Developmental Psychology
2002, Vol. 38, No. 6, 1004–1015

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0012-1649/02/$5.00 DOI: 10.1037//0012-1649.38.6.1004

Children's Understanding of the Knowledge Prerequisites of Drawing and Pretending

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Many young children will claim that someone is pretending to be something even when the person does not know what that something is. To examine whether children's failure to take knowledge prerequisites into account is part of a more fundamental problem in recognizing how mental representations constrain external ones, the authors asked children whether an artist who did not know what something was, yet whose drawing bore resemblance to it, was drawing it. The same questions were asked regarding pretending. Children performed similarly on pretending and drawing questions, and performance on both questions improved when the protagonists' point of view was emphasized. Performance for drawing improved somewhat when alternative goals were stated. Further, cross-sectional data indicated that understanding how knowledge relates to producing external representations increases gradually from age 4 to age 8, suggesting that experiential factors may be crucial to this understanding.

Ever since Wimmer and Perner's (1983) landmark study involving the false belief task, there has been considerable interest in the field of cognitive development in how and when children understand mental representations and their links to actions. One of the key areas of study and debate has been in the arena of children's understanding of pretending. There is some disagreement in the literature concerning when the majority of children understand the mentalistic components of pretense, with estimates ranging anywhere from 3 years old (e.g., Hickling, Wellman, & Gottfried, 1997) to 6 years old (e.g., Lillard, 2001). In fact, the nature of the link between mental representations and external representations has been debated amongst philosophers for some time. The two sides of this debate offer helpful descriptors for the nature of children's responses regarding external representations.

There are two general schools of thought concerning how mental representations relate to external representational productions (like drawings or novels). The traditional romantic interpretation is that the artists' intentions determine the meaning of the production (Taylor, 1998). In other words, a picture is not "of an apple" unless the artist meant it to be an apple. In analyzing literature, romanticists consider what the author meant in writing it. The other side of this philosophical debate has centered on the intentional fallacy (Beardsley & Wimsatt, 1976) and the idea that there are more components to interpretation of art than simply the artist's intention (Dobie, 1998). This approach aligns with deconstructionism. In this view, multiple components (the viewer, the image, the context, and the author's intention) allow for multiple interpretations of the same image. In fact, some philosophers even argue that the artist's intention is irrelevant to interpretation altogether (Tolhurst, 1979). Thus, the role that mental states actually play in the interpretation of representational events is not settled. Evidence from research on children's understanding of the interpretation of pretense actions and drawings aligns with this particular philosophical debate.

Pretense is a representational act in that the pretense outcome is dependent on a specific mental representation. The mental representation is projected onto the self or other aspects of the world and determines the pretense outcome (Lillard, 1998). For example, to pretend to be a kangaroo, a child has to know what a kangaroo is and to think of himself or herself as a kangaroo at the moment of pretending (Lillard, 1993a). Pretending is thus governed by the romanticist view. Adults do not claim that a character is pretending to be something unless he or she intends to be that thing, no matter how much he or she is hopping like it (Lillard, 1999). This romanticist interpretation of pretense, however, may be something that develops, according to research by Lillard (1993b). In the Moe paradigm, a troll from the Land of the Trolls was hopping like a kangaroo hops. But he himself did not know that kangaroos hop—in fact, he had never heard of a kangaroo and had never seen one either. Children were asked whether Moe was pretending to be a kangaroo. Over many experiments in Lillard's and other laboratories, about 35% of 4-year-olds claimed he was not pretending, and the other 65% consistently claimed that he was (see summary in Lillard, 2001). Young children thus offer deconstructionist responses with regard to pretense, privileging the action outcome, as opposed to the mental state, as crucial to the interpretation of the external pretense representation.

Although several studies have suggested that young children may appreciate other mental aspects of pretense (e.g., Aronson &

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This research was supported by National Science Foundation Grant DGE-9550152 to Angeline S. Lillard and National Institute of Mental Health Training Grant 5T32MH18242-15 to the University of Virginia. We thank Michael Kubovy for insightful discussion about this line of work. We are also grateful to the children who participated and their parents and teachers, as well as research assistants and students involved with the experiments: Ali Zeljo, Stephanie van Patten, Jeanine Dick, Stephanie Curenton, Martin Ho, Andria Hollis, and Brandi Sharpe.

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Golomb, 1999; Bruell & Woolley, 1998; Hickling et al., 1997), many young children apparently believe that ignorance does not prevent one from pretending something. Adults do not share that belief and instead respond with a romanticist stance that indicates the importance of the mental state when interviewed on this task (Lillard, 1999).

Children's difficulty with the Moe task can be seen as stemming from two possible sources. One possibility is that it is specific to pretense. Children might think that pretending is solely external actions because they learned about pretending before they knew about thoughts and knowledge (Lillard, 1993b). Children tend to be exposed to pretending by the end of their first year of life (Lillard, 2001), and many demonstrate their first pretend acts before age 2 (e.g., Harris & Kavanaugh, 1993). Such young children have limited understanding of the representational nature of the mind. In fact, despite the ability to correctly use desire terms at 2 years of age (Bartsch & Wellman, 1995), children do not seem to understand the connections among desires, intentions, and action outcomes until age 3 (Flavell, 1999). Thus, it could be that children initially respond in a deconstructionist manner when interpreting pretense, conceptualizing pretense only as action, because they cannot conceive of the intentions that drive pretense. This misunderstanding may persist until middle childhood for many children because it works: Pretense mental representations generally do align with the external ones.

On the other hand, children's difficulty with pretense understanding might stem from a more general problem with understanding how knowledge representations are related to a variety of external representational outcomes. If so, children might well tend toward deconstructionist responses when interpreting other representational actions as well. As was stated above, pretense is considered a representational action because a mental representation is projected onto some aspect of the world, and that mental representation determines the pretense outcome (Lillard, 1998). Drawing is also a representational act: An artist can create a drawing of what he or she knows about, and is projecting onto, the drawing. In drawing an apple, one must know what an apple is or looks like in order to project that representation onto the paper.

In contrast to pretense, adults can view drawings in both romanticist and deconstructionist manners. On the one hand, adults might say that no matter how much something looks like an apple, it is not one unless the artist meant to draw one. On the other hand, one might imagine the work coming to be referred to as "The Apple Drawing" despite the artist's lack of intention. Indeed, the Little Prince (de Saint-Exupéry, 1943) had just such a problem when he tried to draw a cobra who had eaten an elephant: The adults in his midst repeatedly insisted that he had drawn a hat. The appearance of the drawing, not the boy's intention, was considered paramount to determining what the drawing was.

Two studies have suggested that young children tend toward romanticist responses, not deconstructionist ones, in their interpretation of drawings. Bloom and Markson (1998) asked 3- and 4-year-olds to draw a lollipop and a balloon, which resulted in two quite similar drawings of a straight line with a circle on top. From a purely objective standpoint, each drawing looked no more like a lollipop than like a balloon. When later asked to identify which figure was which, 3-year-olds correctly identified 76% of the pictures and 4-year-olds correctly identified 87% of the pictures. Children apparently used their own mental representation at the time of the drawing to label the pictures at a later point in time, despite the similar (objective) appearance of the drawings. This is better performance than on a similar task in a pretense scenario concerning their own behaviors in a study by Mitchell (2000). He asked 3- to 6-year-old children to reach for some keys, told them they looked like a cat when they reached, and then asked if they had been pretending to be a cat. There was no effect of age overall, but only 55% of the children appeared to attend to their own intention to get keys by not accepting that they were pretending to be a cat. Children thus appear more proficient in respecting their own intentions regarding drawing than regarding pretense.

