen or heard about them before and did not know that they hopped. Children were asked whether Moe was pretending to be a kangaroo. Over several experiments, approximately 65% of the children consistently stated that Moe was pretending to be a kangaroo (the incorrect response; see Lillard, 2001a, for a review). In contrast, most of these children were successful on a deceptive container false-belief task (Gopnik & Astington, 1988). This suggests that these children had the mental representational abilities necessary to succeed on the Moe task but did not recognize that one must know about an entity to pretend to be it. Furthermore, success on a standard theory-of-mind task did not influence

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performance on the Moe task: There was no correlation between children's success on the false-belief task and their success on the Moe task. Based on these and other similar findings (e.g., Rosen, Schwebel, & Singer, 1997), another group of researchers has suggested that young children do not recognize that pretense involves mental representation (Harris, 1991; Lillard, 1993, 2001a; Perner, 1991). These researchers have suggested that young children interpret pretense in terms of its characteristic features, such as a person's actions or appearance.

Similar investigations have examined whether young children understand the relationship between pretense and its other defining mental qualities. Lillard (1996; Sobel & Lillard, 2002) examined whether young children understand that pretense requires mental activity. Parallel to her findings with the Moe studies, over several experiments, Lillard found that approximately 65% of 4-year-olds consistently categorized pretend actions with events that required only a body. Likewise, Lillard, Zeljo, Curren, and Kaugars (2000) found that 3- and 4-year-olds mistakenly claimed that moving inanimate objects, such as a spinning top, could pretend but could not think.

Researchers have also examined whether young children recognize that pretenders must have intended their actions (Austin, 1979; Lillard, 2001a). Joseph (1998) presented children with stories about a character who was really sick and really sneezing and another character who was pretending to be sick and pretending to sneeze. He found that most 4-year-olds chose the pretender as the character who was trying to sneeze. In contrast, Lillard (1998) found that 4-year-olds did not understand that one had to try to perform an action to engage in pretense. Approximately 60% of her participants claimed that a character who was hopping, but not trying to hop like a kangaroo, was nevertheless pretending to be a kangaroo. Children failed to recognize that the intention to act in a particular manner was more relevant to determine pretense than the action itself.

These studies have each investigated children's knowledge of defining features of pretense: mental representation, mental activity, and intentionality. The goal of the present study was to investigate whether young children understand another defining feature of pretense: mental awareness (Anscombe, 1981; Lillard, 2001a). Do young children recognize that pretenders are aware that their appearance or actions (or both) are consistent with their pretense? Similarly, do young children recognize that to pretend, one must be aware that one's appearance or actions are of the pretense? For example, char-

acters who have a particular appearance, without knowledge of that appearance, are unlikely to be pretending to be what they look like. Do young children possess this knowledge?

Children's knowledge of pretense and awareness was investigated in two ways. First, do young children judge that sleeping characters—characters with no awareness of their appearance or actions—cannot be pretending? Second, given no other information, do young children recognize that characters with a particular appearance, but who are ignorant that they possess that appearance, cannot be pretending?

### *Are Sleeping Characters Pretending?*

Sleeping characters have no mental awareness of their environment, appearance, or mental states. Do young children recognize that sleeping characters cannot engage in pretense? Flavell, Green, Flavell, and Lin (1999) examined 5-, 7-, and 8-year-olds' understanding of unconsciousness. Specifically, they asked children whether characters who were "sound asleep and not dreaming" could engage in a variety of mental states, including pretense. Five- and 7-year-olds responded at chance levels when asked about nonperceptual mental states such as pretending.

These findings were slightly ambiguous with regard to what children actually know about unconscious mental processing. In a subsequent experiment, Flavell et al. (1999) demonstrated that 6-year-olds were more likely to choose a wakeful character than a sleeping character as experiencing particular mental states. They concluded that 5- and 7-year-olds do have some understanding of unconsciousness, and that it is possible that sensitive measures of children's understanding of unconsciousness would lead to better performance, potentially even with younger children.

Experiment 1 attempted to replicate one aspect of the Flavell et al. (1999) study on younger children using stimuli that might assist children in answering these questions more accurately. Three- and 4-year-olds were presented with pictures of sleeping characters who happened to resemble a particular entity. Children were asked whether these characters were pretending. In this first group of stories, the characters had a characteristic feature of pretending: They appeared or acted like a particular entity. Children were also shown a second group of sleeping characters and were told that they did not resemble some entity. They were also asked whether these characters were pretending. This second group had neither the characteristic nor defining features of

pretense, and hence children should be more likely to state that they were not pretending.

### *Are Ignorant Characters Pretending?*

The second question addressed in this study is whether young children recognize that pretending requires knowledge of one's appearance or actions. Some have argued that young children are aware of their own mental states and use this knowledge to make judgments about pretending. Mitchell (2000) asked children to reach across a table for an object. After they did so, the experimenter told them that while they were reaching, they looked like a cat. For the most part, young children denied that they had been pretending to be a cat. The same children were shown a video of another child reaching across a table for an object and were told that the child in the video looked like a cat. For the most part, children judged that the child in the video was pretending. Mitchell suggested that the simulative aspects of pretense—looking or acting like something—were sufficient for children to infer that another person was pretending but not to make judgments about their own pretense. Children have privileged insight into their own intentions and awareness of their own actions, which leads them to judge that they were not pretending.

Mitchell's (2000) findings imply that young children can introspect about their mental states. Across several studies, however, Flavell and colleagues have demonstrated that young children's introspective skills are still developing. Flavell, Green, and Flavell (1995) showed that young children reported that they could sit and have no thoughts for quite some time. Flavell, Green, Flavell, and Grossman (1997) demonstrated that preschoolers were relatively unaware of their own "inner speech." Preschool children also seemed unaware that others' minds must be active, even when they are looking at, listening to, or thinking about something. For instance, when explicitly told to think about the room in their house where their toothbrush is kept, preschoolers would often deny that they were thinking about anything, including a bathroom (Flavell et al., 1995).

These findings on children's introspection suggest that young children might not be able to infer that pretenders are aware that their appearance or actions refer to their pretense. Is this the case? All other things being equal, do young children recognize that pretenders are aware of their own actions or appearance? Furthermore, do children use this knowledge to determine whether another person is pretending in the same way that they might use sim-

ilar knowledge about mental representation or intentionality? In Experiment 2 children were told about characters who happened to have the appearance of a particular entity but who lacked the awareness of their appearance or actions. Children were asked whether these characters were pretending to be what they looked like.

### *Do Demand Characteristics Influence Children's Knowledge of Pretense?*

Some have argued that experiments of pretense that contrast characteristic and defining features of pretending have demand characteristics that are too difficult for 4-year-olds to respond correctly (see e.g., see Aronson & Golomb, 1999). Because of these demand characteristics, most young children incorrectly state that characters with the characteristic features of pretense, but not the defining features of pretense are pretending. Similarly, Flavell et al. (1999) found that young children responded at chance levels when asked whether sleeping characters could engage in pretense, but they were more likely to choose a wakeful character than a sleeping character when asked which one was pretending. Do these methods, which reflect methods used in other investigations (e.g., Lillard, 1993, 1996, 1998), underestimate children's knowledge?

In Experiment 3, children were shown two pictures of characters engaged in the same action or who had the same appearance and were told that one character was pretending. Children were asked to select which of the two characters knew about his or her own appearance or actions. This method, drawing on Flavell et al. (1999) and Joseph (1998), potentially reduced the demands made on children because it did not require the child to contrast the characteristic and defining features of pretense. Furthermore, in Experiments 1 and 2, children were told that a character did or did not have a particular appearance. This information is rarely given to children and can be linguistically awkward. Children responded that the character was pretending to be what he or she did or did not look like because why else would the experimenter have mentioned it? Using a two-alternative forced-choice (2AFC) method eliminated the possibility of this inference.

This method can be used in one of two ways. In Experiment 3 children were told which of two characters was pretending and were asked to point out which character knew about her appearance. Experiment 4 revisited questions from Experiments 1 and 2 using a 2AFC procedure. Children were told

about the mental states and the physical appearance and actions of two characters and were asked which one was pretending. In some stories, characters' mental states and physical appearances were in conflict. In other stories, both characters had the same appearance or actions.

Furthermore, in each experiment children were asked to justify their response to the questions. What process do children use when they make the proper or improper inference? For instance, do children who correctly state that the character is not pretending when he or she lacks knowledge of his or her appearance also justify their responses in terms of the character's ignorance?

### Experiment 1

To investigate whether children recognize that pretense involves mental awareness, we first examined children's understanding of situations in which characters lacked any mental awareness of the situation: when they were asleep. If children recognize that pretense requires mental awareness, they should recognize that sleeping characters could not be pretending. In some stories, children were told that a character was asleep but had the appearance of a particular entity. In other stories, children were told that a sleeping character did not have a particular appearance. Children were asked whether each character was pretending. This manipulation was not done in previous studies of children's knowledge of unconsciousness (Flavell et al., 1999). Explicitly pointing out that the character did or did not possess these characteristic features of pretense might aid children's performance.

#### Method

*Participants.* Sixteen 3-year-olds, ranging in age from 39 to 48 months ( $M$  age = 44.0 months) and sixteen 4-year-olds, ranging in age from 49 to 61 months ( $M$  age = 54 months) were recruited from two preschools in the Providence, Rhode Island area. Children were either tested at the preschool or they were recruited from the preschool to come into the laboratory. Approximately equal numbers of boys and girls participated. The ethnic breakdown of the sample was as follows: 25 children were Caucasian, 3 were Asian, 2 were African American, and 2 were Latino/Hispanic. The children were all from middle- to upper-middle-class families in the Providence area. No child had ever previously been a participant in the laboratory.

*Materials.* Participants saw four drawings of sleeping children (see Figure 1 for an example). Each was on a 20 cm  $\times$  28 cm sheet of white paper, mounted to a cardboard background. Children were also shown a 48-count crayon box, a set of birthday candles, and a set of 10 white plastic poker chips 2 cm in diameter.

*Procedure.* Participants were brought into a game room by an experimenter with whom they were familiar. Children were told they would hear a set of stories and be asked questions about them. Children heard two types of stories (see Appendix A). In the asleep–appearance stories, children were told about sleeping characters who had the appearance or performed the action of some entity. They were also told that someone else in the story (an adult) also thought that the character had this appearance or performed this action. In the second type of story, the asleep–no appearance stories, children were also introduced to a sleeping character but were told that they did not look or act like a particular entity.

For each story, children were first asked two control questions: whether the character was awake or asleep, and whether she looked like the entity in question. When children answered these control questions incorrectly, feedback was given reminding the child of the story elements. Children were then asked the test question: whether the character was pretending to be the entity in question. Children were also asked to justify their response to this pretense question.

