

# Pretend Play as Twin Earth: A Social-Cognitive Analysis

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Pretend play appears to be important to a theory of mind, but exactly how or why has been controversial. One widely entertained hypothesis about why pretense is important to understanding minds is termed the Metarepresentational Model. According to this model, children knowingly consider and manipulate mental representations during pretense. Children appreciate these mental representations as such and later come to apply their understanding of mental representation outside of pretense domains. This article reviews evidence relevant to the metarepresentational model, and it is concluded that the evidence does not support it. Alternative models of the relationship between pretense and theory of mind are reviewed, culminating in a proposed developmental model of the relation. The Twin Earth model proposes specific relations between pretend play and understanding minds, from the ontogenesis of pretense to the later emergence of role play and mental representational understandings of pretense. Central to the proposal is the supposition that pretend play functions for children in much the way that Twin Earth functions for philosophers—by allowing for participation in and reasoning about nonactual situations.

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Pretend play has long been suspected of being important to theory of mind (Astington, Harris, & Olson, 1988), and several correlational studies support that the two domains are related (Astington & Jenkins, 1995; Dunn & Cutting, 1999; Hughes & Dunn, 1997; Lalonde & Chandler, 1995; Lillard, 2001a; Schwebel, Rosen, & Singer, 1999; Taylor & Carlson, 1997; Watson, 1999, April; Youngblade & Dunn, 1995). This article aims to elucidate the nature of that relationship, first by considering evidence relevant to the metarepresentational model of pretend play. It is concluded that the evidence is not supportive of that model, and instead an alternative, Twin Earth, model is proposed. This model emphasizes that pretend play functions for children much as Twin Earth functions for philosophers: as a slightly varied alternative universe that supports heightened levels of reasoning. Prior to examining

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the models, a brief review of theory of mind and a definition of pretend play are provided.

Theory of mind refers to our tendency to construe other people and their behaviors in terms of mind-related constructs, like desires, personality traits, and intentions (Premack & Woodruff, 1978; Wellman, 1990). Perhaps the most important aspect of a theory of mind is the understanding that minds represent the world. People act based on their personal construal of a situation, regardless of what the situation actually is.

A classic measure of understanding mental representation is the false belief task (Flavell, 1988; Gopnik & Meltzoff, 1997; Perner, 1991; Wellman, 1990). In the original task (Wimmer & Perner, 1983), a boy puts his chocolate in a drawer and then goes out to play. While he is out, his mother moves the chocolate to a cupboard. Concerning the boy's return, the participant is asked, "Where will the boy look for his chocolate: where he left it, or where his mother has put it?" If one appreciates that mental states (like beliefs about the chocolate's location) drive behavior, and that perception can determine belief (he was out and so did not see the chocolate being moved), one would predict a doomed search, in the drawer. Children older than 4 or 5 years of age, from a variety of cultures and social backgrounds, tend to predict this, but younger children do not (Avis & Harris, 1991; Holmes, Black, & Miller, 1996; Wellman, Cross, & Watson, 2001). Many theorists believe that older children pass this task because they appreciate that minds represent the world and can do so in a variety of ways. This same sort of insight seems to be implicated in pretend play because in pretending one might well realize that one has represented some piece of the world one way (say, as a pie) when in fact it is another (say, mud) (Flavell, 1988; Ferguson & Gopnik, 1988).

Pretend play is the "voluntary transformation of the here and now, the you and me, and the this or that, along with any potential action that these components of a situation might have" (Garvey, 1990, p. 82). Every pretend act involves certain features, several of which are defining and necessary (Lillard, 1993a, 1998b). The first defining feature is that there must be a pretender, who is an animate being. Second, there must be some reality that is pretended about. Third, pretense is guided by a mental representation. For present purposes, mental representation can be simply glossed as an idea. In pretense, this idea is usually different from the reality (for discussion, see Leslie, 1987; Lillard, 1993a).

For example, if a child (the pretender) is pretending a box (the reality) is a boat, the child must be mentally representing a boat. To simply row the box around without representing it as a boat is not "pretending the box is a boat"; it is simply acting like the box is a boat. One might do this if one were mistaken about boxes and their actual role in the world; one might also do this if one were demonstrating rowing. But such acts would not be boat pretenses unless a certain mental stance was taken. To say pretense is oc-

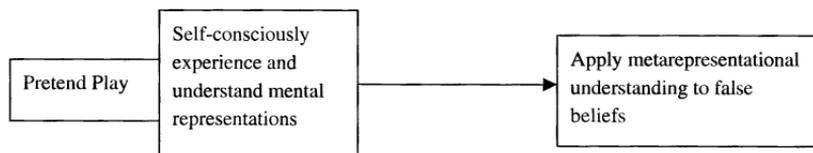
curing, a mental representation of an alternative situation (boat) must be involved. Hence mental representation is necessary to pretending.

A fourth defining feature of pretense concerns what is done with the mental representation: it must be projected onto the reality. In pretense, one must think of one situation as another (Walton, 1990). This is the important difference between an act of imagining and an act of pretending. If one is simply imagining a boat, projection is not necessarily occurring. In pretense one imaginatively projects a particular box onto a particular boat.

The fifth defining feature of pretense is awareness (Anscombe, 1981; Leslie, 1987). A pretender must be aware of the actual situation and the nonactual, represented one or else one is mistaken, not pretending. Sixth, one must project the representation intentionally. To do so without intention is not pretense. Austin's (1979, p. 260) definition of pretending (from the Latin root), as holding one thing in front of another in order to protect or conceal or disguise it, captures this feature, and Searle (1975) has noted it as well: "One cannot truly be said to have pretended to do something unless one intended to pretend to do it" (p. 325). One projects the boat representation with the intention of pretending the box is a boat. In contrast, when a psychotherapy patient projects his mother onto the therapist, he may be aware he is doing so but not be doing so intentionally. Such an act is not a pretense (Lillard, 1993a). In sum, pretense involves a pretender, a reality, a mental representation, the intentional projection of that mental representation onto the reality, and the pretender's awareness.

A characteristic but not omnipresent feature of pretense is external manifestation, like action or costume. Although pretending almost seems to require action, one need not act continuously or even necessarily at all (Nichols & Stich, 2000). Pretending is foremost in projecting a mental representation onto the here and now, with knowledge, attitude, and intention. For example, a pretender might leave a pretend boat at the pretend shore while pretending to sleep. While pretend-sleeping, with the box 20 feet away, the pretender is not acting on the boat. Yet should someone else try to take the box away, the pretender might well get upset, claiming "That's my boat!" Despite the absence of action directed at the boat while pretend-sleeping, the pretender was still pretending it was a boat. And were the pretender to act on the box she would normally do so as if it were a boat. In sum, although action generally accompanies pretense, action is optional. Pretend's nonoptional, defining features are its mentalistic ones: an animate pretender who intentionally, with full awareness, projects a mental representation onto some aspect of reality.

