Available online at www.sciencedirect.com
ScienceDirect
Cognitive Development 22 (2007) 130–141
COGNITIVE DEVELOPMENT

Children's knowledge of the relation between intentional action and pretending

David M. Sobel *

Department of Cognitive and Linguistic Sciences, Box 1978, Brown University, Providence, RI 02912, United States

Abstract

Two experiments investigated preschoolers' understanding of the relation between pretending and intentional action. In Experiment 1, both 3- and 4-year olds recognized that characters whose actions were intended as pretense were pretending. However, children also judged that characters whose actions gave them the appearance of an entity unintentionally were pretending to be that entity. In Experiment 2, 3-year olds reliably chose a character whose pretense actions were intentional as pretending over a character whose actions were guided by another intention. These data suggest that preschoolers have some understanding of the role of intentional action in pretense.

Keywords: Pretense; Intentionality; Theory of mind

Recent research in theory of mind has investigated children's understanding of pretending. In order to recognize that another person is pretending, children must use similar representational abilities as when they recognize that another person has a false belief (Leslie, 1987; Lillard, 1993). In both cases, the other person acts in a manner contrary to what is expected given the actual state of the world. By age 3, children appear to understand when others are pretending (e.g., Harris & Kavanaugh, 1993). Success on standard false belief tasks does not emerge until sometime during the fourth year (e.g., Wellman, Cross, & Watson, 2001).

Some researchers have suggested that this discrepancy in performance can be explained by young children understanding the representational nature of pretending before they understand the representational nature of belief (Bruell & Woolley, 1998; Custer, 1996; Flavell, 1988; Forguson & Gopnik, 1988; Hickling, Wellman, & Gottfried, 1997; Leslie, 1987, 1988).[1] Other researchers,

* Tel.: +1 401 863 3038; fax: +1 401 863 2255.
E-mail address: sobel@cog.brown.edu.

[1] While the representational nature of pretense and belief are similar in structure, it is certainly possible they rely on different or multiple substrates. Leslie and Roth (1993), for example, suggested that false belief and pretending abilities

0885-2014/$ – see front matter © 2006 Elsevier Inc. All rights reserved.
doi:10.1016/j.cogdev.2006.06.002

however, argue that preschoolers do not understand the representational nature of pretense. Rather, young children interpret pretending as "behaving-as-if"—more dependent on a person's actions than mental states (Harris, 1991; Harris, Lillard, & Perner, 1994; Lillard, 1993, 2001; Lillard, 1994; Perner, 1991).

Much of this debate has revolved around a procedure developed by Lillard (1993): the Moe task. Children are shown Moe the troll who is hopping up and down. Children are told that Moe is hopping like a kangaroo, but since Moe is from the land of the trolls, he does not know what kangaroos are or that they hop. Children are then asked whether Moe is pretending to be a kangaroo. Lillard's hypothesis was that if children understood that pretense involved mental representation then they should recognize that Moe could not pretend to be something that he could not represent. This was not the case: only ∼35% of 4-year olds claimed that Moe was not pretending. In contrast, the majority of these children passed standard false belief tasks. The findings in support of the "behaving-as-if" hypothesis are quite robust: in addition to multiple replications of the Moe procedure (see Lillard, 2001), 4-year olds do not appreciate that pretending involves the use of one's mind in the same way adults do (Lillard, 1996; Richert & Lillard, 2002; Sobel & Lillard, 2002).

Do preschoolers treat all "behaving-as-if" action as pretending, or do they recognize that acts of pretense must involve intentionality on the pretender's part? To examine this question, Lillard (1998) told 4-year olds about a character who was jumping up and down like a kangaroo, but who was not trying to be a kangaroo. The majority of children stated that this character was pretending to be a kangaroo. Even when provided with an explanation for the character's actions (e.g., he is jumping up and down because the pavement is hot), children judged that the character was pretending (Richert & Lillard, 2002). Similarly, Ganea, Lillard, and Turkheimer (2004) showed 4- and 5-year-olds videos about actors who each stated a particular goal (e.g., a woman who wanted to find her keys). To accomplish this goal, the actor took on the appearance of an animal (e.g., she got down on all fours to look for her keys, and was moving around like a bear). Ganea et al. (2004) found that most children claimed the actor was pretending to be that animal (i.e., a bear). They also found that these same children judged actors who intended their actions as pretending to be pretending. This suggests that young children do not distinguish between intentional and unintentional behaving-as-if actions: both were considered pretending.

