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Just Pretending Can Be Really Learning: Children Use Pretend Play as a Source for Acquiring Generic Knowledge

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Children can acquire generic knowledge by sharing in pretend play with more knowledgeable partners. We report 3 experiments in which we investigated how this learning occurs—how children draw generalizations from pretense, and whether they resist doing so for pretense that is unrealistic. In all experiments, preschoolers watched pretend scenarios about an animal and were then asked questions about real animals. In Experiment 1, 3- and 4-year-olds treated the pretend scenarios as informative about the kind of animal represented in the pretense but as uninformative about another kind of animal. In Experiments 2 and 3, 4- and 5-year-olds resisted learning from scenarios that contradicted their existing knowledge and expectations. Together, these findings show that children's learning from pretense shows specificity for the kinds represented in pretense and that children's learning from pretense is selective.

Keywords: learning, pretend play, generic knowledge

Children playfully misrepresent the world—they pretend. Children pretend that empty cups contain tea, that dolls eat food, and that they themselves are lions. This is puzzling. Young children know little about the world, and so it is striking that they intentionally misrepresent objects when they could instead be learning about them (A.M. Leslie, 1987). Yet pretending may benefit children. It might allow children to practice or "pre-exercise" skills useful in later life—skills like hunting, chasing, and child-rearing (Groos, 1901; Steen & Owen, 2001). It might also allow children to practice various cognitive abilities, including self-control (Blair & Diamond, 2008; Vygotsky, 1967), narrative abilities (e.g., Pellegrini, 1985), theory of mind abilities (Harris, 2000, Chapter 3), and creative abilities (Carruthers, 2002). Or pretending might allow children to learn about how things in the world could be different than they actually are (e.g., Gopnik, 2009, pp. 71–73; Lillard, 2001).

Pretending might also provide another important benefit—it might aid children in acquiring generic knowledge (Sutherland & Friedman, 2012). Examples of generic knowledge are *Sharks eat fish* and *Forks have tines*. It concerns kinds (e.g., *sharks, forks*), not individuals (e.g., *the hammerhead shark at the aquarium*, *the fork that fell to the floor;* for excellent overviews of generic knowledge see S.J. Leslie, 2007, and Prasada, 2000). To see how pretending might allow children to acquire generic knowledge, consider a child who knows little about sharks but watches an adult pretend that a rock is a shark, that some leaves are fish, and that the shark eats the fish. By sharing in this pretense, the child might infer the generic fact that (real) sharks eat fish. That is, the child could treat the adults' pretense as a source of information about reality, and this might happen without the adult instructing the child to learn and without the adult acting on pedagogical intentions.

This account of pretending follows closely from the observation that people sometimes use fiction to draw conclusions about reality (Bloom, 2010, p. 167), and the account may extend ~~researchers'~~ appreciation of social contributions to children's knowledge acquisition (Tomasello, 1999). In particular, it helps explain how children acquire generic knowledge, because few sources are known from which children acquire such knowledge. First, children sometimes acquire generic knowledge from experience with members of kinds. For example, a child might learn about forks by seeing her mother use a particular fork. Such learning is facilitated if it occurs in a communicative context, as might happen if the mother's behavior signals that she is demonstrating how forks are used (Butler & Markman, in press; also see Csibra & Gergely, 2009). However, direct experience is not always possible because children are unlikely to have much contact with members of many kinds. For example, children rarely encounter sharks, even though it might be useful for them to learn that sharks are dangerous ~~predators~~. Second, children can acquire such knowledge by being told (Harris, 2002; Harris & Koenig, 2006), and generic language is particularly effective in this regard (Cimpian & Cadena, 2010; Cimpian & Markman, 2008). And third, children might also ac-

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quire generic knowledge from picture books and other media (Ganea, Ma, & DeLoache, 2011). Hence, learning from pretending may be one of the few sources from which children acquire generic knowledge.

Key features of pretending make it well suited for transmitting knowledge. In pretense, people intentionally misrepresent objects as having fictional identities and properties (e.g., a stone can represent a shark), and people recognize and share in one another's pretense. Hence, pretend play allows everyday objects to be used to convey a limitless range of scenarios. Although these scenarios sometimes feature unrealistic fantasy themes (e.g., fairies, superheroes), observational studies show such themes are not the rule; children's pretense is often used to enact a wide variety of real-life themes (e.g., Farver & Shin, 1997; Marvin & Hunt-Berg, 1996; McLoyd, Warren, & Thomas, 1984; Youngblade & Dunn, 1995, Appendix; see Bretherton, 1989, for a good overview). Moreover, the things represented in pretend play typically retain their actual properties. A person pretending to be a cat will typically say "Meow" and might pretend to chase mice; this shows that generating and recognizing pretense depends on previously acquired generic knowledge (e.g., that cats say "Meow"). This "realism" of pretense is acknowledged (or implied) in all major cognitive accounts of children's pretense, and it forms the basis for most tests of children's pretend play abilities (e.g., Harris & Kavanaugh, 1993; Leslie, 1987, 1994; Lillard, 1993; Nichols & Stich, 2000). And it has even been observed that parents prompt very young children to keep pretense realistic (Howes, Unger, & Matheson, 1992, pp. 15–16). Given that people rely on generic knowledge when producing pretense, children might learn in the reverse direction, using observed pretense to acquire generic knowledge.