Children also appear to use mental representational information when naming pictures that someone else has produced. Gelman and Ebeling (1998) showed 2- and 3-year-olds pictures that were shaped like familiar objects, such as a flower, and told a story about how each picture was produced. In the intentional condition, the picture was drawn intentionally (e.g., for a teacher), and in the accidental condition, it was produced accidentally (e.g., by spilled paint). Children were asked what each picture was. In the intentional condition, 3-year-old children named the apparent object (flower) on 86% of trials; in the accidental condition, they did so on only 44% of trials.

Taken together, these studies suggest that 3-year-olds frequently consider the artist's mental state, not just the appearance of the picture, when asked to name a picture. Children might therefore understand the mental representational aspects of drawing earlier than those of pretense, or, in other words, be romanticist in their understanding of drawings.

In summary, past research has suggested that children have a romanticist interpretation of drawings by age 3; they may later take romanticist or deconstructionist viewpoints, as adults do. For pretense, the evidence has suggested a different pattern: Adults clearly take a romanticist stance, whereas children initially tend toward a deconstructionist interpretation, often responding on the basis of external appearance rather than the actor's a priori mental representation. By about age 8, most children take the romanticist view of pretense.

Past research on drawing suggests then that children's deconstructionist understanding of pretense is specific to pretense. This statement cannot be made definitively, however, because pretense and drawing have not been compared in parallel tasks. In addition, children in the drawing and pretense studies were of different ages. It may be that children's understanding of drawings initially reflects romanticist interpretations, but then becomes deconstructionist for a time. In the present study, we sought to determine whether children's deconstructionist tendencies in pretense—the tendency to deny the importance of the protagonists' mental representation in judging representational outcomes—applies simultaneously to drawing when the circumstances leading to the two representational outcomes are the same. Because the two drawing studies reviewed above (Bloom & Markson, 1998; Gelman & Ebeling, 1998) were conducted with children younger than those given the Moe tasks, and because the Moe task may not be appropriate for younger children (because they may not understand very much about knowing), Experiment 1 examined a large cross-section of children, from 4 to 8 years of age. This considerably extends prior work on the Moe pretense understanding task.

A third extension of Experiment 1 was to examine whether children's performance improved when the question about the

representational outcome was rephrased to emphasize the protagonist's point of view. An adult might claim that a certain drawing was "of an apple" even if the artist did not know what an apple was; drawings, once complete, are permitted objective interpretation. But when asked if, to the artist, the apple-like drawing was an apple, adults would be expected to understand it was not. For this reason children were asked, in addition to what Moe was drawing (or pretending), what Moe thought he was drawing (or pretending). Children were also asked what Moe would say he was drawing or pretending. Different responses to the second and third questions were not expected, because other work shows that say and think questions do not elicit different responses (Wellman, Cross, & Watson, 2001), but asking the additional question ensured children would have a second opportunity to reveal understanding if they had it.

Experiment 1

As just discussed, Experiment 1 had three purposes: to examine whether children's difficulty in recognizing Moe's inability to be pretending, on the basis of his lack of knowledge, was specific to the pretense scenario or extended to other representational actions (i.e., drawing); to examine responses to the Moe test across a wide age range; and to examine whether specifying the perspective from which the question should be answered would improve performance.

Method

Participants

Participants were 88 children recruited from public and private preschools and elementary schools in a small metropolitan area. They were divided into five groups: 4-year-olds (n = 16; mean age = 4 years 7 months; range = 4 years 3 months to 4 years 11 months), 5-year-olds (n = 17; mean age = 5 years 9 months; range = 5 years 3 months to 5 years 11 months), 6-year-olds (n = 18; mean age = 6 years 8 months; range = 6 years 2 months to 6 years 11 months), 7-year-olds (n = 19; mean age = 7 years 5 months; range = 7 years 0 months to 7 years 11 months), and 8-year-olds (n = 18; mean age = 8 years 8 months; range = 8 years 1 month to 9 years 2 months). Forty-six of the children were girls and 42 were boys; there were approximately equal numbers of boys and girls in each age group. The majority of the participants were Caucasian, and all children were from middle-class families.

A female experimenter visited the schools and explained to the classes what research is and that she needed their help with some research. Parental consent forms were sent home with the children. The experimenter returned approximately a week later for a day at the school. Those children who returned signed consent forms were interviewed one at a time for approximately 10 min during the school day. All children were interviewed in a small room or quiet hallway of the school. Each child was asked not to talk about the interview until all children had a turn to participate. The experimenter obtained verbal consent from children to tape the interview. One child did not want to be taped, so his responses were recorded manually.

Materials

Two troll dolls, a 5-in. doll with blue hair and an 8-in. doll with yellow hair, and paper and pencils for drawing were used.

Procedure

All children received four trials, two pretense and two draw. Trials were blocked by condition (pretense or draw) and half of the children in each age group received each block first.

Pretense condition. The experimenter introduced the children to a troll doll named Moe and told the following story: "This is Moe. Moe is from a far away place called the Land of Trolls. The Land of Trolls is very far away and very different from earth. There are no animals there, only trolls and trees." The experimenter moved Moe up and down as if he was hopping. Continuing to move the troll up and down, the experimenter said, "Moe is moving like a rabbit. Rabbits move like that, but Moe doesn't know that rabbits move like that. Moe's never seen a rabbit, and he's never heard of one either. So Moe doesn't know anything about rabbits. But Moe is moving like a rabbit. That's just how rabbits move."

While the experimenter was still moving the troll doll, control questions were asked to verify the child's understanding of Moe's action and knowledge. The control questions were, "Is Moe moving like a rabbit?" and "Does Moe know that rabbits move like that?" These were asked in counterbalanced order across and within children. Children who answered a control question incorrectly were reminded of the premises and asked the question again. Finally, the child was asked the experimental questions, "Is Moe pretending to be a rabbit?" (hereafter referred to as the pretend-objective question), "Does Moe think he is pretending to be a rabbit?" (pretend-think, or the subjective pretense question), and "What if you asked Moe what he was doing, what would he say?" (pretend-say). The second pretend task was the same, but Moe was moving like a snake.

Drawing condition. In the draw condition, children were introduced to a troll doll named Luna and were told a story that closely paralleled that of the pretense condition. They were told, "This is Luna. Luna is from a far away place called the Land of Trolls. The Land of Trolls is very far away and very different from earth. There are no animals there, only trolls and trees." Children were then shown Luna drawing something that looked like a fish. Children were reminded that Luna had never seen or heard of a fish and did not know what fish looked like. With Luna still drawing, control questions were asked to verify children's understanding of the appearance of the drawing ("Does this look like a fish?") and Luna's knowledge ("Does Luna know that fish look like that?"). These questions were counterbalanced across and within participants. Finally, they were asked, "Is Luna drawing a fish?" (draw-objective), "Does Luna think she is drawing a fish?" (draw-think), and "What if you asked Luna what she was doing, what would she say?" (draw-say). The second draw task concerned a worm-like drawing.

Results and Discussion

Children responded correctly on 330 of 336 control questions; all six incorrect responses were correctly revised once children were reminded of the premises. Responses for the experimental questions were scored as 1 if correct and 0 if incorrect. Because pretend-say and draw-say were open-ended questions, responses were coded as incorrect if the child said the character would mention the animal ("[Moe] would say he is being like a rabbit") and correct otherwise. Responses for each question type were summed for a total score ranging from 0 to 2 for each type of question.