The remainder of this article is concerned with explaining the relationship between pretend play and theory of mind. First, a much-touted model termed the Metarepresentational Model of Pretense is explored (see Fig. 1). In this model, pretend play gives children experience with mental representations which they understand as such in a pretend context and can later apply to



**FIG. 1.** The metarepresentational model of pretend theory of mind relations.

nonpretense domains. The relationship between pretending and theory of mind is therefore direct, stemming from a conceptual understanding about minds that arises within pretense. Although some possible support for this model is found, it is concluded that this support is limited to particular contexts, so that it does not explain the theory of mind–pretend play relationship. A second model is then proposed, termed the Twin Earth model. In this model, different factors contribute to the pretense–theory of mind relationship during different stages of development.

### THE METAREPRESENTATION MODEL OF PRETENSE–THEORY OF MIND RELATIONS

Pretending, by definition, involves having and projecting a mental representation onto a reality. At some level it also involves awareness that this is what one is doing: If one is not aware of the distinction between the represented (pretense) and the real, then one is not pretending. At issue is the level of that awareness. Some have claimed that young children are explicitly aware of the fact that pretending involves thoughts that diverge from reality. Further, some have claimed that pretending might assist children in understanding mental representation generally because in pretense children gain practice at manipulating mental representations that differ from reality—eating mud pies, for example (Aronson & Golomb, 1999; Flavell, 1988; Ferguson & Gopnik, 1988; Hickling, Wellman, & Gottfried, 1997; Moses & Chandler, 1992; Taylor & Carlson, 1997). If this is correct, then children who are pretending must self-consciously realize that the pretend situation is represented. In other words, they must think of pretending as a mental activity, driven by how one mentally represents the situation. This metarepresentational model is often attributed to Leslie (1987) (e.g., Aronson & Golomb, 1999; Bruell & Woolley, 1998; Currie, 1998; Hickling et al., 1997; Wellman, in press; Whiten & Byrne, 1991), probably due to his early use of the term metarepresentation. Although Pylyshyn (1978) used the term to denote a representation of a representation that was held consciously, as did Perner (1991) and others, Leslie (1987) had used the term to denote simply a representation of a representation, also called a secondary representation. Leslie did not specify whether this representation was understood consciously or not, although in recent writings he has strongly disavowed any

claim that the representations are understood as such (Leslie & German, 2001; Leslie & Roth, 1993). Further, he has retracted use of the term metarepresentation and replaced it with M-representation (Leslie & Roth, 1993). His early usage allowed for some confusion regarding his position (see also Lillard, 1993) and Leslie is frequently cited as advocating that children understand mental representation within pretense.

As mentioned above, there is now abundant evidence suggesting some link, perhaps a metarepresentational one, between understanding of the mind and engaging in pretense (Astington & Jenkins, 1995; Dunn & Cutting, 1999; Hughes & Dunn, 1997; Lalonde & Chandler, 1995; Lillard, 2001a; Schwebel et al., 1999; Taylor & Carlson, 1997; Watson, 1999; Youngblade & Dunn, 1995). In brief, these studies all show that some measures of pretend play are correlated with measures, like false belief and appearance-reality, that assess understanding of representation. According to the metarepresentational model of pretense, these associations are due to the fact that children who engage in more pretense gain more practice at manipulating mental representations of the world and can apply their consequent understanding of mental representation outside of pretense domains.

If the metarepresentational account is correct, then early understanding of pretense is a representational one. However, several theorists have found the metarepresentational model unsatisfactory (Currie, 1998; Jarrod, Carruthers, Smith, & Boucher, 1994; Lillard, 1993a; Nichols & Stich, 2000) and empirical tests of the model also raise questions about its veracity. Below I review these tests, confining discussion mainly to published studies for the sake of brevity. I begin with the initial, and currently still the hardest, test of this understanding: the Moe task (Lillard, 1993b). In this task, a protagonist's behavioral resemblance and mental representational state are seemingly at odds, and children are asked in effect whether pretending requires mental representation. Next are considered tasks in which action is not at odds with mental state, and finally, what are termed "underspecified" tests are examined.

### Tests Involving Contradictory Action

The metarepresentational claim holds that when children pretend, and/or watch others pretend, they understand the pretenders to be mentally representing the pretense situation. To test this, Lillard (1993b) presented children with a character who could not mentally represent something, but who was behaving as that something typically behaves. This test pits two possible conceptualizations of pretense. One is pretense as it is defined—a mental representational state. The other is pretense as action—a characteristic, but not defining feature of pretense. If pretending is merely "acting as if" to children, they should say that a character is pretending even if it does not know anything about the entity it is acting like. If children understand that

mental representation is crucial to pretense, they should acknowledge “the impossibility of pretending to be a bear if one does not know what a bear is” (Shorter, 1952/1964, p. 162).

In one procedure, a troll (Moe) was described as never having seen a kangaroo and not even knowing that kangaroos hop, but as, nonetheless, hopping like a kangaroo (Lillard, 1993b, Experiment 3). After children confirmed their acceptance of these premises by correctly answering control questions (“Does he know that kangaroos hop? Is he hopping like a kangaroo?”), they were asked if Moe was pretending to be a kangaroo. Notice the precise balance between information associating the protagonist with kangaroos and information denying such an association (he is acting like, he does not know about) in the premises and the control questions, insuring that low-level association strategies would not bias the results. Children were given four such tasks. Over many such experiments and across several laboratories, using the basic paradigm, 4-year-olds’ performance has averaged 26% correct (over 23 experiments) and 5-year-olds’ (over 11 experiments) 46% (Aronson & Golomb, 1999; German & Leslie, 2001; Joseph, 1998; Lillard, 1993b, 1996, 1998c, 2001a; Lillard & Joffre, 1999; Mannering, 1999; Mitchell, 2000; Richert & Lillard, 2001; Ruther & O’Reilly, 1995; Sobel & Lillard, 2001a). Children under 4 years of age have usually not been tested because the Moe paradigm relies on children having a reasonable understanding of the implications of knowledge for action, which other experiments suggest is reliable by age 4 years (Wellman, 1990).