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Recent findings suggest children do learn in this way (Sutherland & Friedman, 2012). In one experiment, 3- to 4-year-olds watched pretend scenarios about an unfamiliar (and fictional) kind of animal, a *nerp*. For instance, in one scenario, the nerp (represented by a puppet) ate and disliked a carrot (represented by an orange bead). Children were then asked forced-choice generic questions about "real" nerps. Half the children were asked about facts that could be learned from the scenarios; for the carrot scenario, they were asked, "Can you point to what nerps do not like to eat?" and could respond by pointing to a photograph of either a real carrot or cob of corn. The other children instead were asked about facts that could not be learned from the scenarios; for the carrot scenario, these children were asked which food nerps play with, and the children again responded by choosing between the two pictures. As predicted by the view that children learn generic facts from pretense, responses based on the pretend play were given more often by children who were asked "learning" questions than by those who were asked the other questions. If children had only chosen the carrot because it was highlighted in the story, they should have chosen it equally as often regardless of which question was asked. A second experiment ruled out the possibility that children's learning depended only on the experimenter's utterances during the pretend scenarios and not on the pretending itself. Children ages 4 and 5 years old watched pretend scenarios that did not feature language or sound effects. These scenarios either included actions intended to convey the nerp's preferences or these actions were omitted. For instance, children saw either the nerp puppet push away a toy carrot or the nerp standing beside the toy carrot. When children were subsequently asked open-ended questions about the preferences of real nerps, they based responses on the pretend scenarios more in the "action" than "no-action" condition. These findings suggest that children's learning from pretense can occur without the utterances and language that typically accompany pretense and also show that the pretense actions suffice to allow children to acquire generic knowledge.

The Present Experiments

The present experiments further probe the properties of children's learning from pretense. Although the findings of Sutherland and Friedman (2011) suggested children can learn generic information from pretense, it remains unknown *how* this learning occurs. The current experiments attempt to clarify this question. The first aim of the present research was to examine whether children's learning from pretend play shows *specificity* to the kinds represented in pretense. Studies on children's inductive inferences have shown that children extend properties learned about one animal to other members of its kind, but not to distantly related kinds of animals (e.g., Gelman, 1988; Gelman & O'Reilly, 1988; Rhodes, Gelman, & Brickman, 2010). In Experiment 1, we examined whether children's learning from pretense also shows such specificity.

A second aim was to test whether children's learning from pretense is *selective*. As noted earlier, pretend play sometimes features fantastic elements, and so if children treated all aspects of pretend play as informative about reality, they would come to have many misconceptions about the world. We expected that children would refrain from learning from pretense featuring very implausible events because children are selective in learning from testimony (Harris & Corriveau, 2011; Koenig, 2010); moreover, growing evidence suggests that children are selective in transferring other kinds of information from fictional contexts to reality (Richert, Shawber, Hoffman, & Taylor, 2009; Richert & Smith, 2011; Woolley & Cox, 2007; Woolley & Van Reet, 2006). In Experiments 2 and 3, we investigated whether children's learning from pretense is selective.

In these experiments, children again watched pretend scenarios about an animal and were then asked questions about real animals of its kind. This testing method broadly resembles methods from "property induction" experiments, in which children are typically told that an animal (or some other entity) has a certain property and then judge whether other animals or entities share the property (see Gelman, 2003, for an overview of much of this literature). However, the present experiments differ in key regards from the property induction experiments. First, in contrast with the present experiments, property induction experiments typically use the same sorts of materials during learning and test phases (e.g., children are both told and asked about animals depicted in realistic line drawings). Second, in induction studies, children are typically told the relevant information through explicit verbal utterances, while in the current experiments, children acquired information by recognizing the experimenter's pretense. These distinct features allow ~~the~~ children's transfer of information from pretense to their generic knowledge about reality to be investigated.

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Experiment 1

Method

Participants. Twenty-four children were tested (*M* age = 4 years 0 months; age range from 3 years 0 months to 4 years 11 months; 11 girls and 13 boys). In this experiment, and all subsequent ones, children were tested at their day care centers and preschools; most children were White and from middle-class families, though demographic information was not formally collected.

Design and procedure. Children watched as the experimenter enacted four pretend scenarios on a foam-board stage, using an animal puppet and craft supplies. The puppet was identified as a *nerp*, an unfamiliar (and fictional) animal species, and each scenario showed the nerp reacting to an object or animal. First, the nerp ate and disliked a carrot (or corn), represented by an orange bead; second, the nerp ate and enjoyed an apple (or watermelon), represented by a red bead; third, the nerp feared a frog (or fish), represented by a white puffball; and fourth, the nerp played with a cat (or dog), represented by a brown puffball. Children either saw scenarios about the carrot, apple, frog, and cat, or they saw scenarios about the corn, watermelon, fish, and dog. For example, in the carrot version of the first scenario, the experimenter said, "The nerp sees a carrot." She then put the orange bead to the nerp puppet's mouth, made exaggerated chewing sounds while moving the nerp in rhythm, and then pretended that the nerp said, "Carrots! Blah! Yuck!" It is important to note that although these scenarios did not require children to actively generate pretend behaviors, comprehending these scenarios required children to share in the experimenter's pretense. Consider the carrot scenario: There was no real animal, no real carrot, nothing was actually eaten. Nor did the experimenter narrate the events—she never explained that the nerp ate a carrot. If children had not followed the experimenter's pretense, they would not have known which events had occurred.

After enacting the four scenarios, the experimenter put the pretend materials away and brought out a testing binder. She showed children a page displaying a photo of an unfamiliar animal set against a white background. Children were randomly assigned to either of two groups, *same-kind* or *different-kind*. For children in the same-kind group, the photo showed a loris (a type of lemur). The experimenter said that it was a nerp and told children that they would be asked questions about nerps. Children then received four test trials. In each, they looked at a different page displaying two photo images side by side with a gap between them and answered a question about nerps by indicating either of the two photos. The questions pertained to general facts about nerps that could be learned from the pretend scenarios. For example, in the first scenario, the nerp disliked eating a carrot (or corn). Hence, in the first test trial, children were asked, "Can you point to what nerps do not like to eat?" They could respond by pointing at either a photo of a carrot or a photo of corn. Given this design, each picture served as a target for one counterbalancing group and as a distractor for the other.