However, there is some evidence that young children do appreciate this difference. Ganea et al. (2004, Experiment 3) demonstrated that under some conditions, 4-year olds recognized that not all behaving-as-if actions were pretending. They showed children the same video of the actor who wanted to find her keys, but in the process of looking for them, incidentally took on the appearance of a bear. When asked whether this character was pretending to be a bear or looking for her keys, the majority of children did not choose pretending.

These data are consistent with Joseph (1998), who found that 3-year olds claimed a character who was pretending to be sick and sneezed intended to sneeze, while a character who was really sick and sneezed did not intend her actions. Similarly, Rakoczy, Tomasello, and Striano (2004) found that 3-year olds responded differently to demonstrations of pretend actions (e.g., pretending to write) and "trying" actions, in which an actor tried to perform an act, but failed to do so (e.g., trying to write with a capped pen). Children pretended (and did not actually perform the action)

share certain representational features, but that reasoning about false beliefs has inhibitory demands that pretending lacks. Examining these possibilities, however, seems beyond the scope of the present investigation.

when shown pretense actions, while they actually performed the action (and did not replicate a failed attempt) when shown the "trying" actions. This suggests that children register a difference among types of behaving-as-if actions.

What do young children know about the relation between pretending and intentional action? The findings presented above suggest that children recognize that pretending is goal-directed—what Moses (2001) called the *motivational* aspect of intentional action. Several investigations suggest that even infants register this aspect of intentionality (e.g., Meltzoff, 1995; Woodward, 1998). Moses (2001) also described intentional action as possessing a *causal* aspect: intentional actions are brought about to cause a particular outcome. In general, if a desired outcome results from a person's actions incidental to that action's goal, the one should not judge that the actor intended to produce the outcome (see also Chisholm, 1964/1976). In the case of pretending, not all actions are the same; even if two people both want to pretend to be an animal and are thinking about that animal, the pretender is the one who is acting with the intention to look like that animal, not one whose actions only incidentally happened to give the same appearance.

In general, what do young children know about the causal aspects of intentionality? Phillips, Baron-Cohen, and Rutter (1998) demonstrated that 4-year olds had difficulty with this concept: they often failed to dissociate intentions from desires. Children were told that a desirable toy was hidden in one of two locations—if they chose correctly (by indicating that location with a pointer), they would receive the toy. Children indicated what location they wanted to hit, and then aimed the pointer, which was rigged to appear in the other location. This alternative location was where the toy was actually hidden, and as a result, children received the toy. Children reported that they intended to hit this location all along. If the toy was hidden in the location the child actually intended to hit (resulting in the child's desire not be satisfied), children did not make this response—they said their intention was to hit the target they did not hit.

The question in the present experiments is whether young children understand that when pretenders act, those actions are produced because the pretender intends their actions as pretending, as opposed to engaging in another action. These experiments also extend the findings of Ganea et al. (2004) with two key differences, designed to eliminate potential biases in responses. First, the present procedure uses stories with still drawings, instead of videos, which potentially emphasized the character's overt actions over their mental states. Second, in the present procedure, children were not told the actor's goal (e.g., to find her keys). Instead, they were told that the actor was thinking about an animal and then performed an action that gave them the appearance of that animal. The action either was the product of the character's own intention to look like that animal, or was the product of an unintentional external manipulation. Thus, we provided a potential motivation for both characters to pretend (i.e., both were thinking about the animal). The question was whether children linked thinking about an animal with pretending to be that animal only when the character intentionally acted like that animal (as opposed to incidentally acting like that animal).

In particular, in Experiment 1, preschoolers were asked whether a set of characters was each pretending. All the characters had positive mental attitudes about pretending (i.e., they were all thinking about an animal they saw) and they were all acting like the animal. However, some characters' actions were intended to give them this appearance, while others' actions were caused by an external intervention, which gave them the incidental appearance of that animal. The question was whether children would respond differently between these two conditions. Experiment 2 then replicated the Experiment 1 using a forced-choice method instead of asking children whether each character was pretending.