Importantly, children’s responses tend to be consistent across trials, so a given child is likely to get all four tasks correct or incorrect. Although for some experiments and for 5-year-olds, overall findings are close to chance (50%); individual children rarely respond haphazardly. Further, good test–retest reliability ( $r = .88$ ) has been obtained over a 3-week period on the Moe test (Lillard, 2001a). Such consistent within-subject results suggest that some young children (roughly 25% at 4) truly understand that pretense *requires* appropriate thoughts and knowledge, whereas others (roughly 75% at 4) think that acting like something is a more important indicator of pretense. At each age level from 4 to 8 years, the percentage of children who pass the Moe task increases by about 15% (Richert & Lillard, 2001).

One might wonder whether children who fail the Moe tasks could simply be subnormal on a variety of tasks. To address this, children in the Moe studies have often been given a standard false belief task. In every case they have passed such tasks at a level normal for their age group (as suggested by Wellman et al., 2001), indicating that they understood mental representation in belief contexts even before they had such understandings in pretense contexts (but see German & Leslie, 2001; Lillard & Flavell, 1992). This is very surprising in light of the fact that people have expected that understanding pretense representations precedes and perhaps even assists understanding belief representations. At the very least, people have expected that once chil-

dren understand mental representation in any context, they can apply that understanding across the board, hence should pass both sorts of tests at about the same time (Perner, Baker, & Hutton, 1994).

Some have questioned whether the Moe result is a semantic issue, stemming from a mistaken definition of the word “pretend,” but experiments suggest the word is not at issue (Sobel & Lillard, 2001b). Another concern has been that the the Moe result might be limited to trolls, but it has been replicated with humanlike dolls (Lillard, 1993b, Experiment 4) and people in a videotape (Sobel & Lillard, 2001b). The result has also held when the mental state information has involved thinking about a kangaroo (Lillard, 1993b, Experiment 4), thinking one was hopping like a kangaroo, thinking about being a kangaroo, and even trying to be like a kangaroo (Lillard, 1998c). The “trying” finding is interesting since it gets at another crucial (but not necessarily representational) mental component of pretense: that pretenders must be intentionally engaged in pretense. Outside of pretense domains, children seem to understand intentions and desires earlier than beliefs (Bartsch & Wellman, 1995).

Two variations obtain significantly higher levels of performance, possibly by emphasizing intention. For example, children have performed better on self than other (Mitchell, 1999). This contrasts with false belief task performance, for which no self–other decalage is reliably seen (Gopnik, 1993; Wellman et al., 2001). In Mitchell’s study, each child was asked to reach out for a set of keys on a table, and the experimenter commented that the child had looked like a cat when reaching. The experimenter then asked the child if she had been pretending to be a cat, and on 63% of trials children claimed they had not been. An analogous case was presented with another person reaching for the keys, and, in contrast to the “self” result and consistent with the Moe studies, on only 32% of trials did 4-year-olds correctly claim the other person was not pretending. One explanation for the better performance for self could be that children have access to their own intentions and are able to override the similarity of action when intention information is salient. Such intentional information may be useful in pretense situations, but not in false belief ones. If this is the case, then the Mitchell experiment addresses understanding pretense with regard to own intention, but not with regard to own mental representation. This does not address the metarepresentational claim.

Fantasy contexts have reliably improved performance. For example, about 60% of 4-year-olds have passed the Moe task when the content of the pretense was a fantasy entity, the Lion King, instead of a mere cat (Lillard & Sobel, 1999; Sobel & Lillard, 2001a). This may be because the products of such pretenses are themselves intentionally imagined; Woolley (1995b) has shown that some mental aspects of imagining are understood earlier than are like aspects of belief. Perhaps a percentage of children realize that to do anything with regard to an imaginary figure, one must intentionally use one’s

mind to imagine that figure. Consistent with this possibility, children whose pretense more often involves fantasy themes are more likely to pass the basic Moe task than are children whose pretense involves reality themes (Manning, 1999). Another possibility for why fantasy contexts assist children concerns a general effect of fantasy improving logical reasoning (Dias & Harris, 1988; Hawkins, Pea, Glick, & Scribner, 1984; Kuczaj, 1981). Perhaps it is also via enhancing logical reasoning that fantasy contexts assist children on the Moe task.

### *Concerns with the Moe Procedure*

Despite the reliability of the findings over multiple experiments, it has been argued that the Moe procedure might not adequately tap children's knowledge about pretense (e.g., Aronson & Golomb, 1999; Hickling et al., 1997; Joseph, 1998; Rosen, Schwebel, & Singer, 1997; Woolley, 1995a). Three concerns in particular are that there is no logical alternative explanation for Moe's action, that Moe's behavior is more salient than is his mental state, and that Moe's action contradicts his mental state.

*No logical alternative.* Some have argued that the Moe task yields many false negative responses, because it offers children no logical alternative explanation for Moe's contradictory behavior (Aronson & Golomb, 1999; Davis, Woolley, & Bruell; German & Leslie, 2001; Gerow, Taylor, & Moses, 1999; Joseph, 1998). Lacking a logical alternative, children rewrite the character's intentions, deciding he *must* be hopping like a kangaroo because he wants to pretend to be a kangaroo. People do appear to "make sense" of the input for coherence (Bransford, Barclay, & Franks, 1972; Nelson, Plesa, & Henseler, 1998). Although in the basic Moe task children tended to answer the control question, "Is he trying to be like a kangaroo?" correctly, this might be because they parrot the experimenter's premises without really believing them.

In order to examine if this might be the case, in one study 4-year-olds were presented with an alternative, logical reason for Moe's behavior. Specifically, on half the trials, 4-year-olds were told that Moe was performing his action (hopping) for a specific reason, for example, because the pavement was hot and he did not want to burn his feet (Lillard, in press; Richert & Lillard, 2001). The usual script followed: he does not know that rabbits hop or anything about rabbits, but he does look like one because rabbits do hop like that. Children were asked why Moe was hopping (hot pavement, did not want to burn his feet), whether he was hopping like a rabbit (yes), whether he knew rabbits hopped like that (no), and whether he was pretending to be a rabbit. Although 4-year-olds usually gave the correct reason for Moe's behavior (hot pavement, not burning feet), they still claimed that he was pretending to be a rabbit on 87% of trials. Hence even when provided with a logical alternative explanation for Moe's behavior, most 4-year-olds persisted in claiming that by hopping like a rabbit, he was pretending to be a rabbit. A focused test of the no-logical-alternative criticism thus does not

provide supportive evidence for the criticism that children rewrite the character's intention to create a sensible reason for Moe's action.

*Salient action.* A second concern is that Moe's action is salient enough to swamp the information given about his mental state (Bruell & Woolley, 1998; Currie, 1996; Custer, 1996; Davis et al., in press; Gerow et al., 1999; Hickling et al., 1997; Joseph, 1998). By this account, although children know mental representation matters to pretense, this knowledge is overwhelmed by the salience of Moe's action, so children align their pretense responses with action. Normally pretense acts are visible, but pretense mental states are not, mitigating against this concern regarding the metarepresentational hypothesis for everyday pretense. Yet it would be interesting to see if manipulating salience changes the level of performance. Salience can be equalized in two ways: by increasing the salience of the mental state information and by decreasing the salience of the action.