The numbers of children responding correctly to zero, one, or two of the questions for each of the variables are listed in Table 1. Spearman correlational analysis revealed that responses to the second and third questions (think and say) were highly correlated for both pretend (r = .78, $p < .01$) and draw (r = .67, $p < .01$). Because the say questions did not provide any additional information beyond that provided by the think ones, they were dropped from the analysis. First, chi-square goodness of fit tests were

Table 1
Number and Percentages of Children in Each Group Responding Correctly on Zero, One, or Two Questions, and Chi-Square Goodness of Fit Values, for Variables in Experiment 1

Age group, no. of questions, and χ^2 values	Condition											
	P-O		P-T		D-O		D-T		P-S		D-S	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
4-year-olds												
Zero	12	75	9	56	12	75	8	50	8	50	9	56
One	1	6	2	13	2	13	0	0	3	19	1	6
Two	3	19	5	31	2	13	8	50	5	31	6	38
$\chi^2(2, N = 16)$	22.38**		11.00*		21.50**		16.00**					
5-year-olds												
Zero	11	65	6	35	15	88	7	41	4	24	7	41
One	0	0	3	18	2	12	1	6	5	31	3	18
Two	6	35	8	47	0	0	9	53	8	47	7	41
$\chi^2(2, N = 17)$	18.86**		6.93†		34.87**		12.81*					
6-year-olds												
Zero	10	56	4	22	17	94	5	29	2	11	5	29
One	0	0	1	6	1	6	2	11	2	11	0	0
Two	8	44	13	72	0	0	11	61	14	78	13	72
$\chi^2(2, N = 18)$	18.44**		23.22**		46.33**		14.89*					
7-year-olds												
Zero	6	32	3	16	18	95	3	16	4	21	4	21
One	1	5	3	16	1	5	0	0	2	11	1	5
Two	12	63	13	68	0	0	16	84	13	68	14	74
$\chi^2(2, N = 19)$	19.00**		19.42**		49.32**		36.79**					
8-year-olds												
Zero	2	11	0	0	10	56	1	6	0	0	1	6
One	1	6	0	0	4	22	0	0	1	6	0	0
Two	15	83	18	100	4	22	17	94	17	94	17	94
$\chi^2(2, N = 18)$	33.00**		54.00**		9.56*		46.44**					

Note. P-O = pretend-objective; P-T = pretend-think; D-O = draw-objective; D-T = draw-think; P-S = pretend-say; D-S = draw-say.
† $p < .05$. * $p < .01$. ** $p < .001$.

conducted to test for chance responding on the objective and think questions. All responses were significantly different from chance (see Table 1).

Figure 1 shows the mean responses (out of two) of children in each age group for the objective pretend questions. As can be seen, there was a gradual increase in mean responses of children in each age group to the objective pretense questions, with most children in the 8-year-old group stating that Moe was not pretending to be a rabbit or snake; answers to the subjective pretense questions were slightly elevated and followed the same trend.

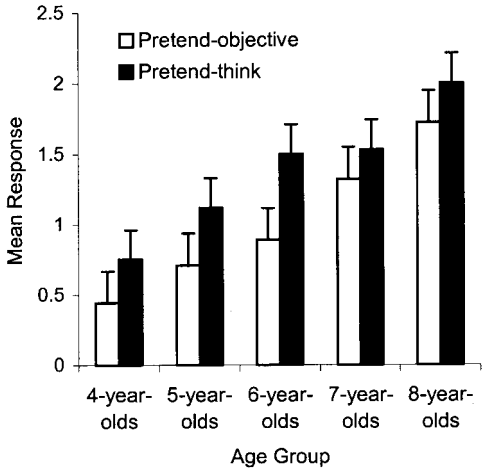

Figure 1. Mean response (out of 2) and standard error of children in each age group for pretend-objective and pretend-think questions for Experiment 1.

As indicated in Figure 2, the developmental trend was absent for the objective draw question, with virtually none of the children giving romanticist answers and instead stating that Luna was drawing that animal. Children's performance on the draw-think question, which assessed the ability to take a romanticist stance, was similar to their performance on the parallel pretend question. Possible reasons for the discrepancy in children's responses to the two drawing questions are discussed later.

Wilcoxon matched-pairs signed ranks tests were first conducted by collapsing across age groups to determine if there was a general difference between the responses for subjective and objective questions and between drawing and pretending questions. Overall, the differences between the subjective and objective questions were significant for both drawing ($Z = 6.92$, $p < .01$) and pretending ($Z = 3.71$, $p < .01$). In addition, there were significant differences between responses for the pretending and drawing questions for the objective questions ($Z = 5.47$, $p < .01$) but not for the think questions. The significant difference in the objective questions was apparently due to the generally poor performance of children on the objective draw question.

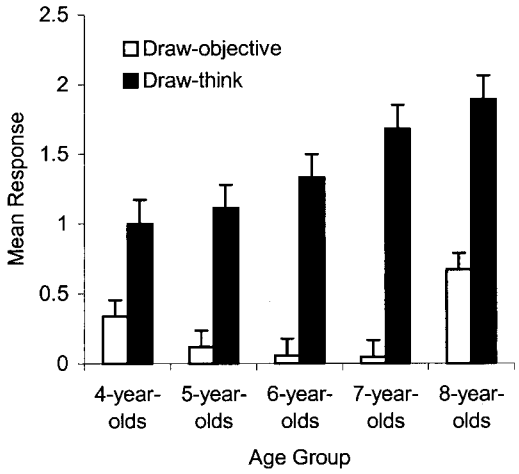

Figure 2. Mean response (out of 2) and standard error of children in each age group for draw-objective and draw-think questions for Experiment 1.

To analyze children's responses across age groups, we conducted a Kruskal-Wallis chi-square test. This revealed significant differences on pretend-objective, $\chi^2(4, N = 88) = 18.35$, $p < .01$; pretend-think, $\chi^2(4, N = 88) = 20.66$, $p < .01$; draw-objective, $\chi^2(4, N = 88) = 14.18$, $p < .01$; and draw-think, $\chi^2(4, N = 88) = 12.52$, $p < .05$. Mann–Whitney U tests of specific differences were conducted between the 8-year-olds and the other age groups to test for a developmental trend. The 4-year-olds were significantly different from the 8-year-olds on the pretend-objective ($U = 46.00$, $p < .01$), pretend-think ($U = 45.00$, $p < .01$), and draw-think ($U = 80.00$, $p < .05$) questions. The 5-year-olds were significantly different from the 8-year-olds on the same questions ($U = 74.00$, 72.00, and 90.00, $p < .01$, .01, and .05, respectively). The 6-year-olds were only different from the 8-year-olds on the pretend-objective ($U = 94.00$, $p < .05$) and draw-objective ($U = 97.00$, $p < .05$) questions. The 7- and 8-year-olds were significantly different only on the draw-objective question ($U = 102.00$, $p < .05$). Thus, except for responses to the draw-objective question, significant differences disappeared with age, suggesting a developmental trend in ability to respond correctly.

Also important to note, as shown in Table 1, is that few children at any age received a score of 1. In other words, children were consistent in their responding. A score of 1 could indicate either confusion and guessing or a transition phase between response strategies. The consistency of responding indicates that over the course of development, children shift from responding in completely deconstructionist ways, emphasizing external appearance, to completely romanticist ways, emphasizing underlying mental states.