It should be noted that the character is not pretending in either condition. Thus, to respond correctly, children must recognize that unconscious characters cannot be engaging in pretense. In the first type of story, children must recognize this even though the character does resemble the pretend



Figure 1. Example of a stimulus used in the asleep–no appearance condition in Experiment 1.

entity in question. In the second type of story, the character explicitly does not have this appearance; therefore, there is no reason children should state that the character is pretending.

After hearing the four stories, children were given a standard unexpected-contents false-belief task as a measure of their general mental representation abilities. Children were shown a crayon box and were asked what was inside. All children responded "crayons" or a synonym (e.g., "markers"). Children were then shown the actual contents of the box, which were birthday candles. The candles were put back into the box and the box was closed. The experimenter then asked the false-belief other question: "Let's say your [caregiver not present in the room, usually Daddy or Teacher] comes in here. [Daddy/Teacher] has never seen this box before. What will [Daddy/Teacher] think is in the box?" After children responded, the experimenter then asked the false-belief self question: "Before I showed you what was in the box, what did you think was in the box?" After children responded, the experimenter asked a control question: "What is really in the box?"

Finally, children were given a number-conservation task as a measure of general cognitive ability, unrelated to theory of mind. Two rows of five white plastic chips were laid out in equal lengths in front of the child. The experimenter told the child that the row of chips closer to the child was "your row" and that the row of chips closer to the experimenter was "my row." Children were asked whether their row had more, the experimenter's row had more, or they had the same. After children responded, the experimenter spread out the chips in the child's row, such that the row was longer. Then the test question was repeated.

*Coding.* On each story, children received a score of 1 if they correctly stated that the character was not pretending; otherwise, they received a score of 0. Thus, in both conditions, children were given a score between 0 and 2. Children's justifications were categorized into one of five groups: (a) no explanation, or "I don't know"; (b) an irrelevant justification (e.g., "cause he's pretending he bonked his head"); (c) a justification in terms of the appearance or actions of the character (e.g., "because he's rolling over like a worm"); (d) a justification in terms of a mental state, not related to awareness or consciousness (e.g., "because he wants to"); and (e) a justification in terms of the relationship between pretending and awareness level, that is, that the character was asleep (e.g., "because she's asleep"). All of the responses were coded by a research assistant. A subset of responses (4 children from each age group, a total of

32 of the 128 justifications, or 25% of the sample) was coded by a second research assistant, blind to the hypotheses of the experiment. Agreement was 96%. Disagreements were resolved by the author.

On the false-belief task, children received a score of 1 for answering each of the self and other questions correctly. Thus, children could score within a range of 0 to 2, provided they answered the control question correctly. The control question served as a baseline for whether children understood what the questions were asking. Thus, children received a score of 0 if they answered the control question incorrectly, regardless of how they answered the other questions. On the number-conservation task, children were coded as passing if they stated that there was the same number of chips in both rows on both questions. If they said that either they or the experimenter had more chips on either question, they were coded as not passing.

## Results

In this experiment, alpha was set at .05; thus, all results reported as significant were at  $p = .05$  or lower. Preliminary analyses revealed no effect of order on responses to the pretending question or to the pattern of distribution of their justifications. Children required feedback on only 3% of the control questions, which suggested that they understood the stories. Table 1 shows the mean and distribution of children's scores on the pretending question across both story types. A 2 (condition: asleep–appearance vs. asleep–no appearance)  $\times$  2 (age: 3- vs. 4-year-olds) mixed analysis of variance (ANOVA) was performed on children's responses to the pretending questions; condition was a within-subject factor and age was a between-subject factor. A significant main effect of condition was found: Children were more

Table 1  
Distribution and Mean of Scores on the Pretending Question in Experiment 1

	Number correct			
	0	1	2	M
3-year-olds				
Asleep–appearance	13	0	3	0.38 (0.81)
Asleep–no appearance	4	5	7	1.19 (0.83)
4-year-olds				
Asleep–appearance	8	1	7	0.94 (1.00)
Asleep–no appearance	4	0	12	1.50 (0.89)

*Note.* Means are out of 2. Standard deviations are in parentheses.

likely to state that the character was not pretending in the asleep–no appearance condition than in the asleep–appearance condition, 67% of the time versus 33% of the time,  $F(1, 30) = 14.94$ . Although the 4-year-olds did accurately reject that the character was pretending more often than the 3-year-olds across both conditions, this main effect of age was only a nonsignificant trend in the data,  $F(1, 30) = 2.88$ ,  $p = .10$ . No significant interactions were found.

Because responses were close to chance levels on the pretending question (50%), responses were examined against that of chance performance. Two analyses were performed: one on group performance and one on individual patterns. First, because children could state that each character was or was not pretending in each story, the number of *no* (i.e., correct) responses was compared against chance performance. This revealed that the 3-year-olds said that the character was pretending (i.e., the incorrect response) significantly more often than chance on the asleep–appearance stories,  $t(15) = -3.10$ . On the asleep–no appearance stories, 3-year-olds responded at a level equivalent to chance. Four-year-olds' correct responses were significantly above chance levels on the asleep–no appearance stories,  $t(15) = 2.27$ , but not on the asleep–appearance stories.

The preceding analysis examined group performance with respect to chance responding. Inspection of the asleep–appearance data, however, suggests that most 4-year-olds either answered both of these questions incorrectly or answered both of these

questions correctly (15 of the 16 children). Analyzing group performance does not reveal these individual differences in responding. Thus, a second analysis, using a chi-square goodness-of-fit test, examined whether children's distribution of responses was systematically different from chance. If children were simply answering randomly, 25% of them should get both stories incorrect, 25% should get both stories correct, and 50% should get one story correct. This analysis revealed that both 3-year-olds' and 4-year-olds responses to the asleep–appearance stories were significantly different from what would be expected by chance responding,  $\chi^2(2) = 28.23$  and 12.37. Responses to the asleep–no appearance stories paralleled the parametric analysis: Four-year-olds' distribution of responses was significantly different from chance,  $\chi^2(2) = 23.96$ , but 3-year-olds' responses were not. This analysis suggests that a subset of 4-year-olds do recognize that sleeping characters cannot be pretending.

Table 2 shows the distribution of children's justifications as well as the distribution children's justifications when they correctly rejected that the character was pretending. Overall, few justifications were in terms of the characters' lack of mental awareness (only 18%). Chi-square analyses revealed that the pattern of justifications was significantly different between the 3- and 4-year-olds on both the appearance stories and no-appearance stories,  $\chi^2(4) = 18.84$  and 13.08, respectively. Four-year-olds made significantly more justifications in terms of awareness in both conditions, binomial tests. This is

Table 2  
Distribution of Justifications in Experiment 1

Group	None/IDK	Appearance	Mental state	Awareness	Other incorrect
All justifications					
Asleep–appearance					
3-year-olds	44%	19%	0%	3%	34%
4-year-olds	16%	31%	3%	38%	13%
Asleep–no appearance					
3-year-olds	25%	22%	0%	3%	50%
4-year-olds	22%	25%	6%	28%	18%
Correct responses only					
Asleep–appearance ( $n = 21$ of 64)					
3-year-olds	33%	0%	0%	0%	67%
4-year-olds	13%	0%	7%	80%	0%
Asleep–no appearance ( $n = 43$ of 64)					
3-year-olds	21%	26%	0%	0%	53%
4-year-olds	13%	21%	8%	38%	21%

Note. IDK = I don't know.

true overall and when only the justifications of children who correctly rejected that the character was pretending were considered. No 3-year-old who correctly rejected that the character was pretending justified his or her response in terms of awareness. In contrast, when the 4-year-olds correctly rejected that the character was pretending, 59% of the time they justified their responses in terms of the character's mental awareness. Four-year-olds were also more likely to do this in the appearance condition (80% of the time) than in the no-appearance condition (38% of the time). However, this may be explained by the fact that children in the no-appearance condition could have correctly justified a response by stating that the character did not look like a butterfly or a flower (i.e., the object the characters were compared to).

Averaging across the two conditions, 4-year-olds responded that the character was not pretending 61% of the time and justified their responses in terms of mental awareness on 34% of the stories. In contrast, although 3-year-olds correctly responded that the character was not pretending 39% of the time, no 3-year-old justified his or her response in terms of the appropriate mental states.

Responses were then compared with performance on the false-belief task. Preliminary analysis revealed that children did not differ on their responses to the false-belief other and false-belief self questions. Overall, 3-year-olds had an average score of 0.88 (of a possible 2,  $SD = 0.89$ ), and 4-year-olds had an average score of 1.50 (of a possible 2,  $SD = 0.63$ ). These scores, however, did not correlate with responses to the pretense questions. Similar to previous experiments by Lillard (1993, 1996), children's understanding of false belief did not relate to their knowledge of pretense. Finally, no correlation between performance on the number-conservation task and responses to the pretense questions was found.

### Discussion

In Experiment 1 children were asked whether sleeping characters, who either had or did not have the appearance or action of a particular entity, were pretending to be that entity. For the most part, 3-year-olds did not understand that pretenders could not be asleep. Even when the character did not look like the alleged pretense, 3-year-olds often stated that the sleeping characters were pretending. When they did answer correctly, they never justified their response in terms of sleeping or level of consciousness. Overall, 4-year-olds accurately rejected that the sleeping characters were pretending approximately

60% of the time, though only 47% of the time when the character had the appearance of a particular entity. Furthermore, on approximately 35% of the stories, 4-year-olds rejected that the character was pretending and justified their responses in terms of the character's consciousness level. This level of performance is similar to Lillard's (1993, 1996, 1998; Sobel & Lillard, 2002) findings on children's understanding of the relationship between pretense and mental representation, mental activity, and intentionality.

These findings support the hypothesis that 3-year-olds make judgments about a character's pretense based on characteristic features, such as appearance. Furthermore, these data suggest that a subset of 4-year-olds do conceptualize pretense in terms of defining features. Although most 4-year-olds did not demonstrate an understanding of this relationship, performance was not at floor. Specifically, when 4-year-olds were told about sleeping characters who explicitly did not have the appearance or action, children judged that these characters were not pretending.

A concern with these data, however, is that the demand characteristics of the experiment might have been too great for the younger children. Overall, children claimed that a sleeping character who did not look like an entity was not pretending to be that entity more than a sleeping character who did look like an entity. However, why they ever claimed the former is a source of concern. It is possible that preschoolers simply do not understand the relationship between sleeping and pretense. However, it is also possible that preschoolers were overwhelmed by the mention of the entity. These stories, especially the no-appearance stories, might have provided too strong a pragmatic influence: Why would the experimenter mention that the character did not look like a flower unless flowers were relevant to the situation? If children recognize this fact, they might infer that the character must be pretending. Furthermore, children might have responded "yes" (i.e., incorrectly) simply to agree with the experimenter. These concerns helped motivate Experiment 4.