1. Experiment 1

Three- and 4-year olds were told two types of stories. In one type, a character was thinking about a particular entity (an animal) and then engaged in an intentional action designed to give the character the appearance of that entity. In the other type, a character was thinking about a particular entity, and engaged in an action that gave the character the appearance of that entity, but the action was produced by an external manipulation, not by the intention to pretend. If children recognize that pretending must involve acting with the intention to pretend, then children should claim that only the characters in the first set of stories were pretending.

1.1. Method

1.1.1. Participants

The participants were sixteen 3-year olds (7 girls, $M = 42.25$ months, range = 37–48 months) and sixteen 4-year olds (9 girls, $M = 53.13$ months, range = 51–60 months) recruited from flyers posted in local preschools and through a list of hospital births. Three additional children were tested (one 3-year olds, two 4-year olds), but were not included because of experimental error. The children were all from middle to upper-middle class families in an urban area. No child had ever previously been a participant in the laboratory.

1.1.2. Materials

Children were shown four sets of three pictures. Each picture was drawn on a 10.2 cm × 15.2 cm index card and the three pictures were mounted on a 20 cm × 33 cm piece of blue oak tag.

1.1.3. Procedure

All children were tested by an experimenter with whom they were familiar in a game room in the laboratory or in a quiet room at their preschool. Children were told they would hear a set of stories and would be asked questions about them. In the *intentional* stories, children were told about a character who was thinking about a particular animal. The character then performed an action intended to make them look like that animal. For example, in one story, a boy was thinking about a tiger and smeared mud on his orange shirt to make stripes, giving him the appearance of a tiger. In the *unintentional* stories, children were told a story in which the character was thinking about an animal, but then through an unintentional sequence of actions, happened to take on the appearance of that animal. For example, in one story, a girl was at the zoo, looking and thinking about the kangaroos (who jump up and down). Then, she saw a big bug, which scared her and made her jump up and down, giving her the appearance of a kangaroo (see Fig. 1 and Appendix A for the full text of the stories and questions). Children were given two stories of each type, in one of four quasi-random orders, counterbalanced across participants.

For each story, children were asked two control questions to ensure that they understood the story's content. Children were asked whether the character was thinking about the animal they potentially were pretending to be. They were also asked whether the character's actions were volitional or the result of an external intervention (e.g., whether the character painted stripes on himself in the intentional story and whether the character jumped up and down because of the bug in the unintentional story). They were then asked the test question: whether the character was pretending to be the animal in question. If children understand that pretending requires the pretender to intend their actions as pretending, then they should judge that only the characters in the intentional stories are pretending.

Fig. 1. An example stimulus used in Experiment 1 for one of the unintentional stories.

1.2. Results and discussion

Children required corrective feedback on 2% of the control questions, and no child required corrective feedback on both control questions on any story. Children were given a score of 1 for each "yes" response to the pretending question. Preliminary analyses revealed no effect of order on responses to the pretending question, all $F(3, 31)$-values <1.36, all ns. Preliminary analyses also revealed that scores did not differ between the two intentional or two unintentional stories, McNemar $\chi^2(1, N = 32)$-values <1, ns. As such, these scores were summed to form aggregate scores on the intentional and unintentional stories that ranged from 0 to 2. These scores are shown in Table 1.

Since the number of 'yes' responses were close to ceiling levels (i.e., for each value, one standard deviation above the mean was greater than the maximum value), only a nonparametric analysis of these data was considered. Scores between the intentional and unintentional stories did not significantly differ, Wilcoxon Signed Rank Test, $z = -0.59$, ns. Scores on each story type did not differ between the 3- and 4-year olds, Mann–Whitney $U = 112.00$ and 128.00, $z = -1.05$

Table 1
Distribution and summary of responses to the pretending questions in Experiment 1

	Number of 'yes' responses				
	0	1	2	Mean	S.D.
3-Year-olds					
Intentional stories	0	3	13	1.81	0.40
Unintentional stories	1	1	14	1.81	0.54
4-Year-olds					
Intentional stories	0	1	15	1.94	0.25
Unintentional stories	1	1	14	1.81	0.54

and 0.00 for the intentional and unintentional stories, respectively, both p-values ns. Chi-squared goodness-of-fit tests revealed that both children in both age groups responded "yes" to the pretending questions more often than would be expected by chance on both the intentional and unintentional stories, $\chi^2(2, N = 16) = 27.38$ and 33.38 for the 3-year olds and $\chi^2(2, N = 16) = 40.38$ and 33.38 for the 4-year olds, all p-values < 0.001.