Wilcoxon matched-pairs signed ranks tests within each age group were conducted for question type within each condition (draw-objective vs. draw-think and pretend-objective vs. pretend-think) and for condition by question (draw-objective vs. pretend-objective and draw-think vs. pretend-think). There were no significant differences in the 4-year-olds' responses for any of the questions, indicating that performance was poor in general for all questions. For the 5-year-olds, there were significant differences for responses on pretend-objective and pretend-think ($Z = 2.07$, $p < .05$), draw-objective and draw-think ($Z = 2.92$, $p < .01$), and draw-objective and pretend-objective ($Z = 2.20$, $p < .05$). The difference between draw-think and pretend-think was not significant. This indicates that 5-year-olds responded better on the subjective than the objective questions in general. In comparing the subjective questions, we found that 5-year-olds performed similarly for the drawing and pretending questions.

The same pattern of significant differences emerged for the 6-year-olds. The differences between pretend-objective and pretend-think ($Z = 1.96$, $p < .05$), draw-objective and draw-think ($Z = 3.36$, $p < .01$) and pretend-objective and draw-objective ($Z = 2.76$, $p < .01$) were again significant, but the difference between draw-think and pretend-think remained nonsignificant. This suggests the same pattern was true for the 6-year-olds as for the 5-year-olds: better performance on the subjective questions and similar performance on drawing and pretending when comparing the subjective questions.

The pattern of significant differences changed for the 7- and 8-year-olds and appears to reflect the poor performance for the draw-objective question. More specifically, for the 7- and 8-year-olds, respectively, the differences between pretend-objective and pretend-think and pretend-think and draw-think were not significant. However, the differences between draw-objective and draw-think ($Z = 3.90$, $p < .01$ and $Z = 3.24$, $p < .01$, for 7- and 8-year-olds, respectively) and draw-objective and pretend-objective ($Z = 3.42$, $p < .01$ and $Z = 3.07$, $p < .01$, for 7- and 8-year-olds, respectively) were significant. This indicates that in general, the 7- and 8-year-olds responded similarly for the subjective and objective questions in the pretend condition, and similarly on the subjective drawing and pretending questions, indicating that the understanding of drawing and pretending is fairly sophisticated by 7 years of age. However, performance on the draw-objective question is quite poor if one has a romanticist interpretation of drawing.

Summary

To review, this experiment had three aims. The first aim was to compare children's responses on a Moe test concerning pretense with their responses on a parallel test concerning another representational act, that of drawing. The second was to do a full-scale cross-sectional study of children's responses to the Moe procedure to determine percentage passing at each age, and the third aim was to examine whether children's responses would change when asked to answer the questions from Moe's perspective.

Results clarified the developmental course of children's ability to pass the Moe task: Only about 20% passed at age 4 and this percentage gradually increased until age 8, when 85% of children passed. When subjectivity was highlighted by asking what Moe or Luna would think, performance improved: 31% of 4-year-olds and 100% of 8-year-olds answered correctly on both pretend-think questions. This effect was even stronger for draw: Only 12% of 4-year-olds responded correctly to both draw-objective questions, compared to 50% who answered correctly on both of the draw-think questions. In addition, only 22% of 8-year-olds answered correctly on both draw-objective questions, but 94% responded correctly on both draw-think questions.

In regard to the first aim, there were no significant differences at any age between responses on the pretend-think and draw-think

questions, suggesting that development in understanding the knowledge requirements for these representational actions develops in parallel. The expectation was that children would understand the knowledge prerequisites for drawings sooner than they would demonstrate such an understanding for pretense, given their seeming understanding of the mental underpinnings of drawings in other studies (Bloom & Markson, 1998; Gelman & Ebeling, 1998). The implications of this particular finding are discussed in more detail below.

First, however, it is important to address the fact that children did not perform as well as expected on the objective draw question. One possible reason for this is that children might have interpreted the question, "Is Luna drawing a fish/worm?" as "Does Luna's drawing look like a fish/worm?" If children were answering the question in this way, then the test was not about their understanding of the implications of Luna's knowledge, but rather it was about their own interpretation of the appearance of the drawing. In other words, perhaps the question begged for a deconstructionist response. Certainly the drawings did look like fish and worms, and perhaps asking children "Is this a fish/worm" instead of "What is this?" (as in Gelman & Ebeling, 1998) emphasized the appearance too strongly for children to consider the role of the (inconsistent) mental state. The issue of different interpretations for the draw-objective and draw-think questions is addressed more specifically in Experiment 3. Given the ambiguity of this question in Experiment 1, the clearest test of the development of children's understanding of the role of mental states is their responses on the draw-think questions, which emphasized the mental state. Even on this question, however, children did not perform as well as expected.

We had expected that children would respond on the basis of the character's mental states, given prior findings suggesting that children initially have a romanticist approach to drawings (Bloom & Markson, 1998; Gelman & Ebeling, 1998). Closer comparisons between the studies, however, revealed that our findings are not necessarily inconsistent with previous research. There are three important differences to consider. First, the Bloom and Markson (1998) study asked children about their own drawings. Other research with pretense has suggested that children perform better on tasks when asked about themselves, as opposed to another (Mitchell, 2000). Because our study asked children about the drawings that another character produced, it may have been more difficult for children to take into account the underlying mental state.

Second, in Gelman and Ebeling's (1998) study, children were told that the line drawings were made either intentionally or accidentally. Children's strong tendency to provide names for the pictures produced intentionally (as opposed to referring to the literal contents of the drawing, like paint) was taken as evidence that children understood the mental underpinnings of drawing. However, there was also a parallel condition where the pictures were produced accidentally (e.g., by spilling paint). This accidental condition is actually the closest condition to the scenario given to children in this experiment. It would be unlikely that Luna would intentionally produce a picture resembling an animal if she did not know what an animal was. In other words, if Luna does not know about animals and yet is drawing pictures of animals, the similarity between the picture and a particular animal likely occurred by accident. In Gelman and Ebeling's (1998) accidental condition, children named the picture 44% of the time and referred to the literal contents 48% of the time, a nonsignificant difference. Thus, when a picture was produced accidentally, children identified the picture essentially equally by the literal contents or the appearance, and thus it becomes unclear from this study whether we should expect children to respond in a deconstructionist or romanticist manner on our task. Furthermore, adults named the accidental picture about 70% of the time, suggesting people become more deconstructionist about drawings with age. Comparing the percentage of 4-year-old children correctly responding to our draw-think question (50%) to the percentage of children correctly responding to Gelman and Ebeling's accidental condition (48%) reveals virtually no difference.

A third important difference between our study and the Bloom and Markson (1998) and Gelman and Ebeling (1998) studies is that in those studies, the artist's intention was likely highlighted more strongly than in our scenario. Experiment 2 aimed to test whether children's performance might improve further when the protagonist's intention was emphasized within the story itself. One way to emphasize intention is to have the child perform the task himself or herself, as in Bloom and Markson's (1998) study. Another is to state the reason why an act is performed, as in the Gelman and Ebeling (1998) study, in which artists' purpose in making the picture was explicitly stated. For Experiment 2, we chose also to use the Gelman and Ebeling approach by emphasizing reasons, in the form of explanations, for the protagonist's actions. For pretend, this change also served to address a concern that children may answer incorrectly on the Moe task because they cannot think of any other reason for his hopping except that he must be pretending (Aronson & Golomb, 1999; Custer, 1996; Hickling et al., 1997; Joseph, 1998).