One paradigm has increased the salience of Moe's mental state by using a picture of Moe attached to two "bubbles": a thought bubble and an action bubble (Lillard, 1998c, Experiments 3–5). The action bubble ensured that mental state information did not become even more salient than action. For example, Moe was described as thinking about a bird, yet acting like a bat. Pictures of a bird and a bat were placed in the appropriate bubbles, and Moe was shown to be flying—a behavior consistent with birds and bats. Even with the salience of the mental state increased by the thought bubble, performance was essentially the same as in the basic Moe paradigm: most 4-year-olds claimed Moe was pretending to be the animal in the "acting like" bubble on all or almost all trials. A study by Davis et al. (in press) was similar, but emphasized that the Moe character was acting like both the bird and bat equivalents and failed to connect Moe to the bat, making the association to birds stronger. Under these conditions, children tended to answer correctly.

The second way to address the salience concern is to reduce the salience of action and see if performance is better. Salience of action can be reduced both by removing it altogether and also by using items for which an action-based rendering is less or more obvious (for example, pretending to be a rock versus a kangaroo). Using the latter strategy, Sobel and Lillard (2001a) found that salience of action makes no difference. Using the former strategy, Lillard (1993, Exp. 4) found that merely describing action, not showing it, yielded no change in level of performance. Davis et al. (in press) also employed this strategy, but their study is problematic for the reason just stated. Adjusting salience of the mental state and action, while keeping associations balanced, has thus not appeared to change levels of performance on the Moe task.

### Tests Involving Consistent Actions

The third concern sometimes raised regarding the Moe procedure is that the pretense action contradicting the mental state is an unusual situation and may not provide a good test (Aronson & Golomb, 1999; Bruell & Woolley,

1998; Hickling et al., 1997; Joseph, 1998; Rosen et al., 1997).<sup>1</sup> Just as children seem to understand true beliefs before false ones, they may well understand cases in which pretense and mental state correspond before they understand cases in which they differ.

Eight studies published to date address this by involving pretense actions that are consistent with the protagonist's mental state. In what was perhaps the earliest study aimed at whether young children understanding pretense representations, Flavell and his colleagues compared children's understanding of the pretense–reality distinction with their understanding of the appearance–reality one (Flavell, Flavell, & Green, 1987). Children were shown an apple-candle out of which a confederate pretended to take bites (Flavell et al., 1987). In the pretense condition, the experimenter asked, "Is she pretending that thing is a candle or pretending it's an apple?" In the appearance condition, she asked, "Right now, does that thing look like an apple or look like a candle?" Children performed significantly better on the pretense question than on the appearance question, leading the authors to suggest that pretense is an area of early competence for understanding mental representation.

However, the pretense paradigm might have enabled children to pass without considering mental representations (Lillard, 1993a). If children define pretending as "acting as if," then the question, "Is she pretending that thing is a candle or pretending it's an apple?" is about her action: What is she acting like? The experimenter was engaging in "pretend-to-eat-an-apple" actions, so children should answer correctly simply by reading her false behavior. This suggestion has recently been empirically supported (Sodian, Huelsken, Ebner, & Thoermer, 1998), casting doubt on the validity of the method for testing the metarepresentational hypothesis.

The Flavell et al. findings do support the claim that young children know pretense equals "not real." Logic also supports this claim as otherwise children would become confused by pretense (Leslie, 1987; Lillard, 1994; Woolley, 1997). An important question is whether this understanding of pretense as not-real must also in some way be an understanding that pretense is mental. Perner and his colleagues have suggested that it is and that any relation to a nonexistent state of affairs must be understood to be mental (Perner et al., 1994), but Harris (1991) instead suggests that children can understand such situations as existing "elsewhere," much as a play or other fictional story does, without specifically locating it in the mind.

Another test of the metarepresentational claim using consistent actions can also be interpreted as showing only that children know pretense is not real. Perner et al. (1994) showed a character putting a carrot into an empty

<sup>1</sup> Aronson and Golomb (1999) argue that this sort of case would not arise in real life, but consider that a person can eat like a pig without necessarily knowing what a pig is, or talk just like Lauren Bacall without having heard her.

cage under two conditions. In one case, she had seen a rabbit inside, and in the other she knew there was not a rabbit inside. The test question concerned whether she really thought there was a rabbit inside or was just pretending. Three-year-olds claimed the doll was just pretending in both cases, whereas 4-year-olds correctly discriminated pretense and false belief. Perner interpreted this result as children coming to understand pretense and false belief representations simultaneously at age 4.

However, there is an alternative explanation, consistent with other findings. If 3-year-olds consider all false actions to be pretense, then it makes sense that 3-year-olds called both cases of putting the carrot into the empty cage "pretend." Once children come to understand false belief (around age 4), they would begin to discriminate the case of feeding the carrot into the cage when one does not know it is empty as being a case of false belief and would continue to call the other false action case "pretend." Thus Perner et al.'s study appears inconclusive as to children's understanding of the mental representational component of pretense.

Custer (1996) also removed the contradictory action component to examine children's understanding of pretense representations, and again the study can be interpreted as showing only that children see all false actions as pretense. She showed children drawings of people engaged in actions (like fishing, but catching a boot instead of a fish). In the pretense condition, the people were described as pretending (say, to fish). Children were then shown two additional pictures and asked to choose which "thought picture" showed what the person had in his mind: one showing him catching a fish or one depicting the real situation. Even 3-year-olds usually chose the fish picture for pretense. Other studies have shown that preschoolers know that thought bubbles refer to thoughts (Flavell, Green, & Flavell, 1995; Wellman, Hollander, & Schult, 1996) and by choosing the correct thought picture, children have may have been revealing a fledgling understanding that thoughts undergird pretense. On the other hand, as with the two studies just described, the results can also be explained by as showing that children know pretense is different from reality (Bertenthal, personal communication, April, 1998). Such an understanding alone would lead children to choose the not-real picture to illustrate pretense.

In sum, results from three studies can be explained by the notion that 3-year-olds understand all actions that do not correspond with the way the world actually is to be pretense. This understanding in itself might provide an important frame into which mental understandings of pretense can be placed. Surely one of the most important aspects of mind to understand is that, although minds reflect reality, they are different from it. The studies might also show a nascent understanding of mental representations underlying pretense, but a pretense-is-not-real understanding is sufficient to explain the results.