Three- and 4-year olds showed little ability to distinguish between characters who were intending their actions as pretense and characters whose actions made them incidentally resemble a pretense entity. On the unintentional stories, children almost always claimed that the characters were pretending. These data suggest that children do not necessarily incorporate the causal aspects of intentionality when making a judgment about whether someone is pretending. These findings are similar to that of Richert and Lillard (2002), who demonstrated that 4-year olds' difficulty with the Moe task persists when children are provided with an explanation for why Moe is acting like an animal of which he is ignorant (e.g., Moe does not know about kangaroos. He is jumping up and down because the pavement is hot, but he looks like a kangaroo). The present data suggest that children's difficulty extends to their understanding of the intentional states that produce action—young children do not distinguish between cases where the agent produced action of their own volition and cases where the agent's actions are produced by an external manipulation. Both cases were considered pretending.

Do children possess any knowledge of the relationship between causal aspects of intentional action and pretending? Ganea et al. (2004) found that 4-year olds recognized that actors in situations similar to the unintentional stories in Experiment 1 were engaged in an alternative behavior (as opposed to pretending) when given an explicit forced-choice question. Experiment 2 used a similar manipulation. Children were told about two characters. Both saw and were thinking about an animal (and thus potentially had the goal of pretending to be that animal). One started to act like the animal intentionally. The other was engaged in another action, which incidentally gave him/her the appearance of the animal. Children were asked to pick which character was pretending. If children only rely on the character's behavior, then they should choose at chance levels.

2. Experiment 2

Experiment 2 asked young children to select which of two characters was pretending to be an animal. Both characters were thinking about and acting like the animal. One character, like those in the intentional stories in Experiment 1, intended their actions as pretending. The other character, like those in the unintentional stories in Experiment 1, performed an action that incidentally gave them this appearance. If young children understand that pretenders produce actions in order to pretend, they should select the character acting volitionally as the one who is pretending. If children lack this understanding, one might expect chance performance. In this experiment, only a 3-year olds sample was considered, as positive results from this age group should indicate positive results in older children as well.

2.1. Method

2.1.1. Participants

The participants were sixteen 3-year olds (8 girls, $M = 41.13$ months, range = 36–47 months), who were recruited from a preschool classroom and from flyers posted at local preschools. No child had ever previously been a participant in the laboratory.

2.1.2. Materials

Materials similar to Experiment 1 were used, consistent with the story scripts (see Appendix B).

2.1.3. Procedure

Children were read four stories (counterbalanced in the same manner as Experiment 1), each about two characters. Both characters were thinking about the same entity (e.g., dogs). One character performed a set of intentional actions that gave him the appearance of a dog (e.g., got down on all fours); the other character performed an action in which the intention was not to pretend (e.g., picked up a quarter), but that incidentally gave the character the appearance of a dog. Children were asked two control questions to ensure they understood the content of the story, for which they received corrective feedback if they erred. Specifically, they were asked whether both characters were thinking about the pretense entity, and to point to the character whose actions were motivated by an external factor. Then children were asked the test question: which character was pretending to be the animal in question. The details of the four stories and questions are shown in Appendix B.

2.2. Results and discussion

Children required corrective feedback on 4.7% of the control questions, and no child required corrective feedback on both control questions on any story. Children who did require feedback were included in the final analyses. Children received a score of 1 on each story in which they picked the character who was acting with the intention to pretend (i.e., the character whose actions were not motivated by an external factor), and a score of 0 otherwise. A preliminary analysis revealed that children did not respond differently among the four stories, Cochran's $Q(3) = 2.20$, ns. As such, these data were summed and children were given a score that could range between 0 and 4. A preliminary analysis of these scores revealed no effect of order on responses, $F(3, 12) = 1.20$, ns.