For children in the different-kind group, the photo instead showed a baby kiwi bird. The experimenter told children that it was a *googoo bird* and that they would be asked questions about googoo birds. These children then received four test trials that were identical to those received by children who were asked about nerps, except the questions instead were about googoo birds. For example, rather than being asked in the first trial about what nerps dislike eating, these children were instead asked, "Can you point to what googoo birds do not like to eat?" The children could again respond by pointing at either a photo of a carrot or a photo of corn. Figure 1 shows the materials used in this experiment and a sample script. If children's learning from pretense is specific to the kind whose member was represented in the pretense, children should choose targets less often when asked about googoo birds because the pretend play did not concern a member of this kind. F1

Results and Discussion

A preliminary analysis revealed no difference across conditions in the ages of the children as measured in months, $t(22) = 0.57$, $p = .574$, *all tests two-tailed*, nor in the distribution of girls and boys, Fisher's exact test, $p = .414$. Children were scored 1 for each choice of a target (maximum score = 4). Children chose targets more when asked about nerps than when asked about googoo birds, Mann–Whitney U test = 17.50, $z = 3.30$, $p = .001$, $r = .67$. Children who were asked about nerps chose targets more than would be expected by chance (88% of responses, $M = 3.50$, $SD = 0.67$), one-sample Wilcoxon signed ranks test, $z = 3.04$, $p = .002$, $r = .88$; children asked about googoo birds chose between targets and distractors at chance (54% of responses, $M = 2.17$, $SD = 0.94$), one-sample Wilcoxon, $z = 0.63$, $p = .53$. These findings suggest that children's learning showed specificity to the kind represented in pretense, because it did not extend to an unrelated (or perhaps distantly related) kind of animal. The findings also show that children did not simply choose items that were highlighted in the pretend scenarios—had children relied on this strategy, they would have preferentially chosen targets regardless of whether they were asked about nerps or googoo birds.

However, against the claim that children learn by sharing in pretend play, one might worry that children were only "playing along" when asked the test questions. Children might have thought they were *supposed* to base their answers on the pretend scenarios or that they were supposed to continue with the pretense. In either case, children's answers would not reflect their views about reality, nor would such answers provide evidence for learning. These possibilities are plausible because children can base responses to questions on the suppositions of pretense scenarios (e.g., Dias & Harris, 1988, 1990; Friedman, Neary, Burnstein, & Leslie, 2010; Harris & Kavanaugh, 1993, Experiment 6; Kavanaugh & Harris, 1994).

We believe it unlikely that children interpreted the questions in this way because the experimenter put away the pretend materials and showed children a photo of a real animal before asking the test questions. Nonetheless, the next experiment tested this possibility by including conditions in which children watched pretend scenarios that conflicted with their existing knowledge (e.g., scenarios in which a cat was afraid of mice). If children think they are supposed to play along with the pretense when asked the test questions, they should readily base responses on these scenarios. However, children would not do this if they interpret such questions as asking about reality, and if they selectively avoid learning from pretense that conflicts with their existing knowledge. This experiment also examined whether children would base responses on pretend play if questioned by someone other than the person who had enacted the pretend play. Also, in the experiment, the

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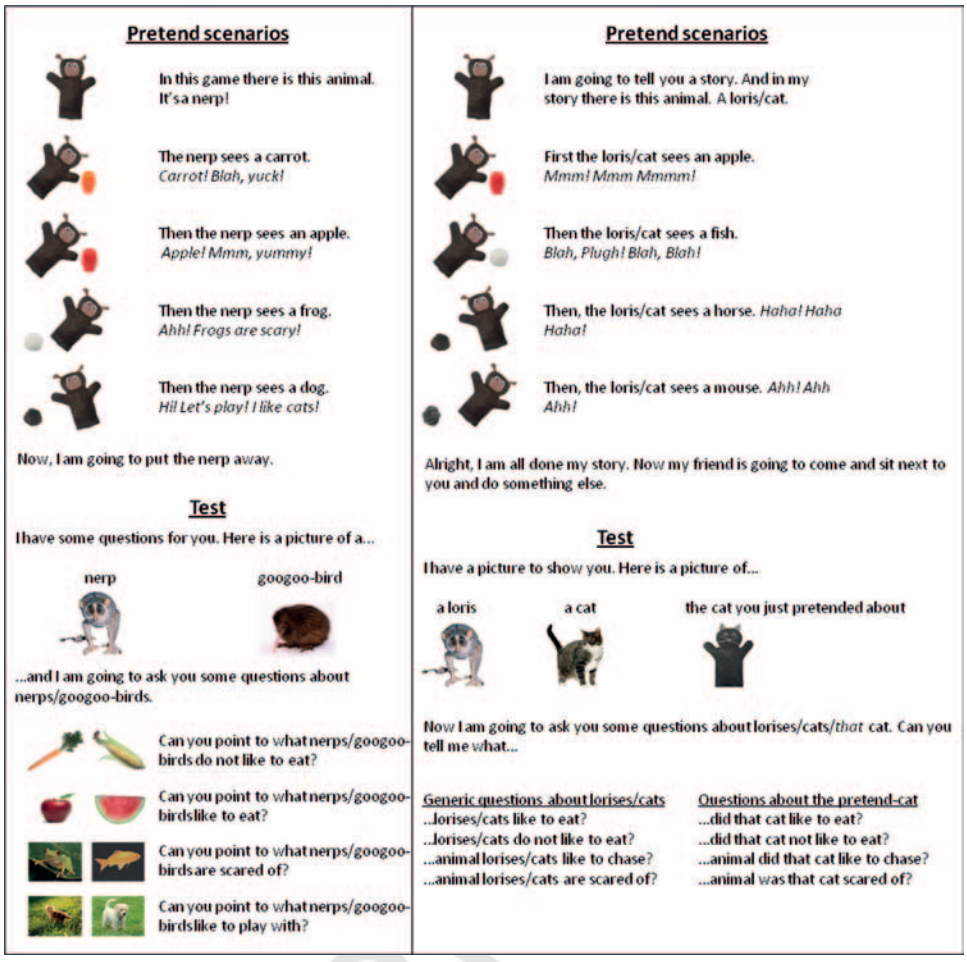

Figure 1. Sample scripts, with materials shown, for Experiments 1 (left panel) and 2 (right panel).

children were asked open-ended test questions; these questions provide a more stringent test of children's learning from pretense because they free children to give any response they like, rather than just the options offered in a forced-choice arrangement. Earlier pilot tests have shown that many 3-year-olds said, "I don't know" or gave no answer to open-ended questions; hence, slightly older children (4 and 5 years old) were tested.