Experiment 2

In Experiment 2 we examined the effects of offering children an alternative explanation (in effect, an intention) for the pretense and drawing actions. Other drawing studies have highlighted intention, and children have shown more romanticist interpretations (Bloom & Markson, 1998; Gelman & Ebeling, 1998). Other pretense studies have also shown that children perform better when the protagonist's intention is clear (Ganea, Lillard, & Turkheimer, 2002; Joseph, 1998). In fact, regarding the basic Moe procedure, the criticism has been made that although children answered the control questions correctly (e.g., agree that Moe is hopping like a rabbit, and that Moe does not know that rabbits hop), they may have ignored that information in deciding that Moe was pretending to be a rabbit (Aronson & Golomb, 1999). If this criticism were correct, then perhaps if children were given some other logical reason why Moe is hopping and Luna is drawing, they would avoid the error. To this end, in Experiment 2 children were told why Moe and Luna were doing what they were doing, for example, that Moe was hopping to avoid burning his feet on the very hot pavement and that Luna wanted to draw a red balloon. Care was taken to make the pretend and draw conditions as similar as possible. Children were then asked the same objective questions as were asked in Experiment 1 to test whether emphasizing the mental state in the story would serve the same function as emphasizing the mental state in the test question.

For half of the trials, a behavior was shown and described with its explanation in terms of the protagonist's intention. Following the explanation, the resemblance of the representational outcome of that behavior to something else was noted, along with the protagonist's ignorance of that something else. Then the same objective questions were asked as in Experiment 1, but a third control question regarding the protagonist's intention was asked. Each child participated in both the explanation and the no-explanation conditions, but drawing and pretend were between-subjects conditions because presenting all possible variations to all children created too long a procedure. Only preschoolers were tested because they are of focal interest regarding the issue at hand.

Method

Participants

Thirty-three children ranging in age from 3 years 3 months to 5 years 4 months (mean age = 4 years 6 months) participated in a between-subjects design, with 17 children (mean age = 4 years 6 months; range = 4 years 0 months to 5 years 0 months) in the pretend condition and 16 children (mean age = 4 years 6 months; range = 3 years 3 months to 5 years 4 months) in the draw condition. One child in the pretend condition was dropped because it became apparent during the procedure that he was not fluent in English. In the final sample, there were 10 boys and 6 girls in the pretense condition and 10 girls and 6 boys in the draw condition. Children were mostly from White, middle-class families and were recruited from preschools and day-care centers in a small U.S. city. All but 2 children gave verbal consent to having their interviews taped. Responses were recorded manually for those children who did not want to be taped.

Materials

The same two troll dolls as in Experiment 1, a 5-in. doll with blue hair and an 8-in. doll with yellow hair, were used. In addition, a cardboard replica of a tree with apples was used as materials for the pretense condition. For the draw condition, materials were a piece of plain white paper and colored pencils used to draw the pictures.

Procedure

Children were tested individually in a small room by a trained experimenter. Once children were comfortable, the experimenter began the interview.

Pretense condition. The preamble for the pretense condition was similar to that of Experiment 1, except in this case children were told there were no monkeys, rabbits, dogs, or pigs in the Land of Trolls. Four pretend tasks were administered, followed by a series of follow-up questions. The tasks were of two different types: explanation and no explanation. Each child received two of each type, blocked. As an example of a task in which an explanation was provided, children were shown the cardboard tree and were told, "This tree has apples. Moe wants to pick an apple so he's climbing the tree. [Moe was made to climb.] Moe looks like a monkey. Monkeys climb like that. Moe doesn't know that monkeys climb like that. Moe doesn't know anything about monkeys." For one item of each type, the order of the looks like and know information was reversed, with Moe's knowledge about the animal stated first. Children were then asked control questions: "Why was Moe climbing the tree?", "Does Moe know what a monkey is?", and "Does Moe look like a monkey?" (with the latter two asked in counterbalanced order). When children incorrectly answered a control question about Moe's knowledge or appearance (15 of 128 times, combining conditions), the premises were repeated and the questions were asked again. The experimenter next asked the test question, "Is Moe pretending to be a monkey?" The no-explanation tasks were exactly the same but omitted the first two sentences, and the explanation question ("Why was Moe climbing the tree?") was asked after the test question.

In addition to the monkey climbing task, children in the pretend condition were given a rabbit hopping (explanation: hot pavement), a dog digging (explanation: to find treasure), and a pig rolling (explanation: to itch his back) task. Each task was given to half of the children without an explanation. The two explanation and the two no-explanation tasks were blocked; half of the children received each type of task first.

Draw condition. The draw preamble was also similar to that of Experiment 1, except in this case children were told there were no lollipops, worms, boats, or cats. After the preamble, the experimenter held a pencil by the troll's hand and manipulated the troll to draw a picture of a circle with a straight line at the bottom. The experimenter then began to color in the circle and told the child, "This is Luna's picture. She wants to make a red balloon, so she is coloring it red (explanation). Her picture looks like a lollipop. Lollipops look like that. Luna doesn't know what lollipops look like. Luna doesn't know anything about lollipops." The child was then asked three control questions: "Why is Luna coloring red?", "Does Luna's picture look like a lollipop?", and "Does Luna know that lollipops look like that?" If children responded incorrectly to either control question (11 of 128 questions), they were reminded of the premises. Once children correctly responded to the control questions, the experimental question was asked, "Is Luna drawing a lollipop?" The explanation control question ("Why is Luna coloring red?") was asked before the other control questions in the explanation condition and after the experimental question in the no-explanation condition. In the no-explanation condition, the explanation sentence ("She wants to make a red balloon, so she is coloring it red.") was removed from the story.

Children in the draw condition were told four such stories. The other stories were about a snake that also looked like a worm, a watermelon that also looked like a boat, and a dog that also looked like a cat. The explanations for Luna's drawings were to draw (a) stripes on the snake, (b) seeds on the watermelon, and (c) whiskers on the dog. Each task was given to half of the children without an explanation, and half of the children received each type of task first. As with the pretense condition, two explanation and two no-explanation tasks were blocked, and half of the children received each type of task first.

Results and Discussion

Children participated in either a draw or pretense condition. Within each condition they had two trials of each type (explanation or no explanation) and were scored 1 for each correct answer to a test question. Scores for each variable ranged from 0 to 2, with 0 indicating incorrect responses on both questions and 2 indicating correct responses on both questions. Table 2 shows the number of children responding correctly on zero, one, or two of the explanation and no-explanation questions by condition. Chi-square goodness of fit tests were conducted to test for chance responding. All responses were significantly different from chance (see Table 2).

Figure 3 shows the mean number of correct responses for children in each condition. For the pretense condition, the overall mean correct was 0.50 out of 4. The means for the explanation and no-explanation conditions were both 0.25 out of 2. For the draw condition, the overall mean was 1.38 out of 4. The means for the explanation and no-explanation conditions were 0.75 and 0.63 out of 2, respectively. Mann–Whitney U tests conducted to compare the responses (combining explanation and no-explanation conditions) for the drawing and pretending conditions revealed a nonsignificant trend in better responding on the draw questions ($U = 87.00$, $p = .07$). There was also a trend toward better

Table 2
Number and Percentage of Children Responding Correctly on Zero, One, or Two Questions, and Chi-Square Goodness of Fit Values, by Condition in Experiment 2

Condition, no. of questions, and χ^2 values	Explanation		No explanation	
	n	%	*n*	%
Pretend				
Zero	13	81	13	81
One	2	13	2	13
Two	1	6	1	6
$\chi^2(2, N = 16)$	27.00**		27.00**	
Draw				
Zero	8	50	9	56
One	4	25	4	25
Two	4	25	3	19
$\chi^2(2, N = 16)$	6.00*		8.50*	

* $p < .05$. ** $p < .001$.

responding in the draw condition when an explanation was provided ($U = 86.00$, $p = .06$). A nonsignificant trend for an order effect was also observed, toward better responding when children received an explanation in the first story they heard ($U = 86.00$, $p = .06$).