Overall, children chose the character whose actions were intended as pretending on 3.44 out of 4 stories (S.D. = 1.03). This is significantly different than what would be expected by chance (i.e., 2 out of 4), $t(15) = 5.58$, $p < 0.001$. A nonparametric analysis confirms this finding. A Chi-squared goodness-of-fit test revealed that the distribution of responses was significantly different from chance responding, $\chi^2(4, N = 16) = 108.25$, $p < 0.001$. In addition, 11 of the 16 children (69%) chose this character on all four of the stories, significantly greater than the number that would be expected if children were responding randomly (6.25%), Binomial test, $p < 0.001$.

When given a choice between two characters with the same mental attitudes towards pretending to be an animal (i.e., both saw it and were thinking about it) and the same actions that gave them its appearance, 3-year olds judged that the pretender was the character who acted under his/her own accord. They rarely chose the character whose actions were the result of an external manipulation. This suggests that young children might have some understanding of the role that intentional actions plays in pretending. Specifically, children recognize that a pretender is one whose actions volitionally give them the appearance of an entity, as opposed to one whose actions incidentally give the same appearance.

3. General discussion

The two experiments considered what young children know about the relation between intentional action and pretending. In Experiment 1, both 3- and 4-year olds judged that characters

who were thinking about an animal and acting like that animal were pretending to be that animal. Children did not distinguish between characters who intended their action as pretending and characters whose actions provided them with the same appearance, but not through their own intentions. In Experiment 2, however, 3-year olds were given the explicit contrast between two such characters—a character who intended his actions as pretending and a character whose actions were the result of an external act (e.g., a bug being present, a quarter on the ground). Young children routinely chose the character whose actions were volitional as the one who was pretending.

How are we to interpret the discrepant findings between the two experiments? There are at least three possible interpretations for the observed discrepancy. The first is to point to a methodological difference between Experiments 1 and 2. Both Lillard (1998, 2001) and Gopnik (1998) have pointed to a difference in the methods used among various investigations to explain similar discrepancies among experiments. Many investigations that demonstrate 3-year olds understand the role of mental states in pretense tell children that a character is pretending and then ask about that character's other mental states (e.g., Custer, 1996; Joseph, 1998). In contrast, investigations that demonstrate 4-year olds have difficulty in understanding the relation between pretending and mental states present children with characters' mental states and actions, which are often in conflict. Children must judge whether the characters are pretending. It is possible that preschoolers can infer what a person's mental states are given that they are pretending, but cannot infer whether they are pretending from their mental states. Experiment 1 asked children to infer whether characters were pretending, which might have been difficult. In contrast, in Experiment 2, the implication of the test question was that one of the characters was pretending. Thus, children had to infer whether the mental states of each character matched, given that they were pretending. This might explain the discrepant findings between the two experiments.

Some investigations have directly examined this methodological hypothesis (Davis, Woolley, & Bruell, 2002; Ganea et al., 2004; Sobel, 2004), and have suggested that the directionality of the question does not completely explain the discrepant findings among preschoolers. For example, Sobel (2004) found that preschoolers do have a fragile (but not absent) understanding that pretense involves a variety of mental states (and specifically intentionality, see also Ganea et al., 2004). Critically, Experiment 2 found that 3-year olds recognized that in order to pretend, a character's action had to be produced volitionally, as opposed to an alternative reason. Children made this response even though the two characters had the same mental attitudes about pretending (i.e., they were thinking about the same animal) and had the same actions and appearance. These data are consistent with a set of findings that suggest that 3-year olds recognize that pretenders think about what they are pretending to be (e.g., Bruell & Woolley, 1998; Custer, 1996; Hickling et al., 1997).

What might this comprehension of the role of intentionality in pretense consist of? Young children potentially understand that pretenders' actions are goal-directed, but do not necessarily relate the mental attitudes that are required to pretend (e.g., that the pretender is thinking about what they are going to pretend to be and wants to pretend[2]) to the intentional state of trying to act like what they are pretending to be. If a character's actions are not intended as pretending, but

[2] Note that in the present experiments, we never explicitly told children that either character wanted to pretend. In Experiment 1 especially, we thought that pointing this out would place too much emphasis on pretending, resulting in a bias for affirmative answers. It would be interesting to see whether the results of Experiment 2 replicate if this fact is pointed out about both characters. This interpretation of the present experiments suggests that it would, but this is an open question for future research.

result in the same appearance as a pretender, young children might (incorrectly) believe that the character is pretending because they cannot dissociate the intention behind the action from the desire that produced the action. This would be consistent with young children failing to understand what Moses (2001) calls the causal aspects of intentionality. The results of Experiment 1 support this hypothesis. However, when provided with a choice between a character whose intentions match their thoughts and another whose intentions do not, they would choose correctly; this would result in the findings in Experiment 2.