Experiment 2

Method

Participants. Sixty children were tested (M age = 5 years 0 months; age range from 4 years 1 month to 5 years 10 months; 29 girls, 31 boys).

Design and procedure. Children again watched four scenarios enacted by an experimenter (E1) on a foam-board stage using an animal puppet and craft supplies. Children were randomly assigned to one of three groups. Children in one group saw scenarios about a loris, and these were enacted using the puppet from Experiment 1; children in the other two groups saw scenarios about a cat, and these were enacted using a cat puppet. Beyond this difference in the puppet used and in whether the experimenter referred to it as a loris or as a cat, the scenarios viewed by the three groups were identical.

First, the animal enjoyed eating an apple (red bead); then it disliked eating a fish (white puffball); then it chased a horse (brown puffball); and finally, it was scared by a mouse (gray puffball). In these scenarios, the animal did not "speak." Instead, E1 pretended that the animal made sounds conveying its feelings about the different things to which it reacted. For instance, in the first scenario, E1 said, "First the loris [cat] sees an apple." E1 then put the red bead to the puppet's mouth while making chewing sounds and said "Mmmm!" in a high-pitched voice, while moving the puppet in rhythm.

After enacting the scenarios, E1 said she was finished, put the pretend materials away, and went out of view. A different experimenter (E2), who had been out of view, then approached to test the children. The test differed by condition. Children who initially watched pretend scenarios about a loris were shown a photo of a loris and were then asked four generic questions about lorises. Likewise, one group of children who watched scenarios about a cat were shown a photo of a cat and were then asked four generic questions about cats. For both of these groups, the four questions were open-ended, and each pertained to a general fact for which

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the answers could be based on one of the pretend scenarios (e.g., "Can you tell me what lorises [cats] do not like to eat?"). If children answer the test questions about reality by merely playing along with the pretense, they should base responses on the pretend scenarios regardless of whether they are asked generic questions about lorises or cats. However, if children view the test questions as asking about reality, responses for these two groups should differ. While the scenarios about lorises provided plausible information about real lorises, the scenarios about cats conflicted with children's existing knowledge about cats—children know, for example, that cats eat cat food or mice, not apples (this was confirmed in pilot tests conducted on different children). So while children might consider the scenarios in answering questions about real lorises, they should not do so when asked about real cats.

One concern with this prediction, though, is that the children asked about cats might *want* to play along and base their answers about cats on the pretend scenarios, but they might have difficulty because of interference from their conflicting knowledge. For example, they might have difficulty remembering that the pretend cat enjoyed eating an apple because of interference from their knowledge that real cats like eating things like fish and cat food. To rule out this concern, the experimenter E2 showed the other group of children who watched scenarios about the cat a photo of the cat puppet during test and asked (nongeneric) questions about that pretend cat's preferences. E2 told these children, "I am going to ask you some questions about the cat you just pretended about" and then asked questions such as, "Can you tell me—what did *that* cat like to eat?" Figure 1 shows the scripts and materials used in this experiment.

If children have difficulty remembering the scenarios about the cat (i.e., because these scenarios conflict with their existing knowledge), they should give few target responses, but if they instead give many target responses, this would show that their memory for the scenarios is strong.

Results and Discussion

A preliminary analysis revealed no difference across the three conditions in the ages of the children as measured in months, $F(2, 57) = 0.11$, $p = .894$, nor in the distribution of girls and boys, $\chi^2(2, N = 60) = 0.93$, $p = .627$. Children were scored 1 for each target response given (maximum score = 4). Scores varied across the three conditions, Kruskal–Wallis $\chi^2 = 25.32$, $df = 2$, $p < .001$. Target responses were given more by children who were asked generic questions about lorises (54% of responses, $M = 2.15$, $SD = 1.53$) than by those who were asked generic questions about cats (11% of responses, $M = 0.45$, $SD = 0.69$), Mann–Whitney U test = 69.50, $z = 3.70$, $p < .001$, $r = .59$. This finding suggests that children viewed the questions as pertaining to reality, because if children had been playing along, they should have based responses on the pretend play regardless of whether they were asked about lorises or cats. Target responses were also given more by children who were asked about the pretend cat (71% of responses, $M = 2.85$, $SD = 1.27$) than by those asked about cats generically, Mann–Whitney U test = 29.00, $z = 4.78$, $p < .001$, $r = .76$; scores did not differ between the children asked about the pretend cat and those asked generic questions about lorises, Mann–Whitney U test = 149.50, $z = 1.41$, $p = .157$. These findings show that children could have based responses about real cats on the pretend scenarios—this is evident because children successfully remembered the scenarios when explicitly asked about the pretend cat. Taken together, the findings provide further evidence that children learn from pretend play. At the same time, the findings suggest that children's learning from pretense is selective to the extent that children did not learn from pretense that conflicted with their existing knowledge. These findings rule out the possibility that children were only playing along with the pretense when answering the test questions.

In a final experiment, we sought to examine whether children interpret information from pretend scenarios as extending to reality, even when explicitly given the chance to deny this by claiming the information is "just pretend." This experiment also allowed a further test of the claim that children's learning from pretense is selective. In this experiment, we used somewhat different methods from the previous experiments: Those experiments used tasks that probably taxed children's memory—children watched all four pretend scenarios before being questioned. These memory demands were reduced in the final experiment because children were questioned about each scenario immediately after it ended.

Experiment 3

Method

Participants. Twenty-three children were tested (M age = 4 years 8 months, age range from 4 years 0 months to 5 years 10 months; 13 girls, 10 boys). An additional group composed of 3-year-olds (M age = 3 years 6 months, age range from 3 years 1 month to 3 years 11 months; $n = 14$, six girls and eight boys) were also tested. However, eight of 14 in the additional group failed comprehension questions, and so we stopped testing 3-year-olds and did not include them in the main analysis.