In this experiment, we attempted to make the procedure easier for 4-year-old children by including an alternative explanation for the actions, thereby emphasizing intention. This manipulation appeared to assist children in formulating a romanticist interpretation of the drawings. Children persisted in below chance responding for both drawing and pretending, however, continuing to respond in a deconstructionist manner about drawing and pretense by claiming the external appearance constituted the identity of the representation.

Crucial to the interpretation of this experiment is whether children actually heeded the explanations we provided. Children's responses to the "why" question suggest that they did register the explanations provided. In the pretense condition, when asked why Moe was engaged in his behavior, 16 of 32 replies stated the given reason, for example, that he was climbing the tree in order to get apples. Of the remaining responses, on 7 (of the original 32) occasions children appeared to overwrite the given reason and apply one consistent with pretense (e.g., he was climbing in order to pretend to be a monkey). This offers limited support to Aronson and Golomb's (1999) claim of this problem for the Moe-pretense procedure. Given this, one must ask if children performed better when they heeded the explanation than when they overwrote it. They apparently did: When they bore in mind the given explanation for his behavior, performance was 25% correct, and when they gave a different explanation no children responded correctly. This difference was significant ($Z = 3.46$, $p < .01$), suggesting that having a clear idea of the character's nonpretense intention seems to influence children's interpretations of the character's behavior, perhaps serving the same function as emphasizing the mental state in the experimental question. However, performance was still very poor.

In the draw condition, 13 of the 32 responses to the why question in the explanation condition concerned the explanation given (e.g., "because it's a watermelon" and "dogs have whiskers"). Children were correct on 38% of these trials, as compared with 37% of trials for which they supplied a different explanation (e.g., "because cats have whiskers" and "some lollipops are red"). These percentages reflect that children were in general better at the drawing task, but they were not significantly different from each other, suggesting that simply registering the explanations may not actually influence children to take a romanticist view of drawings. In addition, the 38% of children in the draw condition who responded correctly to both the "why" question and the test question was not significantly different from the 25% of children in the comparable group in the pretend condition. This suggests that understanding the intention of the action assists children in their interpretation of both drawing and pretense outcomes.

In summary, this experiment provided children with explanations for the troll's behavior on half of their trials, to see whether children's performance would improve when the troll's intention was made clear. Regardless of whether an alternative explanation for the resembling action was provided, and even when children correctly recalled that explanation, most young children still did very poorly on pretense trials, claiming that the doll was pretending to be something that he did not know anything about. There were, however, nonsignificant trends toward better responding in the drawing condition and the explanation first condition. The best overall performance, 44% correct, was obtained for the drawing condition when an explanation was provided for the first two tasks presented. These findings are again consistent with those of Gelman and Ebeling (1998), who found that 3-year-olds correctly identified pictures on the basis of their literal components on 48% of trials when the picture resulted from an accidental spilling of paint. Thus, providing the explanation in the initial story influenced children to be somewhat less deconstructionist in their responses about the identity of a drawing. This was not a significant result, however, and Experiment 3 attempted to further clarify this finding and extend the age range upwards.

Experiment 3

In Experiment 2, we had expected that emphasizing the intention of the actor would lead to more romanticist interpretations of

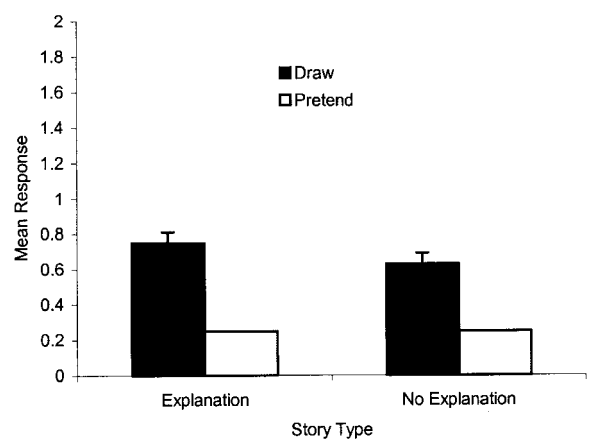

Figure 3. Overall mean response and standard error of children on the pretend and draw questions in the explanation and no explanation conditions for Experiment 2.

drawings. There was only very limited support for that possibility. The goals of Experiment 3 were to see if results could be clarified by including an older group of children and by providing children with an even more straightforward procedure. The procedure was clarified in three ways. First, as in Experiment 1, children received subjective questions that highlighted the mental state of the troll (e.g., "Would Moe say he is pretending to be a monkey?"). The same objective questions (e.g., "Is Luna drawing a cat?") were included as well for comparison. Second, children were shown pictures of the trolls either drawing or pretending (see Figures 4 and 5 for examples), instead of the experimenter holding the dolls and performing the movements. This was to correct for the possibility that some children were attributing an intention to the experimenter when they named the drawing. Third, children were always provided with an alternative explanation for the trolls' actions or drawings, because the findings of Experiment 2 suggested this may make the task easier for children. Both 4- and 5-year-olds were interviewed in this study to further probe the possible age trends for the preschoolers revealed in Experiment 1.

Method

Participants

Sixty children were recruited from day-care centers, preschools, and elementary schools in a small U.S. city. Children were from White, middle-class families and were separated into two groups by age. There were 30 children (18 girls and 12 boys) in the 4-year-old group (mean age = 4 years 4 months; range = 3 years 8 months to 4 years 11 months) and 30 children (13 girls and 17 boys) in the 5-year-old group (mean age = 5 years 7 months; range = 5 years 0 months to 6 years 6 months).

Materials

Materials were four pictures, one each of a troll hopping and a troll climbing a tree and two pictures of trolls drawing. Examples of the pictures are displayed in Figures 4 and 5.

Procedure

Children were tested individually in a small room or quiet hallway of the school by an experimenter. The experimenter began the interview after children were comfortable. All children were told four stories (two pretense and two draw) with the help of pictures. At the end of the story, they were asked questions about the pictures. Stories were blocked by the pretense and draw conditions, and which type children received first was counterbalanced across participants.

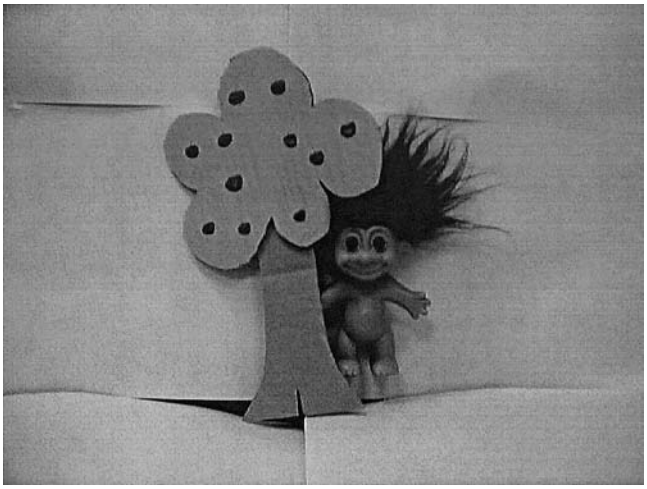

Figure 4. Sample stimuli for Experiment 3: Moe climbing a tree.