It is also possible that young children do understand that pretenders are aware of their own appearance or actions but responded incorrectly in Experiment 1 because the questions were about sleeping characters, a mental state that young children might not fully understand. Experiment 2 eliminated the context of sleeping characters and examined whether young children used characters' ignorance of their own appearance to make decisions

about whether the characters were pretending. Children were presented with characters who looked like or were acting like some entity but who had no knowledge of their actions or appearances. Would children judge these characters to be pretending?

### Experiment 2

In Experiment 2, children were told about characters who did or did not have a particular appearance. In the test stories, the characters were unaware of their appearance. In the control stories, the characters did not have this appearance and recognized this fact. As in the first experiment, children were asked whether the characters were pretending and were asked to justify their answers. Because 3-year-olds' performance on the previous experiment was relatively poor, only 4-year-olds were examined in this experiment.

#### Method

**Participants.** Twenty-four 4-year-olds, ranging in age from 47 to 64 months ( $M$  age = 55 months) were recruited from a preschool and a list of hospital births in the Providence, Rhode Island area. Those recruited from the preschool were tested at the preschool. The other children were tested in the laboratory. Approximately equal numbers of boys and girls participated. The ethnic breakdown of the sample was as follows: 19 children were Caucasian, 2 were Asian, and 3 were African American. The children were all from middle- to upper-middle-class families in the Providence area. No child had ever previously been a participant in the laboratory.

**Materials.** Participants saw four pairs of drawings (see Figure 2 for an example). Each pair was mounted on a 20 cm  $\times$  28 cm sheet of cardboard. Children were also shown the same crayon box, birthday candles, and poker chips from Experiment 1.

**Procedure.** Participants were brought into a game room by an experimenter with whom they were familiar. Children heard two types of stories. In the appearance stories, children were told about a character who was engaged in some activity (e.g., playing in the mud). The top picture in the pair (see Figure 2) depicted the character engaged in this activity. In the bottom picture, children were told that the character had a particular appearance because of that activity (e.g., that she was all dirty when she was finished, with mud on her face and clothes, and that she looked like a tiger). Children were then told that the character did not know about her appearance. Children were then asked two control questions:



Figure 2. Example of a stimulus used in the appearance condition in Experiment 2.

whether the character actually had the appearance (e.g., does she look like a tiger—correct answer: yes) and whether the character knew about that appearance (e.g., does she know she looks like a tiger—correct answer: no). If a child failed these control questions, corrective feedback was given reminding the child of the story elements. Then children were asked whether the character was pretending to be what she looked like and to justify their responses. The order of the control questions was counter-balanced across the two stories.

In the other set of stories, the no-appearance stories, children were told about a character engaged in an activity, but who specifically did not look like one of the entities from the other story set. For instance, one story is about a character who builds a block tower. The tower falls down and all the blocks land on him, and he does not look like a tiger. Children were also told that these characters know that they do not look like the entity in question. The two control questions and test questions were the same as the appearance stories. The text of the four stories is shown in detail in Appendix B.

Children received the four stories in one of four quasi-random orders. After the four pretense stories, children also received the same unexpected-contents false-belief task and the same number-conservation task as in Experiment 1.

*Coding.* Coding of the pretense-question, false-belief, and number-conservation tasks were the same as in Experiment 1. Children's justifications were categorized into one of six groups: (a) no explanation, or "I don't know"; (b) an irrelevant justification; (c) a justification in terms of the character's identity (e.g., "She's a girl, not a tiger") or lack of identity (e.g., "She's never going to be a tiger"); (d) a justification in terms of the appearance or actions of the character (e.g., "Because she's got stripes on herself"); (e) a justification in terms of a mental state, not related to awareness or consciousness (e.g., "Because she wants to"); and (f) a justification in terms of the relationship between pretending and awareness (e.g., "Cause she didn't know that she got all muddy"). All of the responses were coded by a research assistant. A subset of responses (4 children, a total of 16 of the 64 justifications, or 25% of the sample) was also coded by the author. Agreement was 92%. Disagreements were resolved through discussion.

### Results

In this experiment, alpha was set at .05; thus, all results reported as significant were at  $p = .05$  or lower. Table 3 shows the mean and distribution of children's scores on the pretending question across the two conditions. Preliminary chi-square analyses revealed no effect of order on these scores or to the pattern of distribution of their justifications. Overall, children required corrective feedback on 15% of the control questions. On the appearance stories, children's errors on these control questions were evenly divided (10% of the appearance questions, 9% of the knowledge questions). On the no-appearance stories,

children did require more feedback on the knowledge-control questions in the no-appearance stories (38% of those questions) than on the appearance questions (4% of these questions). This suggests that children might have been confused by that control question ("Does the character know he does not look like an X?"). Overall, there was no relationship between the amount of corrective feedback an individual child received and his or her performance on the pretending questions. However, looking at performance on that individual question, on one of the stories (the spilled milk-skunk story, see Appendix B), children who needed the corrective feedback were significantly more likely to answer the pretending question incorrectly,  $\chi^2(1) = 7.73$ .

When children were told about a character who had the appearance of an entity but no knowledge of that appearance, they correctly claimed the character was not pretending 46% of the time. In contrast, when children were told about a character who did not look like the same entity and knew it, they claimed the character was not pretending 60% of the time. The difference between the appearance and no-appearance stories, however, was not significant. This was also confirmed by a nonparametric analysis: a McNemar  $\chi^2$  test comparing correct responses between the two story types also failed to reveal a significant difference.

Responses on the yes-no pretending question in both conditions were then compared against chance performance (again, 50%). Responses did not differ from chance on either story type. However, as in Experiment 1, most children responded consistently on both stories: Twenty-two of the 24 children responded the same on the two appearance stories, and 19 of 24 children responded the same on the two no-appearance stories. Chi-square goodness-of-fit analyses revealed that this pattern of response differed significantly from what would be expected by chance,  $\chi^2(2) = 17.00$  and 10.25 on the appearance and no-appearance stories, respectively.

Table 4 shows the distribution of justifications on the two story types as well as the subset of justifications when children correctly rejected that the character was pretending. Similar to Experiment 1, relatively few justifications were in terms of the characters' mental awareness (overall, only 15%). When the subset of correct responses was examined, children justified their responses in terms of the character's awareness state 29% of the time across the two story types. Children were more likely to do this in the appearance than in the no-appearance stories (41% vs. 17%). This reflects that in the latter condition, children could have correctly explained

Table 3  
Distribution and Mean of Scores on the Pretending Question in Experiment 2

	Number correct			M
	0	1	2	
Appearance stories	12	2	10	0.92 (0.97)
No appearance stories	7	5	12	1.21 (0.88)

Note. Means are out of 2. Standard deviations are in parentheses.

Table 4  
Distribution of Justifications in Experiment 2

	None/IDK	Appearance	Identity	Mental state	Awareness	Other incorrect
All justifications						
Appearance stories	17%	46%	2%	2%	19%	15%
No-appearance stories	19%	50%	10%	0%	10%	10%
Correct responses only						
Appearance stories ( $n = 22$ of 48)	14%	32%	5%	5%	41%	5%
No-appearance stories ( $n = 29$ of 48)	14%	43%	17%	0%	17%	3%

Note. IDK = I don't know.

the stories by referring to the fact that the character lacked another characteristic feature of pretense (i.e., that the character did not look like the pretense entity). Children justified correct responses on the no-appearance stories in terms of the characters' appearance 43% of the time, in contrast to 32% on the appearance stories. Because of the relatively small number of correct responses, however, neither of these differences reached statistical significance.

Responses were compared with performance on the false-belief task. Preliminary analysis revealed that children did not differ on their responses to the false-belief other and false-belief self questions. Overall, children received an average score of 1.42 (of a possible 2,  $SD = 0.78$ ) on the false-belief tasks. A significant correlation between children's responses to the "is the character pretending?" question and false-belief score was found. Overall, children with higher false-belief scores were more likely to respond correctly on the pretending question across the two story types,  $r(24) = 0.44$ . To ensure that this effect was not one of age or general cognitive ability, a hierarchical regression was performed on the number of pretending questions children answered correctly as the dependent variable. First, age and success on the number-conservation task were considered. This factor did not explain a significant amount of variance. Next, false-belief scores were entered; this did explain a significant amount of the variance,  $\Delta r^2 = 0.20$ ,  $F(1, 20) = 5.03$ .

The two story types were then analyzed separately. A similar hierarchical regression analysis, which factored out age and performance on the number-conservation tasks, revealed that children with higher false-belief scores were significantly more likely to answer correctly the pretending question on the appearance stories,  $\Delta r^2 = 0.28$ ,  $F(1, 20) = 8.91$ . This was not the case on the no-appearance stories.

A further analysis was then done on correct justifications. Across both stories, a similar hierarchical

regression demonstrated that there was a non-significant trend for children with higher false-belief scores to reject that the character was pretending and to justify their response in terms of the character's awareness level,  $\Delta r^2 = 0.14$ ,  $F(1, 20) = 3.48$ ,  $p = .077$ . This trend was present in responses to the appearance stories. The 41% of correct responses to the pretending question that were justified in terms of awareness tended to come from children with higher false-belief scores (controlling for age and number-conservation score),  $\Delta r^2 = 0.14$ ,  $F(1, 20) = 3.62$ ,  $p = .071$ . The correlation between false-belief score and performance on the no-appearance stories did not reach significance.

### Discussion

Four-year-olds were shown characters who had a particular appearance or who were engaged in an action but were unaware of that appearance or that their actions gave them a particular appearance. Children often claimed that these characters were pretending. Those who did respond correctly rarely justified their responses in terms of the appropriate mental state. However, as in Experiment 1, and in previous research on children's knowledge of pretense (see Lillard, 2001a), a small subset of 4-year-olds did seem to demonstrate this knowledge. In all, 29% of the children recognized that pretense involves certain mental states and, as a result, rejected that these characters were pretending. Furthermore, children who recognized the relationship between pretense and awareness were more likely to pass a standard unexpected-contents false-belief task.

Experiment 2 shares a problem similar to Experiment 1: In the no-appearance stories, which were intended as a control to the appearance stories, some children claimed that a character who did not look like a tiger and knows he was pretending to be a tiger. Why they ever do this might reflect that they simply do not understand the relationship among

appearance, awareness, and pretending. Children did not differ in how they responded to the appearance and no-appearance questions. It is possible that this failure to find a difference between the two story types was due to children's general confusion on the no-appearance stories. Children might have inferred that the entity in question (e.g., tigers) was relevant to the questions because why else would it have been mentioned? On one of these stories, children did require more corrective feedback on one of the control questions, and children who required this feedback were more likely to answer the pretending question incorrectly. This is consistent with the idea that children fall victim to the linguistic demand characteristics of the stories.