Design and procedure. Children watched four scenarios enacted by an experimenter on a foam-board stage using the loris puppet and small toy replicas (e.g., a small toy apple was used instead of a bead). Children were randomly assigned to watch plausible or implausible scenarios about the loris. In the plausible condition, the loris first enjoyed eating an apple, then disliked eating a carrot, then was scared of a frog, and finally enjoyed playing with a cat. In the implausible condition, the loris first enjoyed eating a hat, then drove a truck, then colored with a crayon, and finally sang "Twinkle, Twinkle, Little Star." In this experiment, the experimenter often "made" the loris speak (e.g., "A truck! Vroom vroom! I love driving trucks! Vroom vroom!"); however, as in the previous experiments, she did not narrate the events of the scenarios.

After enacting each scenario, the experimenter removed the puppet from her hand, placed it and other pretend materials out of view, and then asked children a comprehension question about the scenario. For example, after the first scenario, she asked, "What did that loris just eat?" All children answered all comprehension questions correctly. Following each comprehension question, the experimenter then asked, "Now who does that—just pretend lorises or real lorises too?" Once children answered this question, the experimenter brought out the pretend materials and enacted the next scenario.

If children do not readily extend pretend events to reality, then they would be expected to choose the "just pretend lorises" option.

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However, we expected that children who saw the plausible scenarios would view these scenarios as depicting properties of lorises that extend to real lorises generally. Children were expected to choose these "real" options less often for the implausible scenarios because they likely contradicted children's expectations about what real animals do.

Results and Discussion

A preliminary analysis revealed no difference across the two conditions in the ages of the children as measured in months, $t(21) = 0.68$, $p = .504$, nor in the distribution of girls and boys, Fisher's exact test, $p = .214$. Children were given a score of 1 for each time they indicated that some preference or activity shown in the pretend scenarios extended to real lorises (maximum score = 4). Scores were higher in the plausible condition (69% of responses, $M = 2.75$, $SD = 1.14$) than in the implausible condition (32% of responses, $M = 1.27$, $SD = 1.79$), Mann–Whitney U test = 33.00, $z = 2.09$, $p = .036$, $r = .44$. Comparing scores to the chance score of 2, children predominantly chose the "real lorises too" option in the plausible condition, one-sample Wilcoxon, $z = 2.01$, $p = .045$, $r = .580$, but their responses in the implausible condition did not depart from chance, one-sample Wilcoxon, $z = 1.52$, $p = .129$. Together, these findings suggest that children readily view content enacted in pretend scenarios to extend to reality even when explicitly given the opportunity to deny this and also that children are selective about which content they extend.

As noted earlier, we also tried testing 3-year-olds in this experiment. However, we stopped because eight of 14 children in the group of 3-year-olds we tested had difficulties with the comprehension questions. Most of these difficulties occurred in the implausible condition (six of seven 3-year-olds failed at least once), and fewer failures occurred in the plausible condition (two of seven 3-year-olds failed at least once). Although we cannot make conclusions based on this small sample, this result may suggest that young children expect pretend play to be "realistic"; they may expect things depicted in pretense to retain many of their real-world properties. It is important to note, though, that children's difficulty was not with the main test question and therefore does not provide evidence that 3-year-olds fail to learn from pretend play.

General Discussion

Our findings suggest that pretend play is not just fun and games for children. Rather, children benefit from pretend play in a straightforward way—they sometimes use it as a source of information about reality. In our experiments, children watched pretend scenarios about an unfamiliar kind of animal. When subsequently questioned about animals of its kind, children often based their responses on the pretend scenarios. They did so even though they were not directly told the facts about which they were questioned, were not told to learn from the pretend scenarios, were not told to base their responses on the scenarios, and were sometimes questioned by an experimenter who had been out of view when the pretend scenarios were enacted (Experiment 2). These findings extend knowledge of children's learning from pretend play by demonstrating that this learning shows specificity and selectivity; these findings also rule out some counterexplanations for the phenomenon. We consider these findings in the following, along with new questions raised by the present experiments.

Specificity

The findings show that children's learning shows specificity to the kinds represented in the pretense—children were more likely to give responses based on pretend play when asked about the kind of animal featured in the pretense than when asked about a very different kind of animal (Experiment 1). This specificity is similar to findings from experiments on children's inductive inferences, which also have shown that children are reluctant to judge that a property held by one kind of animal is shared by distantly related kinds of animals (e.g., those from a different basic level category) or by other entities (Gelman & O'Reilly, 1988; Rhodes et al., 2010; Waxman, Lynch, Casey, & Baer, 1997). However, this research has found that preschoolers readily judge that the properties are shared by different subordinate members of the same basic level category—for instance, they judge that setters and collies share the same properties, because both are members of the basic level category *dog* (Waxman et al., 1997). It would be valuable for future research to examine whether this "basic level advantage" also holds in children's learning from pretense. More generally, it will be important to come to a clearer sense of the knowledge that children can acquire through pretense. For example, although the present experiments focus on the acquisition of generic knowledge, which concern kinds, it is plausible that sharing in pretense might allow children to learn about particular individuals. For example, sharing in pretense might allow children to acquire knowledge of *habituals*, which concern the enduring properties and typical behaviors of particular entities (e.g., the Empire State Building is tall; it is cold in the Arctic).

Selective Learning

The findings also show that children's learning from pretend play is selective—children do not indiscriminately treat pretend play as a source of information; they refrain from doing so when it conflicts with their knowledge (Experiment 2) or when it includes events and content that are very implausible (Experiment 3). This selectivity is important. Pretend play sometimes features fantastic elements, so if children treated all aspects of pretend play as informative, they would become deluded about the world. It is not surprising that children are selective in learning from pretense, because they are also selective in learning from testimony (Harris & Corriveau, 2011; Koenig, 2010). Moreover, recent research has revealed other instances in which children's transfer of information from fictional contexts to reality is selective (Richert et al., 2009; Richert & Smith, 2011; Woolley & Cox, 2007; Woolley & Van Reet, 2006). These previous experiments did not examine children's learning of general facts but rather investigated how children come to solve problems, judge whether novel entities are real, and judge which sorts of events are possible. Similarly to the present findings that children are more likely to learn from plausible pretense than from pretense that is implausible, these experiments also showed that children are more likely to transfer information from realistic than fantastic stories. Hence, together the experiments provide converging evidence that children are selective in transferring information from fictional contexts, based on the degree to which the contexts are plausible or realistic.