However, a third explanation of the discrepancy between Experiments 1 and 2 and other similar findings (e.g., Davis et al., 2002; Sobel, 2004) is that young children have a more sophisticated understanding of the role of the mind and mental aspects in pretending, but the demands of the questions themselves prevented children from demonstrating such knowledge. Frye (2000), for example, has suggested that accurate responding on the Moe task requires children to inhibit Moe's actions in favor of the mental state knowledge critical for success (i.e., that Moe does not know about the animal he is acting like). Experiment 1 has similar inhibitory demands—in the unintentional stories, children must inhibit the character's actions in favor of the character's mental states. In Experiment 2, such inhibitory demands are less of a factor, since the actions of the characters are the same, and what differ are their mental states. Inhibitory control is difficult, especially for 3-year olds (e.g., Carlson & Moses, 2001). As such, Experiment 2 might be the more accurate representation of children's knowledge of pretending – that young children have a relatively sophisticated comprehension of the role of intentionality in pretending – and the inhibitory demands of Experiment 1 prevented them from demonstrating this knowledge.

It is certainly possible that children's developing inhibitory control abilities explain the difference in performance observed between the present Experiments 1 and 2. This would postulate that the latter experiment, in which 3-year olds reasoned successfully, more accurately represents young children's knowledge of the relation between pretending and intentional action. However, research on the development of inhibitory control abilities suggests that young children typically struggle with these measures before their fifth birthday (e.g., Carlson & Moses, 2001; Gerstadt, Hong, & Diamond, 1994). Children do not reliably succeed on the Moe task until approximately age 8 (Richert & Lillard, 2002). This suggests that children's developing inhibitory control abilities are not solely responsible for the emergence of successful performance on measures that test children's understanding of pretense. However, this hypothesis suggests a follow-up study on individual differences in development: on this account, children's success on questions like the ones posed in Experiment 1 will correlate with their developing executive function and inhibitory control abilities.

To conclude, these data motivate a middle ground between theories of children's understanding of pretense that suggest they understand the representational nature of pretending at relatively early ages (e.g., Leslie, 1987) and theories that suggest little to no representational understanding at these ages (e.g., Lillard, 2001). Children may understand certain aspects of the role of the mind and mental states in pretending, and such understanding might be more easily demonstrable if the inhibitory demands of the task are reduced. Disentangling the role of children's developing inhibitory control from their understanding of the mental qualities of pretending is clearly a cause for further investigation.

Acknowledgements

This work was supported by NSF (DLS-0518161). I would like to thank all of the parents and children who participated in this research. I would like to thank Emily Blumenthal, Victoria

Mazgalev, and Kelly Powell for help with stimuli design, data collection, and data analysis, and Peter Bryant, Claire Cook, Angeline Lillard, Rebekah Richert, and two anonymous reviewers for helpful discussion and feedback on this manuscript.

Appendix A. Script of stories used in Experiment 1

A.1. Intentional stories

Here's a boy and he's at school reading a book about tigers. He goes outside and says, "I'm thinking about a tiger". Look, he takes mud and smears it all over his orange shirt to make stripes. He looks just like a tiger.

- *Control 1*. Is he thinking about a tiger?
- *Control 2*. Did he smear stripes on himself?
- *Test*. Is he pretending to be a tiger?

Here's a girl and she's at school at the art table, and she sees the school cat. She says, "I'm thinking about a cat". Look, she takes the paintbrush and paints whiskers on her face. She looks just like a cat.

- *Control 1*. Is she thinking about a cat?
- *Control 2*. Did she paint whiskers on her face?
- *Test*. Is she pretending to be a cat?

A.2. Unintentional stories

Here's a girl and she's at the zoo and she see the kangaroos. She says, "I'm thinking about a kangaroo". But look, she looks down and sees a giant bug, and she gets all scared and jumps up and down. She looks just like a kangaroo.

- *Control 1*. Is she thinking about a kangaroo?
- *Control 2*. Did she jump up because she saw a bug?
- *Test*. Is she pretending to be a kangaroo?