Other studies in which the contradictory action element is not present, and

children performed better, cannot be explained by the lower level understanding that pretense is not real. Aronson and Golomb (1999) introduced children to Zolar, who knew about jumping beans but not about people and animals. Several control questions focused in on jumping beans and the fact that they existed on Zolar's planet, Zoom. Zolar hopped, and children were asked if he was pretending to be a jumping bean, a child jumping rope (person), or a grasshopper (animal). Across two experiments, 56 and 63% of 4-year-olds said Zolar was pretending to be a jumping bean, and 38 and 31% said a grasshopper; very few children ever chose "child jumping rope" (perhaps due to lack of action similarity—in a preexperiment control task "jumping rope" was the least favored option).

The strength of the Aronson and Golomb method is its attempt to give children a positive alternative: Zolar knows about something that hops. However, is it conceivable that children's preference for the jumping bean response was due to prior questions in the trial. (Recent experiments by Davis et al., in press, and German and Leslie, 2001, also fail to balance control questions.) In Aronson and Golomb experiments, two questions pertaining to jumping beans were asked prior to the test question, and these both required positive answers ("Do you know about jumping beans?" and "Do they have jumping beans on Zoom?"). These references alone might have highlighted jumping beans for children, leading to the slight but significant preference for that answer (given that with this method, if one understands pretense as action, there is no compelling reason to prefer jumping beans to grasshoppers). In such cases, children's justifications become particularly important: Were correct answers justified by reference to Zolar's knowledge or to his action? Against the pretense-as-mental representation hypothesis, most children justified their answers by mentioning the similarity of Zolar's external actions to the jumping bean, and very few (25% in one experiment and 0 in the other) referred to his knowledge state. If most children really understood that Zolar was pretending to be a jumping bean because he had knowledge only of jumping beans then they should have used that fact as justification, as did children who passed the basic Moe task in Lillard (1993b). Hence, although contradictory action was removed and performance improved, children's failure to justify correct responses in the Aronson and Golomb study make uncertain whether results indicate true understanding on the part of roughly 60% of 4-year-olds.

Two further experiments do appear to show earlier understanding under particular circumstances. Hickling et al. (1997) introduced children to a puppet who was pretending there was chocolate milk in a glass. The puppet left, and, at the experimenter's suggestion, the child and the experimenter pretended that the glass was empty. The puppet returned, and children were asked what the puppet thought was in the glass: Did he think it contained chocolate milk, or did he think it was empty? Even 3-year-olds performed quite well, with 78% saying the puppet thought the glass contained chocolate

milk, although children might answer correctly by choosing the not-real answer. Their second experiment remedied this, by using a sequence of two not-real pretenses: first the puppet pretended chocolate milk, and then the child pretended something else, like orange juice. Children performed equally well.

Hickling et al. incorporated two elements that are known also to assist children in false belief tasks: there was no real content with which to contrast the chocolate milk, and the child was personally involved in the pretense task (Wellman et al., 2001). These adjustments are both strengths and weaknesses. On the one hand, with the adjustments children reveal an early appreciation of pretense thoughts. On the other, the control false belief task was not also made easier, so one cannot tell the degree to which the adjustments or pretense were the cause of precocious understanding about thoughts. The second experiment remedied one confounding variable by using a “trick” false belief task that involved the child, but lack of real content remained confounded with the pretense and not the false belief condition. The authors argued that the empty glass provided a salient reality, but it may be that empty “realities” are themselves easier to put aside in acknowledging representations. Still, the authors’ conclusion that the “studies show that by age 3 years, children recognize the subjective, mental qualities that pretence holds in common with other mental states, such as thoughts and beliefs” (p. 351) seems apt. The differences between the false belief and pretense conditions make it difficult to conclude that such understandings arrive earlier for pretense than for belief, but the study does suggest that when action does not contradict mental state, children can acknowledge pretense thoughts at age 3.

Bruell and Woolley (1998) support this interpretation. They showed children a video of two people riding a table. One person had a thought bubble containing a horse superimposed above her head; the other person had a thought bubble containing a car. Children were asked what each of the two people was pretending. On roughly 70% of trials, 3-year-olds referred to the content in each actor’s thought bubble as indicating what each person was pretending. As with the Hickling et al. study, then, correct thoughts were attributed to pretenders when thoughts were asked about and forced choices were provided.

It is instructive to compare this method to the Moe pictureboard described earlier. In the earlier study, Moe was said to be thinking about a bird, but acting like a bat, while flying around. Both alternatives were displayed in connected “bubbles.” In the Bruell and Woolley study, two people were shown to be acting in the same manner, and each was connected to his/her own bubble. In both studies, actions were consistent with both “bubble” alternatives. The fact that children did much better in the Bruell and Woolley study, in preferring own bubble choices to other’s bubble choices, could be revealing an early appreciation that, all things being equal with regard to

action resemblance, thought is important to pretense. All things were not quite equal in the Lillard study, since the actions were *described* as being more like one animal than the other. A lower level interpretation of Bruell and Woolley is also possible: Children were attributing what was in the thought bubble because that is what the actors were connected to (see also Davis et al., in press). Only the Lillard study controlled for this connection factor by using a second, connected “bubble.” Yet even on a low-level “connection” interpretation, because different pretenses are attributed to each character, the study, like that of Hickling et al., certainly demonstrates that 3-year-olds understand pretense as subjective, as something that can differ from one person to the next. Further, at least when pretense thoughts are specified or asked about, children do seem to appreciate that the content of thought during pretense is important to pretense content—except when action contradicts it.

In sum, studies involving consistent action removed an important difficulty in the Moe task: an action that contradicts the mental state. Only contradictory action tasks pit a mental representational understanding against an acting-as-if one. Some have argued that even though they fail these contradictory tasks, young children still might appreciate that pretending involves thoughts. Yet many of the tasks designed to test that possibility have alternative explanations, like that children understand pretense is not real or that all things being equal children select their answers by virtue of stronger associations set up in the experiment premises. The last two experiments, just discussed, however, do suggest that at the very least, young children can appreciate that pretense is subjective.

### Underspecified Methods

The final section reviews underspecified methods. Studies addressing the metarepresentational pretense hypothesis generally concern three factors: a mental state, an action, and a pretense. The studies described up to here always presented an action, and most also presented information about either the character’s mental states or their pretense and then asked about the other of these two factors. In this sense the scenarios are fully specified. The benefit of specifying all these factors is tightly controlled scenarios; the downside is that real-life contexts rarely specify all these aspects, hence the results may not be applicable to natural situations.