A similar concern with both Experiments 1 and 2 is the manner in which children were asked the test question. In both experiments, children were asked whether the characters were pretending to be what they did or did not look or act like (e.g., "Is the character pretending to be a tiger?"). Children might have inferred that the character must be pretending in all the stories and interpreted the test question as asking what the character was pretending to be. If this is the case, especially in the appearance stories where the entity was the only thing mentioned, children might accept it as the object of the character's pretense. This could account for the perfunctory *yes* responses in both experiments.

A better method would come from reducing these pragmatic difficulties, which might have made it difficult for children to respond correctly. In Experiment 3 and 4, children were not asked yes-no questions but rather were given a 2AFC procedure. In this procedure, children were given relevant information about two characters and had to judge which of the two characters was pretending or had knowledge of their appearance. This eliminates the possibility of any yes bias, which might have influenced responses. This also potentially eliminates the pragmatic demands present in the first two experiments.

Before discussing this method, there is one more aspect of the results of Experiment 2 to consider. Performance on the false-belief task correlated with performance on the pretending question on the appearance stories. Several researchers have pointed to the correlation between the complexity of children's pretending and precocious performance on theory-of-mind tasks (Astington & Jenkins, 1995; Lalonde & Chandler, 1995; Lillard, 2001b; Taylor & Carlson, 1997) as evidence that pretense is a "zone of proximal development" for understanding mental representation (see Lillard, 1993). In the

present experiment, the correlation between recognizing the importance of awareness in pretense and success on a theory-of-mind task supports this hypothesis.

It is possible that this correlation is mediated by the child's language ability. Many researchers have found a significant correlation between children's developing theory of mind and their language ability (e.g., Astington & Jenkins, 1995; Hughes & Dunn, 2001; Ruffman, Slade, & Crowe, 2002). A weak correlation was found between false-belief performance and the number of stories children justified in terms of the character's awareness. The stronger correlation was between false-belief performance and correct responses on the pretending question itself. Thus, it is possible that children understand that pretenders are aware of their actions or appearance but cannot explicitly verbalize this knowledge (e.g., see Leslie & Roth, 1993). Other findings are consistent with this hypothesis: Across both Experiments 1 and 2, only a minority of the 4-year-olds who correctly claimed that the characters were not pretending explicitly justified their responses in terms of the appropriate mental state of the character. This implies that experiments that reduce the linguistic demand characteristics are important to examine. If similar correlations persist with the demand characteristics reduced, this suggests that the correlation is not a spurious one.

### Experiment 3

In Experiment 3, we examined children's knowledge of the relationship between awareness and pretense while attempting to reduce certain linguistic demand characteristics that were present in Experiments 1 and 2. In this experiment, instead of asking whether young children thought that characters ignorant of their actions or appearance were pretending, young children were asked whether pretenders were aware of their actions or appearances. This way, children received no strange or irrelevant information (such as that the character did not look like a particular entity).

Three- and 4-year-olds were presented with pictures of two characters with the same appearance or who were engaged in the same action. Children were told that one character was pretending to be what he or she resembled and that the other character was engaged in another activity. Children were asked to state which of the two characters knew what his or her appearance or actions were and to justify their response.

### Method

**Participants.** Sixteen 3-year-olds and 17 four-year-olds were recruited from a preschool and a list of hospital births from the Providence, Rhode Island area. The 3-year-olds ranged in age from 36 to 47 months ( $M$  age = 42 months), and the 4-year-olds ranged in age from 50 to 55 months ( $M$  age = 53 months). Those recruited from the preschool were tested at the preschool. The other children were tested in the laboratory. Approximately equal numbers of girls and boys participated. The ethnic breakdown of the sample was as follows: 30 children were Caucasian, 1 child was Asian, 1 child was African American, and 1 child was Latino/Hispanic. The children were all from middle- to upper-middle-class families in the Providence area. No child had ever previously been a participant in the lab.

**Materials.** Participants saw four sets of drawings (see Figure 3 for an example). Each set was mounted on a 20 cm  $\times$  28 cm sheet of cardboard. The set contained one picture of two characters with the same appearance and below it was a picture of each character individually, as if it were cropped from the first picture. For the false-belief and number-conservation tasks, the same materials as in Experiments 1 and 2 were used.

**Procedure.** Participants were brought into a game room by an experimenter with whom they were familiar. Children were told two types of stories. In the high-contrast stories, children were shown a picture of two characters who each appeared engaged in the same action and as a result had a particular appearance. For instance, children were shown two girls who were finger painting and, as a result, had black paint all over their shirts and faces. The experimenter pointed out that both of the girls looked like zebras. The experimenter then pointed to one of the bottom two pictures, each of which depicted one of the two girls, and told the child that one girl was pretending to be a zebra and that the other girl was painting a picture of a zebra. Thus, the child was given an explicit verbal contrast between a character who was pretending and a character who was not pretending but was engaged in a task that involved the pretense entity.

In the low-contrast stories, children received the same initial exposure to the two characters, except they were told that the character who was not pretending was engaged in an action that was ambiguous as to whether it was pretense. For example, children were shown a picture of two boys who were playing in the mud and, as a result, looked like tigers (see Figure 3). One boy was pretending to be a tiger;

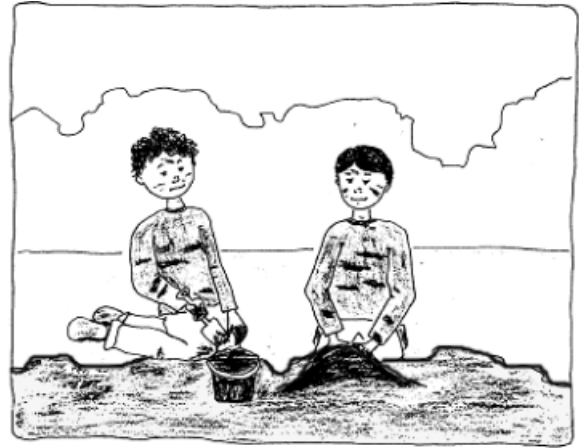


Figure 3. Example of a stimulus set from the high-contrast condition in Experiment 3.

the other was playing in the mud; therefore, whether he was also pretending was uncertain.

This manipulation was used to ensure that children did not respond based on their knowledge of activities other than pretense. Children might choose the pretending character as being aware of her appearance in the high-contrast stories because they know that pretenders are aware of their actions or appearance. However, they could also choose the pretending character because they know that characters engaged in other activities do not have to be aware of their actions or appearances. In the low-contrast stories, making such an inference is not possible because the other character may or may not be pretending. If children respond based on recognizing that characters explicitly engaged in non-pretense actions are not aware of their actions or appearance, one would expect children to respond at chance levels on the low-contrast stories.

In both stories, children were first asked two control questions to confirm that they remembered which of the two characters was pretending. If a

child failed these control questions, corrective feedback was given. Children were then asked which of the two characters knew about their appearance and to justify their response. There were two stories of each type (four in all), and they were presented in one of four quasi-random orders. After the four stories, children received the same false-belief and number-conservation tasks as in Experiments 1 and 2.

*Coding.* On each story, children received a score of 1 if they chose the picture of the character who was explicitly pretending; otherwise, they received a score of 0. Thus, on both story types, children were given a score between 0 and 2. Children's justifications of their picture choices were coded according to a coding system similar to that of Experiment 2. All of the responses were coded by the same research assistant who coded the responses in Experiment 2. A subset of responses (4 children in each age group, a total of 32 of the 132 justifications, or 24% of the sample) was also coded by the author. Agreement was 100%.

### Results

In this experiment, alpha was set at .05; thus, all results reported as significant were at  $p = .05$  or lower. Table 5 shows the mean and distribution of children's scores on the knowledge question. Preliminary chi-square analyses revealed no effect of order on responses to this question or on the distribution of justifications. Preliminary analyses also suggested that children did not perform differently on the two high-contrast or two low-contrast stories; therefore, these data were combined. Overall, children required corrective feedback on 3% of the control questions. Preliminary analyses suggested that overall there was no relationship between the amount of corrective feedback children received and their performance on the test questions.

Table 5  
Distribution and Mean of Scores on the Knowledge Question in Experiment 3

	Number correct			M
	0	1	2	
3-year-olds				
High contrast	0	7	9	1.56 (0.51)
Low contrast	2	3	11	1.56 (0.73)
4-year-olds				
High contrast	1	6	10	1.53 (0.62)
Low contrast	0	4	13	1.76 (0.44)

Notes. Means are out of 2. Standard deviations are in parentheses.

Children in both age groups recognized that the pretending character knew about her appearance. The 3-year-olds chose this character 78% of the time on both story types. The 4-year-olds chose this character 77% of the time on the high-contrast stories and 88% of the time on the low-contrast stories. A 2 (story type)  $\times$  2 (age group) mixed ANOVA was performed on children's response; story type was a within-subject factor and age was a between-subject factor. No effects of either factor or significant interactions were found. No significant simple effects were found.

Responses in both age groups were then compared against chance performance. On both story types, 3- and 4-year-olds' responses were significantly more accurate than what would be expected by chance performance,  $t(15) = 4.39$  and  $3.09$  for the 3-year-olds' performance on the high- and low-contrast stories, respectively, and  $t(15) = 3.50$  and  $7.21$ , for the 4-year-olds' performance. Similarly, chi-square goodness-of-fit tests revealed that the distribution of 3-year-olds' responses to both the high- and low-contrast stories differed significantly from what would be expected by chance,  $\chi^2(2) = 10.38$  and  $16.37$ , respectively. The same was true of the 4-year-olds' responses,  $\chi^2(2) = 11.75$  and  $26.06$ , respectively.

Table 6 shows the distribution of justifications, as well as the distribution of justifications to only the correct responses. Both the 3- and 4-year-olds justified their choices in terms of the character's appearance significantly more than any other response type. This was true for all responses overall, binomial tests, and for only correct responses, binomial tests. Justification in terms of the character's pretense almost never occurred: The 3-year-olds did so on only 7% of the high-contrast stories and on only 3% of the low-contrast stories. The 4-year-olds did so on 12% and 6% of the high-contrast and low-contrast stories, respectively. No significant effects of age were found.