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Even so, important questions about the selectivity of children's learning from pretense remain. First, although the present experiments show that children avoid learning from pretense that contradicts their existing knowledge (Experiment 2) or is wildly implausible (Experiment 3), the experiments leave open the possibility that children might learn from mildly implausible pretense. The degree to which children are selective, then, remains to be discovered. Second, the present experiments only explored one way in which children might be selective in learning from pretense (i.e., plausibility). But probably there are many other factors children could use. Studies of children's inductive inferences (Gelman, 1988) and recognition of generic meanings (Cimpian & Markman, 2008, Experiment 2) have shown that young children appreciate that properties reflecting temporary states (e.g., being sick; having fallen down on the floor this morning) do not generalize—for instance, the fact that a particular yak is sick does not allow one to generalize yaks are sick. Children's learning from pretend play might also be limited to generalizable properties. Another factor children might be sensitive to is the manner in which pretense is enacted—they might avoid learning from pretense enacted in an extremely humorous way (e.g., with much laughter). Such cues might be particularly important if it turns out that very young children, such as 2-year-olds, learn from pretense, because they likely lack the knowledge base needed to judge whether pretend scenarios are unrealistic.

Alternative Explanations

The present experiments also help rule out concerns that children only appear to learn from pretense, but without really doing so. First, the findings show that children appreciated that the test questions pertained to reality and thereby rule out the concern that children based answers on the pretend scenarios only because they thought they were supposed to play along with the pretense and answer in this way. The key finding here is that children gave few target answers after watching scenarios that conflicted with their existing knowledge (Experiments 2). For example, after watching a scenario in which a cat enjoyed eating an apple, children did not answer that cats enjoy eating apples. If children had thought they were supposed to base responses on the pretend scenarios, they should have done so regardless of whether the scenarios conflicted with their knowledge.

Second, the findings suggest that children's use of pretense as a source of information does not just arise because children view themselves as having no alternative for responding to the experimenter's questions. In Experiment 3, children were asked whether certain properties of the animal in the pretend scenarios applied only to pretend animals of that kind or also to real ones. Children readily extended the properties to reality when they were plausible for real animals (e.g., lorises enjoy eating apples) but did so less when the properties were implausible (e.g., lorises enjoy eating hats). This finding shows that children extend information gained from pretend play to reality even when explicitly offered the chance to deny this.

Further Questions

Although the current experiments show that children acquire generic information by sharing in pretend play, they also raise many questions for future research. One set of questions concerns whether children's learning from pretense extends beyond the laboratory, and actually occurs in children's regular pretend play. For children to acquire generic knowledge from pretense, they must be exposed to pretend scenarios featuring at least some unfamiliar content. It is likely that children are exposed to such scenarios when partners in pretense differ in age—for instance, when siblings pretend together, older siblings might easily incorporate information of which younger siblings are ignorant (e.g., information about school). Nonetheless, naturalistic studies are needed to confirm this supposition, and to our knowledge none exist (but see Lucariello, 1987, for a seminaturalistic study consistent with this prediction).

Assuming that children are exposed to such unfamiliar content in their regular pretense, their learning from pretense in regular life might differ from their learning in our experiments. First, although pretend play often includes content that is novel for children, it may still typically deal with kinds of entities with which children are already familiar (e.g., a younger sibling might be introduced to novel content about school, but the child already knows that schools exist). However, all the present experiments included conditions featuring an unfamiliar kind of animal. It is uncertain whether watching the pretend scenarios led children to believe that the animals are actually real. Even so, it is likely that the subsequent test phase in each experiment convinced children that such animals do exist, because the experimenter explicitly implied that they were real: In Experiments 1 and 2, the experimenter showed children a photo image of the animal and said, "Here is a picture of a nerp (or loris)." In Experiment 3, the experimenter contrasted "real lorises" with "just pretend lorises." Children likely trusted the experimenter given their bias to trust in adult testimony (e.g., Jaswal, Croft, Setia, & Cole, 2010). This is especially plausible given that children affirm the existence of many entities they have never observed and for which testimony is their only source of information (e.g., Harris & Koenig, 2006; Harris, Pasquini, Duke, Asscher, & Pons, 2006; Woolley, Ma, & Lopez-Mobilia, 2011). Further, children's own responses in Experiment 3 strongly suggest they believed the animals were real, because they mostly chose the "real lorises" option in the plausible condition; if they had thought the animals are not real, they could have chosen the "just pretend" option. However, the fact that it was the test phase that likely convinced children of the reality of the animals implies that children's learning might have depended, in part, on events occurring after the pretense scenarios. Hence, scenarios about familiar entities (e.g., cows, pigs) might provide a purer assessment of children's learning from pretense.

A second difference between the scenarios in the present experiments and pretend play in daily life is that children in the experiments passively watched the scenarios without actively participating. Although this is normal in research on children's comprehension of pretend play (e.g., Harris & Kavanaugh, 1993, Experiment 6; Kavanaugh & Harris, 1994; Lillard, 1993; Rakoczy, Tomasello, & Striano, 2004, 2006; Richert & Lillard, 2004), in real life, children actively participate in pretend play. This participation might influence learning from pretense. For example, children's active participation might create opportunities for them to "rehearse" newly acquired information by incorporating it into their own pretend actions and also for them to receive feedback about reality—as noted earlier, parents may correct their children's pre-

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tense and prompt them to keep it realistic (Howes et al., 1992, pp. 15–16).

Other remaining questions concern the development of children's learning from pretend play. The present experiments primarily focused on 4- and 5-year-olds. Three-year-olds were included in Experiment 1. None were tested in Experiment 2 because pilot tests found that 3-year-olds often said, "I don't know" or gave no answer to open-ended questions asked in similar tasks. In Experiment 3, testing of 3-year-olds was discontinued after it was found that many of them seemed to have difficulty comprehending the implausible scenarios, as assessed by their performance when asked the comprehension questions that preceded the test question. Three-year-olds' difficulties outside the forced-choice method used in Experiment 1 might indicate development in children's learning from pretense—perhaps this form of learning only becomes robust at age 4 years. Alternatively, the difficulties might simply arise because general task demands limit the methods that can viably be used with 3-year-olds.