A few studies have been conducted that specify less about the situation and still address children’s conceptualization of pretense. One important question addressed in these studies is whether children spontaneously assume that pretenders are thinking; studies up to now have simply asked children what was being thought about, making it a given that the person was thinking. Whether children spontaneously attribute thoughts to pretenders is of obvious import to the metarepresentational hypothesis.

Three methods have addressed this. With one method, children were

shown, for example, a spinning top, and the experimenter commented either that she thought it looked like a ballerina or that she was pretending it was a ballerina (Lillard, Zeljo, Curenton, & Kaugars, 2000). They were then asked, "What about the top? Does it think?" (for the first case) or "Does it pretend?" (for the second). Children 3 and 4 years old were very likely to claim that the spinning top pretends, but rarely claimed it could think. Because children claimed that entities that can pretend cannot think, this experiment seems to suggest that for young children, pretending does not depend on thinking. This seems to go against the metarepresentational model.

Lillard (1996) also examined children's understanding that pretense depends on thought. Preschoolers were asked whether pretending involves the mind and brain, which children of these ages view primarily as agents of thought (Johnson & Wellman, 1982). In contrast, children of these ages think that brains are not required for physical actions (like hopping, clapping, or brushing one's teeth). By asking if pretending requires a brain, one gets at whether pretending, for children, is in this sense categorized with physical activities or with cognitive ones. In a first experiment, children were asked whether one needs a brain to pretend, to think, to imagine, to dream, to hop up and down, and so on (Lillard, 1996, Experiment 1). Whereas the other cognitive activities were claimed to require a brain on 75–88% of trials, and physical activities were claimed to require one on just 5–15% of trials, pretense was of intermediate difficulty: About 40% of preschoolers claimed that pretense required a brain.

Because the "brain" question was only asked once, the 40% passing rate could not be distinguished from chance. In further experiments, children were asked to place cards in boxes (Lillard, 1996). One box was for processes that would require a body, but that one did not need a mind for; a second box was for processes that required a mind, but that one did not need a body for; and a third box (used in some experiments) was for processes that absolutely required both. Following training on the purpose of the boxes, children were shown cards one by one. Each card had phrase written on it, like "get blown over by the wind," "think about your favorite story," or "pretend you are a kangaroo." Children were asked to place each card in the box it belonged in. To be included in the final sample, children had to demonstrate that they understood the boxes by putting the vast majority of control items (ones that children of these ages generally think require a brain or not) in the correct boxes.

What was of interest was whether children would opt to place pretense acts in the mind or both box or would opt for the body box. The results, accumulated over several experiments to date, reveal a consistent tendency for young children to place all or almost all pretense items in the body box. Over 11 experiments involving the box tasks with 4-year-olds, performance averaged 55% body box and 45% mind and both boxes (Lillard, 1996; 2001a, in press; Lillard & Sobel, 1999; Sobel & Lillard, 2001b). This does not reflect

chance performance: almost every child placed most (for example, at least eight of nine) or all pretend cards consistently in the same type of box. In sum, then, when action is unspecified, and the method simply asks if pretense requires a mind or brain, most children under 5 years of age appear to think it does not.

All the stimuli used thus far are contrived, produced for an experimental test. Such stimuli have their pros and cons. The question arises as to what children do in more naturalistic situations. When children watch pretending, in the normal course of their lives, can children specify what the person is thinking? This was examined by Rosen, Schwebel, and Singer (1997), who tested 3- to 5-year-olds' understanding of five short episodes from the Barney television show. Two episodes showed real activities, and three showed pretend ones. For example, one pretend episode showed children acting out various roles as if they were in an airport and then pretending a bench was an airplane taking off. One real episode showed children singing while cleaning up. For each episode, children were asked whether the characters were pretending or doing something real (e.g., "Is everyone on Barney *really* cleaning up, or are they just *pretending* to clean up?"). Most 4- and all 5-year-olds were adept at identifying pretense. Next, for the segments concerning pretense, children were also told, "Now we're going to talk about what everyone on Barney is thinking about. Are they thinking about being on an airplane, or about sitting on a bench at their school?" Under these circumstances, 24% of 4-year-olds and 56% of 5-year-olds correctly inferred the thoughts of the pretender. Although children knew that pretense was occurring, many did not state the mental content associated with it. This suggests that when experimental paradigms do not provide a certain level of contextual support—for example, thought bubbles connected to characters such as in the Bruell and Woolley case or self-involvement and lack of real content as in the Hickling one—children of these ages are not likely to spontaneously arrive at pretender's thoughts (see also Flavell et al., 1995).

Using an entirely different approach to the issue of whether pretense is understood metarepresentationally, Hall and colleagues examined children's use of the word "pretend" in natural play contexts (Hall, Frank, & Ellison, 1995). These authors derived an interesting prediction from Leslie's (1987) theory. Leslie argued that the cognitive representation of pretend is matched by linguistic forms. Hall et al. argued that if this is the case, then the emergence of pretense itself, if it is metarepresentational, should be accompanied by matched linguistic forms. In other words, because the cognitive form (according to Leslie) is "Mother pretends that the banana is a telephone," children should often say things like, "I'm pretending that I'm a horse." If children instead tend to say simply, "I'm a horse," Hall et al. argued, then they do not have a metarepresentational concept of pretense.

Convergent with other studies on the use of the word "pretend" (Lloyd &

Goodwin, 1995), such statements were in fact rare among children at these ages. Further, when the word “pretend” was used, it was used to direct action rather than to comment on mental state. The authors concluded that the study supported the idea that for children of these ages, pretending is generally an activity more so than a mental state.

### Synthesis

Developmentalists often theorize as if a child were a stand-alone information processor. Theories of how children develop a theory of mind exemplify this (Gopnik, 1993; Harris, 1995; Leslie, 1994a). The child makes up theories, the child simulates, or the child’s brain processes information. The environment is often portrayed only as input to these processes. Yet cognition is often supported, or challenged, by context (Rogoff, 1990; Vygotsky, 1978; Werner & Kaplan, 1963), including experimental contexts. Levels of performance are changed by the ways and contexts in which questions are asked. The purpose of using a variety of tasks and altering certain elements, thereby adjusting contextual factors, is to allow more precise description of what an understanding is.

The studies just reviewed use a variety of contexts to address children’s understanding of the mental aspects of pretense, and synthesizing this evidence leads to an enriched picture of children’s understanding. By age 3, children certainly seem to understand that pretense is subjective and stands in contrast to reality or past pretense. Further, when particular forms of support are provided, and action is not contradictory, 3-year-olds can often choose the correct pretense content or thought of a pretender. In the Bruell and Woolley study, these particular supports were ones that children do not encounter outside experimental contexts: connected thought bubbles. Three-year-olds also did well in Hickling et al., with different forms of support: nonexistent content and self-involvement. These factors also assist 3-year-olds’ understanding of false belief. Unlike thought bubbles, self-involvement is a feature of preschooler’s pretense. Under such conditions, when action is not contradictory, and when asked specifically about thought content, children can name the correct content. However, as Rosen et al. (1998) found, children of these ages cannot spontaneously state that content when it was not discussed earlier in the experimental task.