Responses were analyzed with regard to performance on the theory-of-mind measure. The false-belief task was scored in the same manner as in Experiments 1 and 2. Overall, 3-year-olds received an average score of 0.56 (of a possible 2,  $SD = 0.81$ ) on the false-belief tasks, and 4-year-olds received an average score of 1.18 (of a possible 2,  $SD = 0.81$ ). No significant correlations were found between these false-belief scores and children's correct picture choices.

As in Experiment 2, a hierarchical regression was then performed on the number of stories on which children chose the correct picture and correctly justi-

Table 6  
Distribution of Justifications in Experiment 3

	None/IDK	Appearance	Identity	Mental state	Pretense	Other incorrect
All justifications						
High contrast						
3-year-olds	31%	47%	6%	9%	6%	0%
4-year-olds	12%	59%	0%	14%	14%	0%
Low contrast						
3-year-olds	38%	44%	3%	3%	3%	9%
4-year-olds	6%	71%	9%	9%	6%	0%
Correct responses only						
High contrast						
3-year-olds ( <i>n</i> = 25 of 32)	40%	40%	0%	12%	8%	0%
4-year-olds ( <i>n</i> = 26 of 34)	8%	58%	0%	19%	15%	0%
Low contrast						
3-year-olds ( <i>n</i> = 25 of 32)	28%	48%	4%	4%	4%	12%
4-year-olds ( <i>n</i> = 30 of 34)	7%	67%	10%	10%	7%	0%

Note. IDK = I don't know.

fied their response in terms of the character's pretending. First, age and success on the number-conservation task were placed into the regression. These did not explain a significant amount of the variance. False-belief scores, however, which were then entered into the model, showed a nonsignificant trend to explain variance,  $\Delta r^2 = 0.09$ ,  $F(1, 29) = 3.04$ ,  $p = .092$ . Children with higher false-belief scores tended to choose the correct picture and justify their responses in terms of the character's pretense more often.

### Discussion

Children were shown two characters who each had the appearance of a particular entity and were told that one of the characters was pretending and that the other was engaged in a different action. Children were then asked which of the two characters knew about his or her appearance. Both 3- and 4-year-olds chose the character who was pretending. This suggests that 3- and 4-year-olds understand that pretenders are aware of their action or appearance. The data also suggest that children's responses are specifically due to their knowledge of pretense and not to their knowledge of other activities. There was no difference between responses to the high- and low-contrast stories, and both were answered correctly at above-chance levels. Furthermore, correct responses were unaffected by whether the child was asked whether the pretenders knew about their appearance (the zebra and tiger stories) or their actions (the statue and kangaroo stories). This was important because it is possible that children could

infer that the nonpretending characters could have looked at the stripes on their shirt and recognized they looked like a zebra or a tiger. This inference seems more difficult in the other two stories.

Although correct responses to the knowledge question were high, children rarely justified their responses in terms of pretense. Instead, they overwhelmingly appealed to the character's appearance or actions in each story, even though both characters had the same appearance or were engaged in the same action. One potential reason for this discrepancy is the difference in age ranges between the 4-year-olds in this experiment and in the previous two experiments. Although the mean age did not differ among any of the experiments, the oldest child in Experiment 3 was 55 months, compared with 61 and 64 months in Experiments 1 and 2, respectively. It is possible that the subset of children who demonstrated explicit understanding of the relation between pretense and awareness in the previous two experiments came from the oldest children. To examine this, data from these experiments were reexamined. A correlation between age in months and correct responses was performed, but no significant effects were found.

Finding that 3- and 4-year-olds recognize that pretenders are aware of their actions or appearance is consistent with several lines of research on children's understanding of pretense (e.g., Bruell & Woolley, 1998; Custer, 1996; Davis, Woolley, & Bruell, 2002; Joseph, 1998). A common method used in these studies is to tell the child that a character is pretending and ask what the character is thinking about

or intended to do. This was the method used in Experiment 3. Both Lillard (1998, 2001a) and Gopnik (1998) pointed to a difference in the method between these experiments and other experiments that suggests that most 4-year-olds do not understand pretense in terms of other mental states (Lillard, 1993, 1996, 1998; Sobel & Lillard, 2002; see also Experiments 1 and 2). Children may be able to infer whether someone has a particular mental state given that he or she is pretending but may not be able to infer whether someone is pretending given a particular set of mental states or a contrast between mental and physical states.

To investigate this possibility, Experiment 4 reexamined issues from Experiments 1 and 2, using a similar 2AFC procedure as used in Experiment 3. Instead of telling children which character was pretending and having them judge something about the characters' mental states, in Experiment 4 children were told about two characters' mental states and physical activities. Children were asked to judge which of the two characters was pretending. Experiment 4 examined questions similar to Experiments 1 and 2, while reducing the linguistic demand characteristics and the potential for a yes bias that might have influenced responses.

#### Experiment 4

Experiment 4 examined two questions from Experiments 1 and 2. First, do young children recognize that sleeping characters cannot be pretending? Three- and 4-year-olds were shown a sleeping character and a wakeful character. In one set of stories, the two characters had the same appearance or performed the same action. Children were told that the wakeful character was aware of his appearance or action. In the other set of stories, wakefulness and appearance were in conflict: The sleeping character had the appearance of the pretense entity, the wakeful character was thinking about that entity but did not have the appearance because of a mishap. In each case, children were asked to state which character was pretending and to justify their answer.

The second question comes from a potential problem in Experiments 2 and 3. In those experiments, the relationship between the characters' intentions and their awareness of their actions or appearance was never made clear. In Experiment 1, because the characters were asleep, it is presumed that they did not have the intention to appear the way they did. However, in Experiment 2, no mention of the character's intentions was made. For instance, in Ex-

periment 2, children might assume that the character who is playing in the mud looks like a tiger because she intended to look like a tiger. Given this presumed intention, the character must be pretending, even though she lacks the awareness of her appearance. In Experiment 4, these two mental states are separated. Are characters with the appearance of an entity (and who are aware of their appearance), but who lack the intention to pretend, engaging in pretense? Alternatively, are characters with the intention and action of the pretend entity, but not the appearance of that entity, engaging in pretense?

Similar to Experiment 3, Experiment 4 used a 2AFC procedure. However, instead of telling children which character was pretending and asking them about their mental awareness, children were asked which character was pretending after being told various pieces of information about the characters' mental states, physical appearance, and awareness of that appearance. If children coherently understand the relationship between pretense and mental awareness, but were impaired in Experiments 1 and 2 because of the demand characteristics of the experiment, one would expect a level of accuracy in this experiment similar to that in Experiment 3. Alternatively, if this understanding is limited, accuracy in this experiment might be reduced from that in Experiment 3.

#### Method

*Participants.* Sixteen 3-year-olds and 16 four-year-olds were recruited from flyers distributed to local preschools and a list of hospital births from the Providence, Rhode Island area. The 3-year-olds ranged in age from 36 to 45 months ( $M$  age = 42 months), and the 4-year-olds ranged in age from 46 to 60 months ( $M$  age = 53 months). All children were tested in the laboratory. Approximately equal numbers of girls and boys participated. The ethnic breakdown of the sample was as follows: 24 children were Caucasian, 1 child was Asian, 3 children were African American, and 4 children were Latino/Hispanic. The children were all from middle- to upper-middle-class families in the Providence area. No child had ever previously been a participant in the lab.

*Materials.* Participants saw six sets of drawings (see Figure 4 for an example). Each set was mounted on a 34 cm × 54 cm sheet of cardboard. For the false-belief and number-conservation tasks, the same materials as in Experiments 1 through 3 were used.

*Procedure.* Children were brought into a game room by an experimenter with whom they were fa-

miliar. Children heard three types of stories. In the sleeping–no conflict stories, children were shown pictures of two characters at school at naptime. One character was asleep, and the other was awake. The two characters had the same appearance or performed the same action. Children were told that the teacher at school said that the two characters looked alike. The wakeful character claimed to have that appearance whereas the sleeping character made no such claim. Children were asked two control questions (which character was asleep, and which character was aware of their appearance) and were then asked which of the two characters was pretending. Corrective feedback on the control questions was given if children answered incorrectly. Children were also asked to justify their answer.

In the sleeping–appearance conflict stories, the same setup was used but the sleeping character had

a particular appearance. For instance, the sleeping character looked like a zebra because he had painted black stripes on his white shirt and pants. The other character was awake and was thinking about the same entity but had the appearance of another entity through a mishap. For instance, the other character in this story was thinking about a zebra but wound up looking like a Dalmatian dog because when he tried to paint stripes on himself the paint spilled and made black splotches on his white shirt and pants. Children were asked similar control and test questions.

Finally, in the intention–appearance conflict stories, children were shown two characters who were engaged in the same activity. One character finished the activity and began to think about a pretense entity. She intended to make herself look like that entity but through a mishap wound up not having that appearance. However, the character persevered and began to act like the entity. The other character had the appearance of the same entity (because of a mishap) but was still engaged in the original activity. For instance, in one story, there were two girls drawing at the art table. One girl finished drawing and was now thinking about a cat. She attempted to make herself look like a cat but failed because of a mishap. Children were also told that the girl knew she did not look like a cat. However, she then began to act like a cat. The other girl also finished drawing and by accident wound up looking like a cat. Children were also told that this girl knew she looked like a cat. However, she then went back to the activity she was engaged in (drawing). Children were asked control questions (which girl was thinking about a cat, and which girl looked like a cat) and were given corrective feedback when they failed to respond correctly. Children were then asked which girl was pretending to be a cat.

Children received two stories of each type (six stories in all), and they were presented in one of four quasi-random orders. The exact text of the six stories is shown in Appendix D. After children were read the stories, they received the same false-belief and number-conservation tasks as in Experiments 1 through 3.

*Coding.* On each story, children received a score of 1 if they chose the picture of the character who was awake (in the two sleeping stories) or the character who was thinking about the pretense entity (in the intention stories); otherwise, they received a score of 0. Thus, on all story types, children were given a score between 0 and 2.