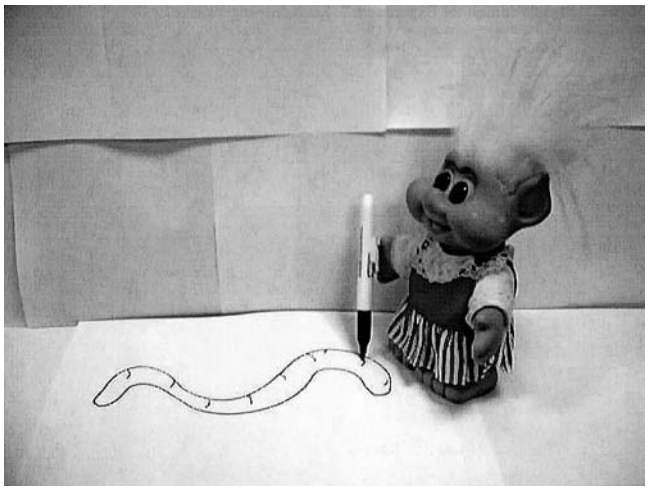

Figure 5. Sample stimuli for Experiment 3: Luna drawing a snake.

Pretense condition. The preamble for the pretense condition was similar to that of Experiment 2. Children were told that Moe was from the Land of Trolls where there are no monkeys and rabbits. They were then told the monkey and rabbit stories from the explanation condition of Experiment 2. For example, children were shown the picture in Figure 4 and told, "This tree has apples. Moe wants to pick an apple, so he's climbing the tree. Moe looks like a monkey. Monkeys climb like that. Moe doesn't know that monkeys climb like that. Moe doesn't know anything about monkeys." The experimenter counterbalanced whether children were given the information about the action or Moe's knowledge first. Following the story, children were asked two experimental questions: (a) "Is Moe pretending to be a monkey?" (pretend-objective) and (b) "Would Moe say he is pretending to be a monkey?" (pretend-say). For the other pretend story, Moe was hopping so as not to burn his feet on hot pavement, and he looked like a rabbit.

Draw condition. The preamble for the draw condition was similar to the preamble for the draw condition in Experiment 2, in which children were told that Luna was from the Land of Trolls, where there are no worms and cats. They were then told the worm and cat stories from the explanation condition of Experiment 2. For example, in the worm story children were shown the picture in Figure 5 and told the following story, "This is Luna's picture. She wants to make a striped snake, so she is drawing stripes. Luna doesn't know what worms look like. Luna doesn't know anything about worms. Her picture looks like a worm. Worms look like that." Again, the knowledge and action information were counterbalanced. The experimental questions were the following: (a) "Is Luna drawing a worm?" (draw-objective) and (b) "Would Luna say she is drawing a worm?" (draw-say). For the second draw story, Luna was drawing a dog that also looked like a cat.

Results and Discussion

All children were told each story and were given a score of 1 for each correct response. Thus, scores for each variable (pretend-objective, pretend-say, draw-objective, and draw-say) ranged from 0 to 2, with 0 indicating the child did not respond correctly on the question for either story and 2 indicating the child re-

sponded correctly on the question for both stories. The numbers of children responding correctly to zero, one, or two of the questions for each of the variables (objective and say questions) are listed in Table 3. Chi-square goodness of fit tests were conducted to test for chance responding. All responses were significantly different from chance (see Table 1).

Figure 6 illustrates the mean response (out of 2) of children in each age group. Responses were similar to responses in the respective explanation conditions in Experiment 2. On the draw questions, 4-year-olds had means of 0.63 (SD = 0.81) and 0.77 (SD = 0.82) on draw-objective and draw-say, respectively. The 5-year-olds had means of 0.43 (SD = 0.77) and 0.80 (SD = 0.89) on draw-objective and draw-say, respectively. On the pretense questions, 4-year-olds had means of 0.47 (SD = 0.73) and 0.73 (SD = 0.87) on pretend-objective and pretend-say, respectively. The 5-year-olds had means of 0.57 (SD = 0.86) and 0.77 (SD = 0.90) on pretend-objective and pretend-say, respectively.

Mann–Whitney U tests were conducted to compare the responses of the age groups on the different variables. There were no significant differences by age, indicating that the 5-year-olds did not perform differently than the 4-year-olds on any of the questions.

Wilcoxon signed-ranks tests for matched pairs were conducted on the within-subjects variables (draw-objective vs. draw-say, pretend-objective vs. pretend-say, draw-objective vs. pretend-objective, and draw-say vs. pretend-say). There were no significant differences among the 5-year-olds' responses. For the 4-year-olds, the only significant difference was between pretend-objective and pretend-say (Z = 1.99, $p < .05$), indicating that 4-year-olds performed significantly better on the pretense questions when the mental state was highlighted in the questions.

The discrepancy in responding for the draw-objective and draw-think/say questions evidenced in Experiment 1 disappeared with the adjusted procedure. This suggests that highlighting the mental state in the procedure with an explanation serves the same function as highlighting it in the question. Thus, in Experiment 1, the poor performance in general on the draw-objective question was likely reflective of the fact that participants interpreted the question as asking about the appearance of the drawing and not the artist's intention.

Table 3
Number and Percentage of Children in Each Age Group Responding Correctly on Zero, One, or Two Questions, and Chi-Square Goodness of Fit Values, for Variables in Experiment 3

Age group, no. of questions, χ^2 values	P-O		P-S		D-O		D-S	
	n	%	*n*	%	*n*	%	*n*	%
4-year-olds								
Zero	20	67	16	53	17	57	14	47
One	6	20	6	20	7	23	9	30
Two	4	13	8	27	7	23	7	23
$\chi^2(2, N = 30)$	27.87**		15.07*		16.60**		8.07†	
5-year-olds								
Zero	20	67	16	53	22	73	15	50
One	3	10	5	17	3	10	6	20
Two	7	23	9	30	5	17	9	30
$\chi^2(2, N = 30)$	30.47**		16.60**		38.47**		13.20*	

Note. P-O = pretend-objective; P-S = pretend-say; D-O = draw-objective; D-S = draw-say.
† $p < .05$. * $p < .01$. ** $p < .001$.

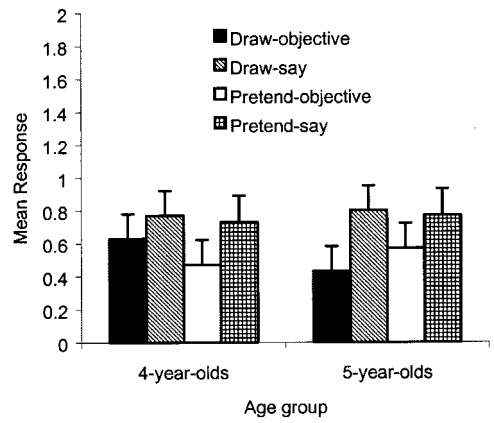

Figure 6. Mean response (out of 2) and standard error of children in each age group in Experiment 3.