Testing when children first learn from pretense is crucial for determining why they acquire information in this way. One possibility is that children's learning from pretend play is itself the outcome of learning. In this view, children do not initially learn from pretense, and so perhaps 3-year-olds might not be expected to learn from pretend play. However, given experience with pretending, young children might eventually notice that things represented in pretend scenarios usually retain their real properties (e.g., pretend cows go "moo" much as real cows do). By noticing this, children could learn that pretend play is a potential source for acquiring knowledge.

Alternatively, children's learning from pretense could be the result of very general properties of information processing, such as a disposition to assume all information is true before rejecting some information as false (e.g., Gilbert, 1991), including information given in fictional contexts such as pretend play. Or it could reflect a design feature of the cognitive system underlying pretense or a design feature of the systems responsible for human communication more generally; this account is broadly consistent with the claim that human communication is adapted to the function of transmitting generic knowledge (Csibra & Gergely, 2009). Both of these accounts predict that children much younger than those tested in the current experiments should also learn from shared pretend play.

References

Blair, C., & Diamond, A. (2008). Biological processes in prevention and intervention: Promotion of self-regulation and the prevention of early school failure. *Development and Psychopathology, 20,* 899–911. doi:10.1017/S0954579408000436

Bloom, P. (2010). *How pleasure works*. New York, NY: Norton.

Bretherton, I. (1989). Pretense: The form and function of make-believe play. *Developmental Review, 9,* 383–401. doi:10.1016/0273-2297(89)90036-1

AQ: 6 ~~Brown, D. E. (1991). *Human universals*. New York, NY: McGraw-Hill.~~

Butler, L. P., & Markman, E. M. (in press). Preschoolers use intentional and pedagogical cues to guide inductive inferences and exploration. *Child Development*.

Carruthers, P. (2002). Human creativity: Its evolution, its cognitive basis, and its connections with childhood pretence. *British Journal for the Philosophy of Science, 53,* 225–249. doi:child10.1093/bjps/53.2.225

Cimpian, A., & Cadena, C. (2010). Why are dunkels sticky? Preschoolers infer functionality and intentional creation for artifact properties learned from generic language. *Cognition, 117,* 62–68. doi:10.1016/j.cognition.2010.06.011

Cimpian, A., & Markman, E. M. (2008). Preschool children's use of cues to generic meaning. *Cognition, 107,* 19–53. doi:10.1016/j.cognition.2007.07.008

Csibra, G., & Gergely, G. (2009). Natural pedagogy. *Trends in Cognitive Sciences, 13,* 148–153. doi:10.1016/j.tics.2009.01.005

Dias, M. G., & Harris, P. L. (1988). The effect of make-believe play on deductive reasoning. *British Journal of Developmental Psychology, 6,* 207–221. doi:10.1111/j.2044-835X.1988.tb01095.x

Dias, M. G., & Harris, P. L. (1990). The influence of the imagination on reasoning by young children. *British Journal of Developmental Psychology, 8,* 305–318. doi:10.1111/j.2044-835X.1990.tb00847.x

Farver, J. M., & Shin, Y. L. (1997). Social pretend play in Korean- and Anglo-American preschoolers. *Child Development, 68,* 544–556. doi:10.2307/1131677

Friedman, O., Neary, K. R., Burnstein, C. L., & Leslie, A. M. (2010). Is young children's recognition of pretense meta-representational or merely behavioral? Evidence from 2- and 3-year-olds' understanding of pretend sounds and speech. *Cognition, 115,* 314–319. doi:10.1016/j.cognition.2010.02.001

Ganea, P. A., Ma, L., & DeLoache, J. S. (2011). Young children's learning and transfer of biological information from picture books to real animals. *Child Development, 82,* 1421–1433. doi:10.1111/j.1467-8624.2011.01612.x

Gelman, S. A. (1988). The development of induction within natural kind and artifact categories. *Cognitive Psychology, 20,* 65–95. doi:10.1016/0010-0285(88)90025-4

Gelman, S. A., & O'Reilly, A. W. (1988). Children's inductive inferences within superordinate categories: The role of language and category structure. *Child Development, 59,* 876–887. doi:10.2307/1130255

Gilbert, D. (1991). How mental systems believe. *American Psychologist, 46,* 107–119. doi:10.1037/0003-066X.46.2.107

Gopnik, A. (2009). *The philosophical baby: What children's minds tell us about truth, love, and the meaning of life*. New York, NY: Picador.

Groos, K. (1901). *The play of man*. New York, NY: Appleton. doi:10.1037/13084-000

Harris, P. L. (2000). *The work of the imagination*. Oxford, England: Blackwell.

Harris, P. L. (2002). What do children learn from testimony? In P. Carruthers, M. Siegal, & S. Stich (Eds.), *Cognitive bases of science (pp.* 316–334). Cambridge, England: Cambridge University Press. doi:10.1017/CBO9780511613517.018

Harris, P. L., & Corriveau, K. H. (2011). Young children's selective trust in informants. *Philosophical Transactions of the Royal Society, Series B: Biological Sciences, 366,* 1179–1187. doi:10.1098/rstb.2010.0321

Harris, P. L., & Kavanaugh, R. D. (1993). Young children's understanding of pretense. *Monographs of the Society for Research in Child Development, 58, No.* 1. doi:10.2307/1166074

Harris, P. L., & Koenig, M. (2006). Trust in testimony: How children learn about science and religion. *Child Development, 77,* 505–524. doi:10.1111/j.1467-8624.2006.00886.x

Harris, P. L., Pasquini, E., Duke, S., Asscher, J., & Pons, F. (2006). Germs and angels: The role of testimony in young children's ontology. *Developmental Science, 9,* 76–96. doi:10.1111/j.1467-7687.2005.00465.x

Howes, C., Unger, O., & Matheson, C. C. (1992). *The collaborative construction of pretend: Social pretend functions*. Albany: State University of New York Press.