Children's justifications of their picture choices were coded according to a coding system similar to

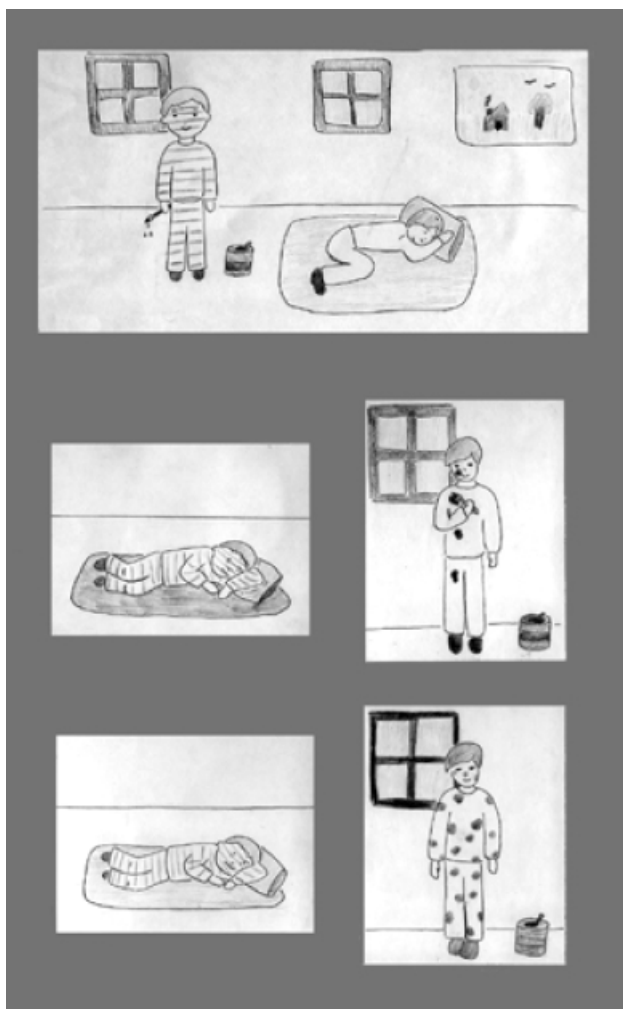


Figure 4. Example of stimulus set from the sleeping–appearance conflict condition in Experiment 4.

that of Experiment 1. Responses were classified into one of four categories: (a) no explanation, "I don't know," or an irrelevant justification; (b) a justification in terms of the appearance or actions of the character; (c) a justification in terms of desire; and (d) a justification in terms of awareness (for the sleeping stories) or intention or belief (for the intention stories). Two new undergraduate research assistants, blind to the experimental hypotheses, coded these data. The overall agreement for the stories was 89%. Disagreements were resolved by the author.

### Results

In this experiment, alpha was set at .05; thus, all results reported as significant were at  $p = .05$  or lower. Preliminary analysis revealed no effect of order on children's picture choices or justifications. Overall, children required corrective feedback on 10% of the control question; however, children did receive different amounts of feedback across the three story types. In particular, children required feedback on 19% of the control questions for the intention–appearance conflict stories, significantly more than the 7% and 5% on the sleeping–no conflict and sleeping–appearance conflict stories, respectively,  $t(31) = 3.70$  and  $3.95$ , respectively. Three-year-olds required significantly more corrective feedback than 4-year-olds, but only for the intention stories,  $t(30) = -3.21$ .

Children did not significantly differ in their responses to the two control questions. However, for one of the intention–appearance conflict stories (the cat story; see Appendix D) there was a nonsignificant tendency for children to answer the control question about the character's intention better than the question about the character's appearance,  $\chi^2(1) = 2.77$ ,  $p = .092$ . This difference reflects that children tended to choose the character who was acting like a cat (i.e., crawling around on the ground) as looking like a cat, instead of the character who had the physical appearance of a cat (i.e., whiskers painted on her face). It is possible that receiving corrective feedback influenced children's responses to the pretending question, but this was not the case. Children who needed the corrective feedback on the appearance question were as likely to answer the pretending question correctly as children who did not require corrective feedback. Furthermore, there was no correlation between the amount of corrective feedback children received and their performance on the pretending stories.

Table 7 shows the mean and distribution of children's scores on the pretending question across the

three story types. These responses were analyzed with a 2 (age)  $\times$  3 (story type) mixed ANOVA. Age was a between-subject factor; story type was a within-subject factor. This analysis revealed a significant main effect of age: Overall, 4-year-olds made more correct picture choices,  $F(1, 30) = 6.02$ . A significant main effect of story type was also found,  $F(2, 60) = 6.87$ . No significant interactions were found. Looking at each story type individually, the 3- and 4-year-olds did not differ in their responses to either type of sleeping story. There was a nonsignificant trend in responses to the intention–appearance conflict stories: Overall, 4-year-olds were more likely to respond correctly than 3-year-olds,  $t(30) = -1.70$ ,  $p = .10$ .

Looking across the three story types, children were significantly more likely to answer the sleeping–no conflict stories correctly than the sleeping–appearance conflict stories,  $t(31) = 3.18$ . Similarly, children were significantly more likely to answer the intention–appearance conflict stories correctly than the sleeping–appearance conflict stories,  $t(31) = 2.61$ . Finally, there was a nonsignificant trend for children to answer the sleeping–no conflict stories better than the intention–conflict stories,  $t(31) = 1.61$ ,  $p = .118$ .

Responses were then considered against chance performance. Children correctly responded to the sleeping–no conflict stories significantly more often than would be expected by chance,  $t(31) = 4.19$ . Similarly, their distribution of responses differed significantly from what would be expected by chance,  $\chi^2(2) = 21.19$ . Both 3- and 4-year-olds individually showed this pattern of performance. This suggests that both 3- and 4-year-olds correctly rec-

Table 7  
Distribution and Mean of Scores on the Pretending Question in Experiment 4

	Number correct			
	0	1	2	M
Sleeping–no conflict				
3-year-olds	2	4	10	1.50 (0.73)
4-year-olds	2	3	11	1.56 (0.73)
Sleeping–appearance conflict				
3-year-olds	11	2	3	0.50 (0.82)
4-year-olds	7	3	6	0.94 (0.93)
Intention–appearance conflict				
3-year-olds	6	5	5	0.94 (0.85)
4-year-olds	3	3	10	1.44 (0.81)

Note. Means are out of 2. Standard deviations are shown in parentheses.

ognized that the wakeful character was pretending in the sleeping–no conflict stories.

Responses to the sleeping–appearance conflict stories showed a nonsignificant trend below chance responding,  $t(31) = -1.79$ ,  $p = .083$ . A chi-square goodness-of-fit test revealed that children's distribution of responses did significantly differ from what would be expected by chance,  $\chi^2(2) = 20.19$ . Looking individually at the two age groups, the 3-year-olds responded significantly below chance performance,  $t(15) = -2.45$ , whereas the 4-year-olds did not differ from chance values. However, looking at their distribution of responses, both age groups significantly differed from what would be expected by chance responses,  $\chi^2(2) = 12.00$  and  $16.38$  for the 3- and 4-year-olds, respectively. Rather, on the sleeping–appearance conflict stories, the 3-year-olds often chose the sleeping character, whereas the 4-year-olds were equally divided in their choice of the sleeping and wakeful character. A subset of 4-year-olds, but few 3-year-olds, reliably recognized that sleeping characters could not be pretending, regardless of their appearance.

Responses on the intention–appearance conflict stories did not differ from chance performance. However, looking at the distribution of responses suggests that children responded significantly different from chance on these stories,  $\chi^2(2) = 10.25$ . Looking at the two age groups individually, the 3-year-olds' response level was no different from chance, and their distribution of responses did not differ from random performance. In contrast, the 4-year-olds' level of response was significantly greater than chance,  $t(15) = 2.15$ , and their distribution of responses significantly differed from what would be expected by chance,  $\chi^2(2) = 12.38$ . This suggests that 3-year-olds simply guessed on the intention–appearance conflict stories but that 4-year-olds showed a systematically correct pattern of performance.

The justification data were consistent with the results of previous experiments. Across the four sleeping stories, children justified only 17% of the stories in terms of the characters' mental awareness. Finally, children's false-belief scores were unrelated to their responses to the pretense questions on all three story types.

### Discussion

Experiment 4 further investigated children's understanding of the relationship between pretense and mental awareness using the method from Experiment 3. Instead of telling children about char-

acters who were or were not pretending, children were told about characters' mental and physical states and were asked which one was pretending. If children coherently understand the relationship between pretense and mental awareness, their performance should be similar to Experiment 3, in which children chose the pretender as knowing about their appearance. However, if children have not developed a coherent representation of the relationship between pretense and other mental states, performance in this experiment might be reduced.

In the sleeping–no conflict stories, in which the two characters had the same appearance or performed the same action, both 3- and 4-year-olds chose a wakeful character as pretending over a sleeping character. This procedure is similar to the method used by Flavell et al. (1999, Experiment 3), who found that 6-year-olds were more likely to choose a wakeful character over a sleeping character as able to perceive, pretend, and know they are awake. Three- and 4-year-olds seem to recognize that wakefulness is important for pretending, and an open question for future research would be to replicate Flavell et al.'s procedure with younger children.

However, Flavell et al. (1999) did not manipulate the perceptual appearance of the characters. If children coherently understand that pretending requires the character to be conscious, they should not claim that any sleeping character is pretending. Alternatively, if children make inferences based on the characters' appearance over their underlying mental states, they will claim that sleeping characters who happen to have a particular appearance are pretending to be what they look like. This latter description better characterizes the 3-year-olds' performance on the sleeping–appearance conflict stories. Four-year-olds were split: Approximately half consistently chose the sleeping character, and approximately half consistently chose the wakeful character. This suggests, consistent with Experiment 1, that only a subset of 4-year-olds coherently understands the relationship between pretense and mental awareness.

Judgments about whether characters are pretending might be easier for children to make if children were aware of the character's intentions. In the sleeping–no conflict stories, the wakeful characters have the intention to pretend (by virtue of stating that they are pretending). In the sleeping–appearance conflict story, the sleeping characters clearly do not have the intention to pretend, whereas the wakeful characters do. However, this is not made

explicit. In the intention–appearance conflict stories, children were told that the character with the appearance of the entity intended to perform another (nonpretense) action, and the character without the appearance of the entity did intend to pretend. Making these intentions clear did seem to benefit performance. Most 4-year-olds responded correctly to the intention–appearance conflict stories, and 3-year-olds' performance improved compared with the sleeping–appearance conflict stories; 3-year-olds did not solely respond based on the characters' appearance. The younger children required more corrective feedback on these stories, which suggested that they might not have understood the nature of the questions. However, their performance on the control questions did not influence how they responded to the test questions. These data suggest that children's recognition of the importance of intention is developing between ages 3 and 4, and may be used to assist their judgments about pretense.

One concern with the data from this experiment is that in the sleeping–no conflict stories, an adult character (i.e., a teacher) claims that both children have a particular appearance. In the conflict stories, no adult is present. It is possible that the presence of this adult character improved performance on the no-conflict stories: children may have latched on to what the adult says, which confirms their own beliefs about the characters' appearance. This would indicate that the no-conflict stories overestimated children's knowledge. This line of reasoning, however, seems unlikely. If it were the case, children should also be more inclined to answer the control questions correctly in this condition. Children did not answer the sleeping–appearance conflict control questions incorrectly more often than the sleeping–no conflict control questions.