Here's a boy and he's at the park and he sees the dogs. He says, "I'm thinking about a dog." But look, he sees a quarter on the ground and he bends down to pick it up on all fours. He looks just like a dog.

- *Control 1*. Is he thinking about a dog?
- *Control 2*. Did he bend down because he saw a quarter?
- *Test*. Is he pretending to be a dog?

Appendix B. Script of stories used in Experiment 2

Here are two girls and they are at the zoo and they see the kangaroos. They see the kangaroos jump up and down. This girl says, "I'm thinking about a kangaroo" and she starts to jump up and down. This girl says, "I'm thinking about a kangaroo". She looks down and sees a big bug.

She gets frightened and jumps up and down. Teacher comes over and looks at the girls and says, "Wow. You both look like kangaroos".

- *Control 1*. Are both girls thinking about a kangaroo?
- *Control 2*. Which girl saw the bug?
- *Test*. Which girl is pretending to be a kangaroo?

Here are two boys and they are in the park and they see the dogs. They see the dogs with their noses in the grass. This boy says, "I'm thinking about a dog" and he puts his nose in the grass. This boy says, "I'm thinking about a dog". He looks down and sees a quarter. He bends down to pick it up and puts his nose in the grass. Dad comes over and looks at the boys and says, "Wow. You both look like dogs".

- *Control 1*. Are both boys thinking about a dog?
- *Control 2*. Which boy saw the quarter?
- *Test*. Which boy is pretending to be a dog?

Here are two girls. They are at school, sitting at the art table. They both see 'Whiskers', the school cat. This girl says, "I'm thinking about a cat". She takes a marker, and draws whiskers on her face. This girl says, "I'm thinking about a cat." She draws a picture of a cat. When she's done, she wipes her face, and oops, she gets marker all over her face. Teacher comes over and says, "Wow, you both look like cats."

- *Control 1*. Are both girls thinking about cats?
- *Control 2*. Which girl got marker on her face by wiping it?
- *Test*. Which girl is pretending to be a cat?

Here are two boys. They are at school, reading a book about tigers. This boy says, "I'm thinking about a tiger". He takes mud and makes brown stripes on his orange clothing. This boy says, "I'm thinking about a tiger", but oops, he drops the book on the ground, and the mud splashes him and makes brown stripes on his orange clothing. Teacher comes over and says "Wow, you both look like tigers".

- *Control 1*. Are both boys thinking about tigers?
- *Control 2*. Which boy dropped the book?
- *Test*. Which boy is pretending to be a tiger?

References

Bruell, M. J., & Woolley, J. (1998). Young children's understanding of diversity in pretense. *Cognitive Development*, *13*, 257–277.

Carlson, S. M., & Moses, L. J. (2001). Individual differences in inhibitory control and children's theory of mind. *Child Development*, *72*, 1032–1053.

Chisholm, R. M. (1964/1976). Freedom and Action. In K. Lehrer (Ed.), Freedom and Determinism (pp.11–44). Atlantic Highlands, N.J.: Humanities Press.

Custer, W. L. (1996). A comparison of young children's understanding of contradictory mental representations in pretense, memory, and belief. *Child Development*, *67*, 678–688.

Davis, D. L., Woolley, J. D., & Bruell, M. J. (2002). Young children's understanding of the roles of knowledge and thinking in pretense. *British Journal of Developmental Psychology*, *20*, 25–45.

Flavell, J. H. (1988). The development of children's knowledge about the mind: From cognitive connections to mental representations. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), *Developing theories of mind* (pp. 244–271). New York: Cambridge University Press.

Forguson, L., & Gopnik, A. (1988). The ontogeny of common sense. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), *Developing theories of mind* (pp. 226–243). New York: Cambridge University Press.

Frye, D. (2000). Theory of mind, domain specificity, and reasoning. In P. Mitchell & K. J. Riggs (Eds.), *Children's reasoning about the mind* (pp. 149–168). East Sussex, UK: Psychology Press.

Ganea, P. A., Lillard, A. S., & Turkneimer, E. (2004). Preschooler's understanding of the role of mental states and action in pretense. *Journal of Cognition and Development*, *5*, 213–238.