The underspecified tests show other weaknesses as well. Children’s denying the capacity to think to entities that they claim do pretend suggests they do not see thinking as necessary to pretense. Many children also do not think that simply pretending to be a kangaroo requires a mind, nor that knowing something about kangaroos is required to pretend to be one. However, when faced with fantasy creatures, like the Lion King, there is some advancement in their understanding, perhaps due to the fact that the Lion King is itself an imagined creature. For the sorts of situations that younger children tend

to pretend about—tea parties, horses, airplanes, and so on, using substitute objects (Haight & Miller, 1993)—the studies suggest that most young children do not perceive pretense as involving mental representations.

This review of the evidence suggests that 3-year-olds' everyday, typical pretense does not involve thinking about pretense in a mentalistic fashion. An important issue is what might bring a child to have a metarepresentational understanding of pretense. As suggested by some research, children might access the correct concept by reflecting on intentions in pretense, which might lead to reflecting on mental representations. Or they might access it through improved reasoning when pretending about fantasy creatures. A third possibility is that sociodramatic play might create situations that would make the inadequacy of an acting-as-if construal apparent. This could occur when a player (even oneself) enacted pretense wrongly because she did not know the character she was trying to enact. In such circumstances, a child would come up against the fact that pretending is not merely doing things, but is doing things that stem from a representation of the pretense situation. Different children could come to that insight at quite different ages, perhaps depending on the frequency with which they engage in social pretend play and the type of play in which they engage. This prediction would explain why the understanding appears gradually in groups of from ages 4 to 8, and it is supported by Mannering (1999), who showed that children who pretend more about fantasy understand pretense earlier. In addition to fantasy possibly improving logical reasoning, children pretending about fantasy may be more likely to confront that they can only pretend about what they know about because fantasy may be more unique to certain children. For example, most children are likely to know a lot about pretend birthday parties, but fewer would know about pretending Ninja Turtles or Snoopy. When attempting to share such fantasies in social play, it might become obvious that one needs to know about the fantasy.

Three-year-olds' insights that pretense is mental appear only in highly supportive contexts that are not typical of their early pretense. This conclusion casts doubt on the metarepresentational explanation for correlations between pretense and theory of mind performance. The remainder of the article considers alternative models of the relationship.

## REEXAMINING PRETENSE—THEORY OF MIND RELATIONS

A major theory explaining the relations found in correlational studies between pretending and theory of mind has been that pretending involves meta-representation: When children pretend, and when they watch others pretend, they are aware that pretenders are mentally representing the pretend world. This understanding is then applied to belief contexts. The studies just reviewed suggest that this is not the case. There must be an alternative explanation for the relationship. Two other major theories about how children acquire a theory of mind give a prominent role to pretense: modularity and

simulation. These are considered next, and then aspects of each are incorporated into a developmental model of those relations.

### Modularity

Modularity theorists claim that mentalistic understandings arise from the computational architecture of the mind, which automatically infers mental states from human behavior (Fodor, 1983; Leslie, 2000; Scholl & Leslie, 1999). In Leslie's theory, submodules of the relevant cognitive architecture come on line in succession, as the child matures. By 6 months of age, infants have what Leslie terms ToBy, or a theory of body mechanism, that understands mechanical attributes of objects. Around 9 months, ToMM1, or Theory of Mind module 1, matures and infers goals from human behavior. ToMM module 2 develops around 18 months and infers specific attitudes to information, like pretending and belief (Leslie, 1994b). Young pretenders cannot pass the false belief task because the "selection processor" that allows appropriate selection of the *content* of a person's belief (Leslie & Thaiss, 1992) matures around 4 years of age.

Pretense is important in this account because its appearance around 18 months is evidence that the theory of mind module, the computational architecture to understand beliefs, is up and running. Support for the modular theory comes from the fact that individuals with autism generally do not engage in pretend play and do not pass false belief tasks at anywhere near the appropriate mental age of 4 years (Baron-Cohen, 1987). Even when most children with autism do pass such tasks (at a mental age of 9 years: Happe, 1994, 1995), they may do so via a less automatic, more reasoned approach than do nonautistic people (Grandin, 1995; Leslie & Roth, 1993).

In Leslie's account, early understanding of pretense is implicit, not explicit (Leslie & Roth, 1993). The studies just reviewed involve explicit understandings. In that sense, those studies do not bear on a modularity account. However, Leslie (2000) leaves a conundrum by failing to address how that implicit understanding ever becomes explicit. Clearly he thinks it does: "It is hard to see how perceptual evidence alone could ever force an adult, let alone a young child to invent the idea of unobservable mental states" (Leslie, 1987, p. 422). "Inventing ideas" suggests explicit understandings. Furthermore, it is clear that explicit understandings about the mind are of prime interest to those in the field. Most theory of mind tests given to individuals with autism (see Baron-Cohen, 2000, for a brief review), for example, concern explicit understandings, and the failure of individuals with autism at these explicit tasks is taken as important support for modularity (Leslie, 2000). The implication is that the implicit understanding, at some unspecified point, gives way to an explicit one. Leslie has not touched on the process by which a module that interprets behavior tacitly in internal state terms could give rise to an explicit understanding of those internal states.

There is an aspect of Leslie's theory that is very important to the model

presented later: that of decoupling. Leslie states that ToMM1 operates by temporarily removing representations from their usual referents, a conceptual move that is also needed to understand beliefs that differ from one's own. This issue is resumed below.

### Simulation

The other major account relating theory of mind and pretend play is simulation. Simulation is putting oneself in another's shoes, in effect pretending to be the other person. The theory posits that pretense is important to theory of mind in large part because in pretend role play, as well as in imaginary companion pretense, a child practices at being other people. Likewise, false belief understanding may stem from improved capacity to simulate another person's circumstances and thereby experience that person's psychology (Goldman, 1993; Gordon, 1995; Harris, 1991). By imagining oneself in another's situation, one experiences and thereby knows the other's thoughts and behavior. A younger child might not be able to fully undertake such an act of imagination and would miss, for example, that someone did not know everything that she herself knows. As the child gets older, she is better able to abandon the "default settings" of her own view of a situation and therefore is better able to understand others' false beliefs. There is no requirement in this account that the child understand anything about what she is doing when she pretends; she simply needs to do it. Hence theorizing, and explicitly understanding pretending's mental underpinnings, are unimportant. Further, on this account, solitary play (which often does not involve taking on roles) is less important to understanding minds, and sociodramatic role play is particularly important (Harris, 2000).