Another concern with the present data is that in some stories the characters' intentions are mediated by the use of a prop. For instance, in one of the sleeping–appearance conflict stories, the wakeful character chooses to wear a fireman's hat, even though she is thinking about a ballerina. In the other story, the wakeful character attempts to paint stripes on himself but fails because the paint drips. Children might have interpreted the presence of the mismatching prop as indicating that the wakeful character did not have the intention to pretend to be a ballerina or changed her intention after she found that no ballerina clothes were available. Children's accurate responses did not differ between these two stories. However, making the presumed intention of each character explicit should be investigated

in future research on children's understanding of pretense.

### General Discussion

Four experiments investigated young children's knowledge of the relationship between pretense and mental awareness. These experiments suggest that 3-year-olds recognize certain aspects of this relationship, but they also suggest certain developments between the ages of 3 and 4. The experiments also revealed that even the 4-year-olds' understanding was not terribly robust and that the methodology used can greatly affect performance. What exactly do 3- and 4-year-olds know about this relationship? What are the implications of these experiments for research on children's understanding of pretense, and children's understanding of mental states more generally?

Experiment 1 demonstrated that 3- and 4-year-olds were relatively poor at recognizing that sleeping characters could not engage in pretense. However, children had less difficulty when the character did not have the appearance of the pretense entity. A subset of 4-year-olds, but none of the younger children, did understand this relationship reliably, and they correctly justified their responses in terms of the character's consciousness. Experiment 2 examined whether 4-year-olds recognized that characters who had a particular appearance, but lacked knowledge of that appearance, were not pretending. Most 4-year-olds incorrectly claimed that these characters were pretending. However, as in Experiment 1, a subset of 4-year-olds did seem to understand that mental awareness was critical to recognizing that a character was pretending.

In both Experiments 1 and 2, children might have been affected by certain linguistic demand characteristics: The experimenter mentions that the character looked like a particular entity. Children might have believed that the character's appearance is critical to determining whether the character is pretending, because why else would the experimenter have mentioned it? Experiments 3 and 4 attempted to examine children's understanding of pretense while eliminating these linguistic demands. In Experiment 3, children were shown two characters who either had the same appearance or were engaged in the same action. They were told that one was pretending and the other was not. Children were asked to choose which character knew about her appearance. Both the 3- and 4-year-olds chose the pretender, indicating that they recognized that pretenders are aware of their appearance.

The method in Experiment 3 reduced the linguistic demand characteristics in Experiments 1 and 2, but it differs from those experiments in another way as well. Instead of asking children whether characters were pretending, children were told who was pretending and were asked about those characters' mental states. Lillard (1998) and Gopnik (1998) both pointed out that this methodological difference might affect performance. In studies on children's understanding of the relationship between pretense and intentionality, Joseph (1998) found that 3-year-olds recognize that pretenders intend their actions, but Lillard demonstrated that 3-year-olds state that a character who is not intending his actions as pretense is still pretending.

Experiment 4 used a method similar to Experiment 3 to investigate children's knowledge about sleeping characters and to examine how children judge pretending given a conflict between intentionality and awareness. Instead of telling children which character was pretending, children were told about the characters' appearance and mental state and asked which one was pretending. When there was no conflict between wakefulness and appearance, 3- and 4-year-olds chose wakeful characters and not sleeping characters as pretending. When such a conflict existed, 3-year-olds relied primarily on appearance, whereas 4-year-olds were split between the two. Three-year-olds also judged that a character who looked like an entity, but was not thinking about, intending to be, or acting like that entity, and a character with those underlying mental states and action, but not the appearance of the entity, as pretending equally. Four-year-olds, in contrast, were more likely to base their responses correctly on intentions and action.

These experiments suggest that both 3- and 4-year-olds recognized that pretenders must be aware of their appearance or actions. Similarly, both 3- and 4-year-olds also recognized that sleeping characters were less likely to be pretending than wakeful characters when the two characters had the same appearance or performed the same action. Three-year-olds, however, had difficulty when the appearance and wakefulness of the characters conflicted, and they relied mostly on the character's appearance. Some 4-year-olds also had this difficulty; others did not.

Three-year-olds (and potentially some 4-year-olds) also seemed to be affected by the linguistic demands present in the first two experiments. Given a character whose actions or appearance conflicts with his or her mental state, children made judgments about whether that character was pretending

based on those actions or appearance (in Experiments 1 and 2). However, when asked to make a forced-choice response between two characters with conflicting mental states, performance improved. Three-year-olds showed dramatic improvement in their correct responses when the conflict between mental states and appearance or action was eliminated (Experiment 3, and the no-conflict condition in Experiment 4), but they still had some difficulty when that conflict was present (Experiment 4). Four-year-olds showed improved performance even when the conflict was present (e.g., the two conflict conditions in Experiment 4) but were not completely adult-like in all their responses, suggesting that their understanding of pretense is not fully developed.

Similarly, across all four experiments, only a small subset of children justified their responses in terms of the characters' awareness level or other mental states such as intentions or desires. Some have suggested that young children implicitly understand the relationship between pretense and other mental states but lack the explicit ability to articulate that relationship (e.g., Leslie & Roth, 1993). Children's pattern of response in Experiment 3 and 4-year-olds' improved performance in some conditions of Experiment 4, compared with Experiments 1 and 2, are consistent with this hypothesis. However, despite variations in the level of correct responses, justifications based on the character's awareness were at a relatively consistent level across the four experiments. Seen in this light, the present data suggest that few 3-year-olds and only some 4-year-olds have a coherent representation of the relationship between pretense and mental awareness, and can use that knowledge to generate explanations of why a character is or is not pretending. This is consistent with the findings of Lillard (1993, 2001a). It would be interesting to examine the performance of older children to see whether their development of this understanding parallels the developmental trends found in other studies of children's understanding of pretense (Lillard, 1996; Richert & Lillard, 2002).

This potential developmental difference, and the contrast in results among the present experiments, points to a real-world observation: Children rarely (if ever) must recognize that another person is pretending given a contrast between their mental states and physical activity or appearance. Children, however, do recognize that others are engaging in pretense by 28 months without being told explicitly what that person is thinking (e.g., Harris & Kavanaugh, 1993).

How is this done? Leslie (1987) suggests that children this young do recognize that pretense has

representational content. However, it is also possible that children recognize others' pretense based on certain physical cues. Lillard (2002; Lillard & Witherington, 2004) suggests that children as young as 18 months are sensitive to certain signs of pretense—particular behavioral cues that indicate pretending. Using these behavioral cues to recognize that others are pretending might obscure children from recognizing that certain mental states are defining characteristics of pretense. This might explain the difficulty that 3-year-olds (and potentially older children) have when these behavioral cues (such as appearance or actions) and mental states are in conflict. In Experiments 1, 2, and 4, when the characters' behavior conflicts with their mental states, young children might have resolved the conflict by appealing to the characters' behavior. In contrast, in Experiment 3, where there is no such conflict, both 3- and 4-year-olds performed relatively well.

This distinction is especially relevant when considering the intention–appearance conflict condition in Experiment 4. There, children have two conflicting pieces of behavioral evidence: The character with the intention to pretend acts like the pretense, and the character without the intention to pretend appears like the pretense. Four-year-olds seem to recognize that action trumps appearance, whereas 3-year-olds seem to choose randomly (but consistently) between the two. How exactly children transition from recognizing pretense based on these behavioral cues, and the importance of each behavior cue, to recognizing pretense based on mental state knowledge is a subject for future research.

Similarly, another open question for future research is how coherent children's developing knowledge of pretense is. If the same children participated in Experiments 1, 2, and 4, would the same subset of 4-year-olds consistently answer questions and justify their responses correctly? Even within a particular experiment, is children's understanding of pretenders' awareness of their appearance the same as their understanding of pretenders' awareness of their actions? We did not find many individual differences among the stories used in the present experiments, but such differences were not systematically examined. For instance, in Experiment 4, some characters' intentions to act or appear in a particular way involved their use of a costume or a prop; others involved a physical transformation (e.g., painting or putting mud on themselves). For example, a character who is thinking about a ballerina but puts on a fire helmet knows explicitly that she does not look like a ballerina. A character who is thinking about a zebra but spills the paint on himself

might not explicitly know he does not look like a zebra. In the former case, children can rely on information in the picture. In the latter, children must rely on what the experimenter says. These two actions (putting on a fire helmet and spilling paint) have different intentions behind them (i.e., one is intentional; the other is not). Do children recognize this difference? Does children's developing knowledge of intention mediate how they would answer questions about whether these characters are pretending? The present data cannot completely address this issue: Experiment 4 suggests that the answer is yes, but more experiments are necessary to map out exactly what that relationship might be.

Finally, what do these results tell us about children's developing understanding of mental states, for instance, intentionality, more generally? Why is it that 3-year-olds had difficulty with the intention–appearance conflict stories in Experiment 4, whereas other researchers suggest that even younger children have an early understanding of other's intentions (e.g., Baldwin, Baird, Saylor, & Clark, 2001; Meltzoff, Gopnik, & Repacholi, 1999; Woodward, 1998, 1999)? This discrepancy suggests, consistent with Moses (2001), that younger children might only have a basic understanding of intentionality. Three-year-olds might not understand the causal aspects of intentions—that fulfilled desires and fulfilled intentions are not the same—or the epistemic aspects of intentions—that intentions presume background action and belief states, such as the ability to accomplish an action successfully (Moses, 2001). Indeed, several studies have shown that the understanding of causal and epistemic knowledge of intentionality is still developing until age 5 (e.g., Feinfeld, Lee, Flavell, Green, & Flavell, 2001; Phillips, Baron-Cohen, & Rutter, 1998; see also Astington, 2001).

This hypothesis potentially explains the difference in performance by the 4-year-olds between Experiments 2 and 4. In Experiment 2, children may have presumed that the character playing in the mud intended to look like a tiger. This presumed intention suggests that the character must be pretending and is in conflict with the character's lack of awareness of his appearance. Some children might have ignored this awareness knowledge and relied on the presumed intention; others might have recognized the importance of the awareness knowledge and not made the same presumption. This is consistent with the significant correlation between false-belief performance and correct responses in Experiment 2. Children who succeeded on the false-belief task might be more likely to recognize the proper belief

states that underlie intentions (the epistemic aspects of intention defined earlier). These children would reason that a character who is unaware of his own appearance cannot have intended to look that way. In Experiment 2, where the character's intentions were not made explicit, children with a better understanding of belief might have made the inference that a character who did not know about his appearance could not have intended to have this appearance. In contrast, in Experiment 4, where the character's intentions were made explicit, and thus this inference was not necessary, performance by the 4-year-olds was much better and no correlation with false-belief performance was found.