The results from Experiment 3 indicate that despite numerous attempts to make the mental states of the protagonists as salient as possible for children, most 4- and 5-year-olds continued to respond as deconstructionists, denying a role to the artists' and pretenders' mental representations in interpreting the outcomes of representative actions.

General Discussion

Three experiments examined whether preschoolers' difficulty in understanding that mental representations underpin pretense external representations extends to drawing. The purpose was to address conflicting evidence on the developmental emergence of pretense understanding (e.g., Aronson & Golomb, 1999; Hickling et al., 1997; Lillard, 2001) and to explore parallels in another representational action: drawing. As was outlined in the introduction, a helpful tool for discussing children's responses is through the philosophical debates between the romanticist and deconstructionist stances on the interpretation of representational actions. Romanticists privilege a creator's mental representation (Taylor, 1998), whereas deconstructionists privilege the appearance of the outcome (Tolhurst, 1979).

In addition to the primary goal, Experiment 1 examined age trends and revealed a linear developmental trend, with almost all children demonstrating understanding of the mental underpinnings of pretense and drawing (as assessed by a subjective question) by age 8 by providing romanticist responses. In addition, Experiment 1 revealed that children performed better on both scenarios when asked to answer from the protagonists' perspectives. Children's deconstructionist responses for objective questions, for the drawing scenario, were at first puzzling given their seeming ability in other experiments to consider creators' intentions in naming drawings (Bloom & Markson, 1998; Gelman & Ebeling, 1998). However, there are fundamental differences among these studies that could account for the differences in responding (e.g., self vs.

other), and when the appropriate conditions were compared, the differences virtually disappeared.

Experiment 2 tested whether highlighting the protagonist's intent by giving some alternative explanation for Moe's behaviors and Luna's pictures would encourage younger children to provide romanticist responses. Moe was described as hopping so as not to burn his feet on hot pavement, and Luna as coloring red because she wanted to make a red balloon. During the procedure, children were asked why they thought Moe was hopping and Luna was coloring. Regarding pretense, the hypothesis that children would do better if they knew of an alternative reason for Moe's actions (Aronson & Golomb, 1999) was not supported, as children continued responding in a deconstructionist manner. Children performed slightly better on the parallel procedures for drawing, particularly when the explanation condition was presented first. This suggests that when the creator's intent is emphasized, 4-year-olds are somewhat, but not significantly, more likely to take intent into account, giving a romanticist interpretation when naming the representational outcome of a drawing than for pretense. Responding was still significantly lower than would be expected by chance, however, indicating that overall children persisted in deconstructionist responses regarding the identity of drawings.

In Experiment 3, we attempted to make the task as clear as possible for the age groups of children who performed most poorly in Experiment 1. Children were shown pictures of the actions and drawings to reduce the salience of the experimenter performing the actions. In each story, children were also given an alternative explanation and were asked the experimental questions in both objective and subjective formats. These manipulations did not significantly improve performance. Four- and 5-year-old children continued to largely disregard the knowledge state of the protagonist when asked to describe the pretense actions and drawings, instead taking a deconstructionist stance.

In Experiment 3, more children received a score of 1 than did children in Experiment 1. This score might indicate transitional knowledge, with children being assisted by the provision of an explanation highlighting the protagonist's intention. Findings from Experiment 2 did indicate that when an alternative explanation for the appearance of the drawings was included, children's performance improved, although not to above chance levels. Most important to note, however, is that the percentages of children "failing" the task are comparable to the findings in previous literature (see summary in Lillard, 2001).

Thus, around ages 4 and 5 children based judgments on the external appearances of the drawings and actions, offering deconstructionist interpretations of both drawing and pretending. As children mature, however, they revise their understanding of pretending to offering more romanticist interpretations by 8 years of age and into adulthood (Lillard, 1999). In contrast, 8-year-olds continued responding in a deconstructionist manner in regard to judgments of drawing when not explicitly asked to consider the artist's mental state, and this pattern appears to continue into adulthood as well (Gelman & Ebeling, 1998).

Several interesting questions arise from this research. If it is the case that children become more romanticist in regard to pretense and maintain a deconstructionist stance on drawing (unless explicitly asked about intent), there are likely varying elements of children's exposure to these representative actions that influence this understanding. In regard to pretense, a small subset of preschool children does seem to take the romanticist view that the content of pretense depends crucially on actor intent. What sets these children apart from the others? One possibility is that they pretend more themselves (Lillard, 2001), which could be in part because they have older siblings who encourage earlier play (Dunn & Dale, 1984). Limited support has been found for the possibility that factors in the social environment may facilitate a more advanced understanding of pretense (Mannering, 1999). Perhaps similar factors operate here, whereby children's ability to understand the importance of knowledge for pretense is aided by other cognitive or social factors. Later research should explore more explicitly the potential relationship between these social and cognitive influences and children's performance.

In regard to drawing, perhaps the varying responses for our objective and subjective questions reflect children's broader struggle in understanding various aspects of artifacts, or things created by humans. There is recent research suggesting that not until 6 years of age do children begin to rely on the original function of an object (or the intention in creating it), as opposed to its current function, in making judgments about the kind of thing it is (Matan & Carey, 2001). Similarly, the children in our study focused on the appearance of the drawing when asked what it was, unless asked explicitly what the artist intended it to be. The fact that performance improved with emphasis on the mental state is not surprising given that children at this age also seem to be considering broader issues of final cause, or why something comes into existence in the first place (Evans, 2001). Perhaps in asking children to focus on the mental state of the artist when determining the identity of a drawing, we encouraged them to think of it as dependent on the final cause, and they focused on the knowledge of the artist. Without this push toward a mental state explanation, however, they disregarded the final cause explanation and focused on the current appearance. Further research should explore potential connections between children's understanding of drawings and artifacts.

Finally, the findings of this study raise questions about the development of a more general understanding of the importance of knowledge for representational outcomes. The demonstration of late-emerging understanding of the role knowledge plays in pretense and drawing outcomes is supported by recent research showing surprising lags in young elementary school children's understanding of their own thoughts (Flavell, Green, & Flavell, 2000) and of the interpretive nature of the mind (Carpendale & Chandler, 1996; Pillow & Henrichon, 1996). The results from both these studies and our Experiment 1 indicate that although portions of children's understanding of the mind are evident in younger years, some aspects of understanding of their own and others' thoughts and knowledge may not occur until their 9th year.

Thus, there appears to be an important transition between 4 and 8 years of age in children's understanding of how knowledge contributes to mental representations and influences the outcomes of representational actions. What could be driving this transition? One possible catalyst is the simple role of experience. During this time, children gain experience not only with negotiating pretend themes with siblings and peers, but with describing their drawings. By age 8, they have likely experienced many instances when a drawing or pretense action has been misinterpreted, or when they have been corrected about their interpretation of another's pretense or drawing. Another possible catalyst for children's increasing

understanding of the role of knowledge is children's increasing ability to introspect (e.g., Flavell, Green, Flavell, & Grossman, 1997). Perhaps this increasing ability to reflect on their own knowledge leads to a greater understanding of the role that knowledge plays.

Future research should explore other areas in which young children misunderstand the role of mental contents as they influence representational outcomes. In addition, research should explore how this misunderstanding relates to deficits in other cognitive abilities, like introspection. This would lead to a more complete developmental picture of how children come to understand the mental contents of others, and the role those mental contents play.

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Received March 7, 2001
Revision received June 17, 2002
Accepted June 17, 2002 ■