Gerstadt, C. L., Hong, Y. J., & Diamond, A. (1994). The relationship between cognition and action: Performance of children 3.5–7 years old on a Stroop-like day–night test. *Cognition*, *53*, 129–153.

Gopnik, A. (1998). Wanting to get it right: Commentary on Lillard and Joseph. *Child Development*, *69*, 994–995.

Harris, P. L. (1991). The work of the imagination. In A. Whiten (Ed.), *Natural theories of mind* (pp. 283–304). Oxford: Basil Blackwell.

Harris, P. L., & Kavanaugh, R. D. (1993). Young children's understanding of pretense. *Monographs of the Society for Research in Child Development*, *58*(1), Serial no. 231.

Harris, P. L., Lillard, A. S., & Perner, J. (1994). Commentary: Triangulating pretence and belief. In C. Lewis & P. Mitchell (Eds.), *Children's early understanding of mind* (pp. 287–293). Hillsdale, NJ: Lawrence Erlbaum.

Hickling, A., Wellman, H. M., & Gottfried, G. M. (1997). Preschoolers' understanding of others' mental attitudes toward pretend happenings. *British Journal of Developmental Psychology*, *15*, 339–354.

Joseph, R. M. (1998). Intention and knowledge in preschoolers' conception of pretend. *Child Development*, *69*, 979–990.

Leslie, A. M. (1987). Pretense and representation: The origins of "theory of mind". *Psychological Review*, *94*, 412–426.

Leslie, A. M. (1988). Some implications of pretense for mechanisms underlying the child's theory of mind. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), *Developing theories of mind* (pp. 19–46). Cambridge: Cambridge University Press.

Leslie, A. M., & Roth, D. (1993). What autism teaches us about metarepresentation. In S. Baron-Cohen, H. Tager-Flusberg, & D. Cohen (Eds.), *Understanding other minds: Perspectives from autism* (pp. 83–111). Oxford, England: Oxford University Press.

Lillard, A. S. (1993). Pretend play skills and the child's theory of mind. *Child Development*, *64*, 348–371.

Lillard, A. S. (1994). Making sense of pretence. In C. Lewis & P. Mitchell (Eds.), *Children's early understanding of mind: Origins and development* (pp. 211–234). Hillsdale, NJ: Lawrence Erlbaum.

Lillard, A. S. (1996). Body or mind: Children's categorizing of pretense. *Child Development*, *67*, 1717–1734.

Lillard, A. S. (1998). Wanting to be it: Children's understanding of intentions underlying pretense. *Child Development*, *69*, 979–991.

Lillard, A. S. (2001). Pretend play as Twin Earth. *Developmental Review*, *21*, 495–531.

Meltzoff, A. N. (1995). Understanding the intentions of others: Reenactment of intended acts by 18-month-old children. *Developmental Psychology*, *31*, 838–850.

Moses, L. J. (2001). Some thoughts on ascribing complex intentional concepts to young children. In B. F. Malle, L. J. Moses, & D. A. Baldwin (Eds.), *Intentions and intentionality: Foundations of social cognition* (pp. 69–84). Cambridge, MA: MIT Press.

Perner, J. (1991). *Understanding the representational mind*. Cambridge, MA: MIT Press.

Phillips, W., Baron-Cohen, S., & Rutter, M. (1998). Understanding intention in normal development and autism. *British Journal of Developmental Psychology*, *16*, 337–348.

Rakoczy, H., Tomasello, M., & Striano, T. (2004). Young children know that trying is not pretending: A test of the "behaving-as-if" construal of children's early concept of pretense. *Developmental Psychology*, *40*, 388–399.

Richert, R. A., & Lillard, A. S. (2002). Children's understanding of the knowledge prerequisites of drawing and pretending. *Developmental Psychology*, *38*, 1004–1015.

Sobel, D. M. (2004). Children's developing knowledge of the relation between mental awareness and pretense. *Child Development*, *75*, 704–729.

Sobel, D. M., & Lillard, A. S. (2002). Young children's understanding of pretense: Do words bend the truth? *Developmental Science*, *5*, 87–97.

Wellman, H. M., Cross, D., & Watson, J. K. (2001). A meta-analysis of theory of mind: The truth about false belief. *Child Development*, *72*, 655–684.

Woodward, A. L. (1998). Infants selectively encode the goal object of an actor's reach. *Cognition*, *69*, 1–34.