In all, 3- and 4-year-olds are not ignorant about the relationship between pretense and mental awareness. As seems to be the case with other mental states, children recognize that pretenders have this mental characteristic: They are aware that pretenders must have a particular appearance or perform a particular set of actions. However, the present data lend support to the hypothesis that only some 4-year-olds, and not necessarily younger children, use a character's mental states to infer whether the character is pretending. Specifying how coherent this understanding is, and whether these children understand the relationship between other mental states and pretending, is an important issue for future work.

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## Appendix A

### Script of Stories in Experiment 1

#### Asleep–Appearance Stories

1. Johnny is sleeping in his bed. Sometimes when Johnny sleeps, he moves around a little. He rolls over from one side of the bed to the other. When he rolls over, he really looks like a worm. Mommy is watching Johnny sleep and when Johnny rolls over, Mommy says that he looks just like a worm wiggling.

Control Question 1: Is Johnny awake or asleep?

Control Question 2: When Johnny moves in his bed, does he really look like a worm?

Test Question: When Johnny moves in his bed, is he pretending to be a worm? Why/Why not?

2. Sara is at school and it is naptime. She is taking her nap on the carpet. She is deep asleep and not dreaming. While she is lying there, she really looks like a log floating on the river. Teacher comes over and looks at Sara and says that while she is asleep, she looks just like a log floating on the river.

Control Question 1: Is Sara awake or asleep?

Control Question 2: When Sara is on the floor, does she really look like a log?

Test Question: When Sara is on the floor, is she pretending to be a log? Why/Why not?

#### *Asleep—No Appearance Stories*

1. Michael is sleeping in his bed. Sometimes, when Michael sleeps, he snores. When he snores, he really does not sound like a butterfly. Mommy is watching Michael sleep and when Michael snores, Mommy says that he does not sound like a butterfly.

Control Question 1: Is Michael awake or asleep?

Control Question 2: When Michael snores, does he really sound like a butterfly?

Test Question: When Michael snores, is he pretending to be a butterfly? Why/Why not?

2. Julia is in the car on a long drive. She falls asleep against the seat. While she is asleep, she really doesn't look like a flower. Daddy looks at Julia and says that while she is asleep, she doesn't look like a flower.

Control Question 1: Is Julia awake or asleep?

Control Question 2: While Julia is against the seat, does she look like a flower?

Test Question: While Julia is against the seat, is she pretending to be a flower? Why/Why not?

## **Appendix B**

### *Script of Stories in Experiment 2*

#### *Appearance Stories*

1. This is Susan. Susan is playing in the mud. She gets all dirty playing in the mud. Now she is finished. She is all dirty. She has mud on her face and clothes and she looks like a tiger. See—tigers look just like that. But Susan doesn't know that she has mud on her face and clothes. She doesn't know that she looks like a tiger.

Control Question 1: Right now, does Susan look like a tiger?

Control Question 2: Does Susan know that she looks like a tiger?

Test Question: Right now, is Susan pretending to be a tiger? Why/Why not?

2. This is John. John is leaning up against the white pole in his black outfit. But the pole had paint all over it. Now he is walking away. Look, he has paint all down his back. He looks just like a skunk. See—skunks look just like that. But John doesn't know that he has paint on his back. He doesn't know that he looks like a skunk.

Control Question 1: Right now, does John look like a skunk?

Control Question 2: Does John know that he looks like a skunk?

Test Question: Right now, is John pretending to be a skunk? Why/Why not?

#### *No-Appearance Stories*

1. This is Andy. Andy is at school, playing in the block area. He builds a tower and it is really high. Look, his tower was too high and it fell over. The blocks landed on him. But look, he does not look like a tiger. See—tigers do not look like that. Andy looks at himself and he knows that he does not look like a tiger.

Control Question 1: Right now, does Andy look like a tiger?

Control Question 2: Does Andy know that he does not look like a tiger?

Test Question: Right now, is Andy pretending to be a tiger? Why/Why not?

2. This is Alison. Alison is at home and she is drinking milk. But Alison spills the milk and it goes all down the front of her shirt. But look, she does not look like a skunk. See—skunks do not look like that. Alison looks at herself and she knows that she does not look like a skunk.

Control Question 1: Right now, does Alison look like a skunk?

Control Question 2: Does Alison know that she does not look like a skunk?

Test Question: Is Alison pretending to be a skunk? Why/Why not?

## **Appendix C**

### *Script of Stories Used in Experiment 3*

#### *High-Contrast Stories*

1. Here are two girls. They are both finger painting. Their faces and clothes get all covered with paint. Look at the girls—with all the paint, they both look like zebras. See, zebras look just like that. This girl says, "I'm pretending to be a zebra." This girl says, "I'm painting a picture of a zebra."

Control Question 1: Which girl is pretending to be a zebra?

Control Question 2: Which girl is painting a picture of a zebra?

Test Question: Which girl knows that she looks like a zebra? Why?

2. Here are two boys. They are both sitting in the statue garden. They look at all the statues. Look at the boys. They sit very quietly and don't move—they both look like statues. See, they look like the other statues. This boy says, "I'm pretending to be a statue." This boy says, "I'm looking at the statues."

Control Question 1: Which boy is pretending to be a statue?

Control Question 2: Which boy is looking at the statues?

Test Question: Which boy knows that he looks like a statue? Why?

#### *Low-Contrast Stories*

1. Here are two boys. They are both playing in the mud. Both of the boys are really dirty and have mud on their clothes and on their faces. Look at the mud—both of the boys look like tigers. See, tigers look just like that. This boy says, "I'm pretending to be a tiger." The other boy says, "I'm playing in the mud."

Control Question 1: Which boy is pretending to be a tiger?

Control Question 2: Which boy is playing in the mud?

Test Question: Which boy knows that he looks like a tiger? Why?

2. Here are two girls. They are both playing at the beach, but the sand is really hot. Both of the girls start to jump up and down. Look at the girls jumping—both of the girls look like kangaroos. See, kangaroos look just like that. This girl says, "I'm pretending to be a kangaroo." The other girl says, "I'm hopping up and down."

Control Question 1: Which girl is pretending?

Control Question 2: Which girl is hopping up and down?

Test Question: Which girl knows that she looks like a kangaroo? Why?

## **Appendix D**

### *Script of Stories Used in Experiment 4*

#### *Sleeping—No Conflict Stories*

1. Here are two boys. They are at school and it is naptime. This boy is taking a nap. He is deep asleep and not dreaming. Look, while he is asleep, look what he does, he rolls over. This boy has finished his nap. He is wide awake. And look what he does. He

also rolls over. Teacher looks at the boys. And teacher says, when they roll over, they look just like worms wiggling. This boy [wakeful boy] says, "I look like a worm wiggling." This boy [sleeping boy] doesn't say anything because he's asleep.

Control Question 1: Which boy is asleep?

Control Question 2: Which boy says, "I look like a worm wiggling"?

Test Question: Which boy is pretending to be a worm? Why?

2. Here are two girls. They are at school and it is naptime. This girl is taking her nap. She's deep asleep and not dreaming. And look, she's wrapped in a brown cover, on the blue carpet. This girl has finished her nap. She's wide awake. But, she's also wrapped in a brown cover, on the blue carpet. Teacher comes over and looks at the girls, and teacher says, with the girls wrapped in the brown covers on the blue carpet, they look like logs floating on the river. This girl [wakeful girl] says, "I look like a log floating on the river." This girl [sleeping girl] doesn't say anything because she's asleep.

Control Question 1: Which girl is asleep?

Control Question 2: Which girl says, "I look like a log on the river"?

Test Question: Which girl is pretending to be a log on the river? Why?

#### *Sleeping—Appearance Conflict Stories*

1. Here are two girls. They are at school and it is naptime. Before naptime, this girl was playing dress-up. She got dressed up like a ballerina. She took her nap wearing her ballerina clothes. Now she is deep asleep and not dreaming. But, she still looks like a ballerina. This girl finished her nap. She is wide awake. Now she is thinking about ballerinas. She is thinking about what ballerinas do and what they wear. She goes over to the dress up area, but all they have is a fireman's hat. She puts it on and she looks like a fireman, but she is still thinking about a ballerina.

Control Question 1: Which girl is awake?

Control Question 2: Which girl looks like a ballerina?

Test Question: Which girl is pretending to be a ballerina?

2. Here are two boys. They are at school and it is naptime. Before naptime, this boy took the paintbrush and he painted stripes all over himself. With the black strips on his white shirt and pants,

he looks like a zebra. See that. But he took his nap with the paint all over him. Now he is deep asleep and not dreaming, but he still looks like a zebra. This boy finished his nap. He is wide awake. Now he is thinking about zebras. He's thinking about what zebras do and what they look like. He goes over to paint stripes on himself, but oops, the paint spills and he has some black spots on his shirt. And with the spots, he ends up looking like a Dalmatian dog, but he is still thinking about a zebra.

Control Question 1: Which boy is awake?

Control Question 2: Which boy looks like a zebra?

Test Question: Which boy is pretending to be a zebra? Why?

### *Intention–Appearance Conflict Stories*

1. Here are two girls. They are at school, sitting at the art table. This girl finished her picture. Now she is thinking about a cat. She's thinking about what cats do and what they look like. She picks up a marker to draw whiskers on her face to make herself look like a cat, but oops, the marker spills, and stains her shirt. She looks at herself in the mirror and says, "I really don't look like a cat." But, then she gets down on all fours and starts to run around.

This girl drew a picture of a cat. When she finishes, she wipes his face and by accident, the marker smudges her face. Look, the smudges on her face look just like whiskers—she looks like a cat. The girl sees herself in the mirror and says, "I looks like a

cat." But, she stays at the art table and starts to draw another picture, this time of a dog.

Control Question 1: Which girl is thinking about a cat?

Control Question 2: Which girl knows she looks like a cat?

Test Question: Which girl is pretending to be a cat? Why?

2. Here are two boys. They are baking cookies with the cocoa powder. This boy finishes baking. Now he is thinking about a bear. He's thinking about what bears do and what they look like. So, he takes picks up the cocoa powder to put on his face, to make himself look like a bear, but oops, the cocoa powder spills and gets all over his shoes. He does not look like a bear. He looks at himself and says, "I really don't look like a bear." But then, he starts to run around like this [hands over his head] and goes, "Growl, growl."

This boy was baking cookies shaped like bears, and now he's done. He wipes his face, and by accident, he gets cocoa powder all over his face. With the cocoa powder on his face, he looks like a bear. He looks at himself and says, "Hey, I really look like a bear." But then he goes back to baking cookies, this time shaped like people.

Control Question 1: Which boy is thinking about a bear?

Control Question 2: Which boy knows he looks like a bear?

Test Question: Which boy is pretending to be a bear? Why?