Jaswal, V. K., Croft, A. C., Setia, A. R., & Cole, C. A. (2010). Young children have a specific, highly robust bias to trust testimony. *Psychological Science, 21,* 1541–1547. doi:10.1177/0956797610383438

tapraid5/z2p-devpsy/z2p-devpsy/z2p00113/z2p3093d13z | xppws | S=1 | 10/22/12 | 0:44 | Art: 2011-1282

Kavanaugh, R. D., & Harris, P. L. (1994). Imagining the outcome of pretend transformations: Assessing the competence of normal children and children with autism. *Developmental Psychology, 30,* 847–854. doi:10.1037/0012-1649.30.6.847

Koenig, M. A. (2010). Selective trust in testimony: Children's evaluation of the message, the speaker, and the speech act. In T. Szabo Gendler & J. Hawthorne (Eds.), *Oxford Studies in Epistemology* (Vol. 3, pp. 253–273). Oxford, England: Oxford University Press.

Leslie, A. M. (1987). Pretense and representation: The origins of "theory of mind." *Psychological Review*, *94,* 412–426. doi:10.1037/0033-295X.94.4.412

Leslie, A. M. (1994). Pretending and believing: Issues in the theory of ToMM. *Cognition, 50,* 211–238. doi:10.1016/0010-0277(94)90029-9

Leslie, S. J. (2007). Generics and the structure of the mind. *Philosophical Perspectives, 21,* 375–403. doi:10.1111/j.1520-8583.2007.00138.x

Lillard, A. S. (1993a). Pretend play skills and the child's theory of mind. *Child Development, 64,* 348–371. doi:10.2307/1131255

Lillard, A. S. (1993b). Young children's conceptualization of pretense: Action or mental representational state? *Child Development, 64,* 372–386. doi:10.2307/1131256

Lillard, A. S. (2001). Pretend play as twin earth: A social–cognitive analysis. *Developmental Review, 21,* 495–531. doi:10.1006/drev.2001.0532

Lucariello, J. (1987). Spinning fantasy: Themes, structures, and the knowledge base. *Child Development, 58,* 434–442. doi:10.2307/1130520

Marvin, C., & Hunt-Berg, M. (1996). Let's pretend! A semantic analysis of preschool children's play. *Journal of Children's Communication Development, 17,* 1–10. doi:10.1177/152574019501700201

McLoyd, V. C., Warren, D., & Thomas, E. A. (1984). Anticipatory and fantastic role enactment in preschool triads. *Developmental Psychology, 20,* 807–814. doi:10.1037/0012-1649.20.5.807

Nichols, S., & Stich, S. (2000). A cognitive theory of pretense. *Cognition, 74,* 115–147. doi:10.1016/S0010-0277(99)00070-0

Pellegrini, A. D. (1985). Relations between preschool children's symbolic play and literate behavior. In L. Galda & A. Pellegrini (Eds.), *Play, language, and stories* (pp. 107–121). Norwood, NJ: Ablex.

Prasada, S. (2000). Acquiring generic knowledge. *Trends in Cognitive Sciences, 4,* 66–72. doi:10.1016/S1364-6613(99)01429-1

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. doi:10.1037/0012-1649.40.3.388

Rakoczy, H., Tomasello, M., & Striano, T. (2006). The role of experience and discourse in children's developing understanding of pretend play actions. *British Journal of Developmental Psychology, 24,* 305–335. doi:10.1348/026151005X36001

Rhodes, M., Gelman, S. A., & Brickman, D. (2010). Children's attention to sample composition in learning, teaching, and discovery. *Developmental Science, 13,* 421–429. doi:10.1111/j.1467-7687.2009.00896.x

Richert, R. A., & Lillard, A. S. (2004). Observers' proficiency at identifying pretense acts based on behavioral cues. *Cognitive Development, 19,* 223–240. doi:10.1016/j.cogdev.2004.01.001

Richert, R. A., Shawber, A. B., Hoffman, R. E., & Taylor, M. (2009). Learning from fantasy and real characters in preschool and kindergarten. *Journal of Cognition and Development, 10,* 41–66. doi:10.1080/15248370902966594

Richert, R. A., & Smith, E. I. (2011). Preschoolers' quarantining of fantasy stories. *Child Development, 82,* 1106–1119. doi:10.1111/j.1467-8624.2011.01603.x

Steen, F. F., & Owens, S. A. (2001). Evolution's pedagogy: An adaptationist model of pretense and entertainment. *Journal of Cognition and Culture, 1,* 289–321. doi:10.1163/156853701753678305

Sutherland, S. L., & Friedman, O. (2012). Preschoolers acquire general knowledge by sharing in pretense. *Child Development, 83,* 1064–1071. doi:10.1111/j.1467-8624.2012.01748.x

Vygotsky, L. S. (1967). Play and its role in the mental development of the child. *Soviet Psychology, 7,* 6–18.

Waxman, S. R., Lynch, E. B., Casey, K. L., & Baer, L. (1997). Setters and samoyeds: The emergence of subordinate level categories as a basis for inductive inference in preschool-age children. *Developmental Psychology, 33,* 1074–1090. doi:10.1037/0012-1649.33.6.1074

Woolley, J. D., & Cox, V. (2007). Development of beliefs about storybook reality. *Developmental Science, 10,* 681–693. doi:10.1111/j.1467-7687.2007.00612.x

Woolley, J. D., Ma, L., & Lopez-Mobilia, G. (2011). Development of the use of conversational cues to assess reality status. *Journal of Cognition and Development, 12,* 537–555. doi:10.1080/15248372.2011.554929

Woolley, J. D., & Van Reet, J. (2006). Effects of context on judgments of the reality status of novel entities. *Child Development, 77,* 1778–1793. doi:10.1111/j.1467-8624.2006.00973.x

Youngblade, L. M., & Dunn, J. (1995). Individual differences in young children's pretend play with mother and sibling: Links to relationships and understanding of other people's feelings and beliefs. *Child Development, 66,* 1472–1492. doi:10.2307/1131658

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