One fascinating recent research finding suggests a possible neural analog to simulation. When monkeys watch others engage in specific motor acts, the same parietal neurons fire as fire when the monkey itself engages in like acts (Fadiga, Fogassi, Gallese, & Rizzolatti, 2000). In effect, these neurons may form a physiological basis of theory of mind, as they appear to operate in a manner that is consistent with simulation theory (Gallese, 2000). Behavioral evidence is consistent with the possibility of such a system in humans: Woodward finds that at about the ages that infants begin to grasp and point to objects themselves, they begin to understand something akin to the psychological significance of those same actions in others (Woodward & Guajardo, 2001). Yet this does not seem to bear on pretense: children's responses to questions regarding what aspects of self—body or mind—are needed to pretend suggests that they are not generally privy to their own mental involvement during pretense. Pretense role play, on the other hand, may involve consideration of others' minds in a manner that supports the simulation account of why pretense and theory of mind are related.

The two models just presented include elements that are probably very important to theory of mind. Two elements in particular are the modularity

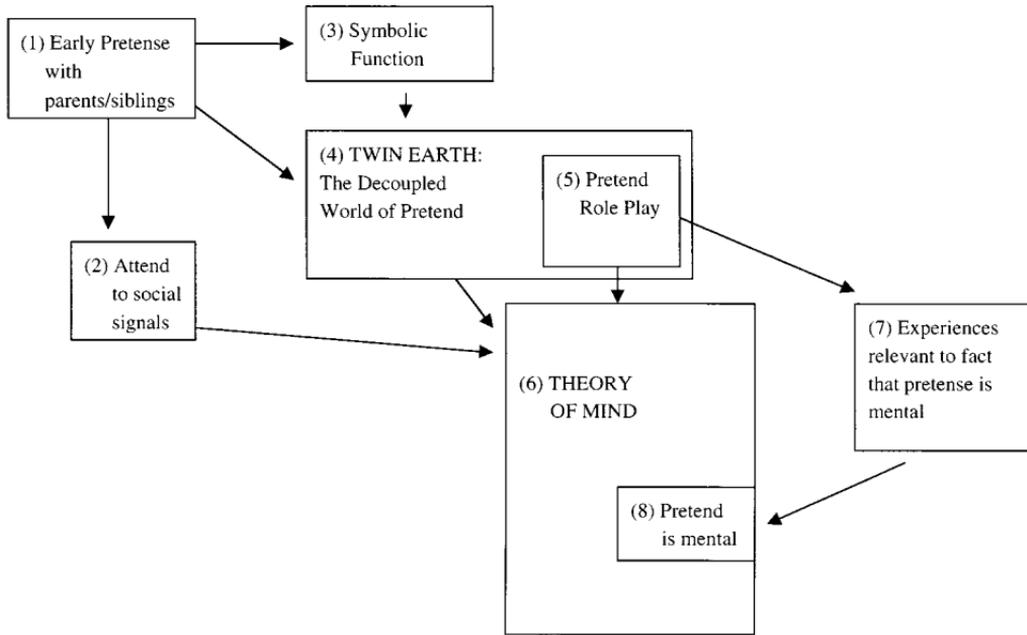


FIG. 2. The twin earth model of pretend theory of mind relations.

account’s focus on decoupling and the process of simulation for understanding minds. The present account draws on both these elements in attempt to provide a more contextualized developmental account of the relation between theory of mind and pretend play.

### The Twin Earth Model of Pretense–Theory of Mind Relations

Figure 2 presents a developmental and contextualized model of relations between theory of mind skills and pretend play from infancy to middle childhood. Central to the model (4) is the decoupled pretend world, termed Twin Earth on the basis of important similarities between pretend worlds and Twin Earth as invoked by philosophers (see below). Even prior to decoupling, to the left side of the model, are social factors involved in early pretense with parents: reading pretense intentions, social referencing, and joint attention (Lillard, Witherington, & Robinette, 2001). Above decoupling is the symbolic function, which has long been thought to assist in getting decoupled pretend worlds off the ground (Nicolich, 1977; Piaget, 1945/1962). Later in development, but overlapping with the decoupled world and theory of mind, is pretend role play. Simulation figures here. I first explain the analogy to Twin Earth and then discuss the model.

#### *Pretend Play as Twin Earth*

Twin Earth is an imaginary world invoked by philosophers to solve problems relevant to real Earth (Pessin & Goldberg, 1996). For present purposes,

it is useful only to know that Twin Earth is exactly like Earth except in a few parameters, specified by the problem one has set out to solve.<sup>2</sup>

In some important respects, pretend play for children is similar to Twin Earth for philosophers. When children pretend, they posit an imagined world that is in many ways just like the real world. Many identities, concepts, and relationships are essentially the same. But a few identities or parameters are specifically changed: the child becomes the mother, the sand becomes apple pie, and/or the doll is alive. Then, as part of the play, the child reasons about relationships in this new world. The child invents circumstances and responds to them, just as philosophers do in Twin Earth forays. The child has become the mother, but mothers are the same, how mothers respond to babies is the same, the fact that pie is eaten after lunch is the same, and so on. Both pretend play and Twin Earth are quarantined worlds, decoupled from the real world. Furthermore, just as the Twin Earth scenario has allowed philosophers to make important headway to solve their conundrums, pretend play contexts appear to support superior levels of reasoning in children (Dias & Harris, 1990; Kuczaj, 1981; Smith, 1982). Finally, philosophers must signal to each other that they are discussing Twin Earth rather than real Earth (although the means by which this signaling is accomplished is, for philosophers, strictly verbal). In pretending, pretenders must also signal to others that the pretense is not to be taken for real; as discussed below, verbal and nonverbal signals may accomplish this communication.

There are of course important differences between pretend play and Twin Earth as well, but these are not discussed; the important similarities are that both are decoupled from yet importantly like reality and that both enhance reasoning under some circumstances. The decoupled aspect of pretense is certainly highlighted in other theories of pretense; for example, Harris (2000, p. 192) speaks of situation model understandings, and Amsel and Smalley (2000) emphasize counterfactual reasoning. I next detail and discuss aspects of the model shown in Figure 2.

*Early pretense (1).* At least in middle-class American families, parents pretend with very young children, even at 12 to 13 months (Crawley & Sherrod, 1984; Haight & Miller, 1993; Kavanaugh, Whittington, & Cerbone, 1983; Tamis-LeMonda & Bornstein, 1991). In the Twin Earth model, this

<sup>2</sup> Putnam (1975/1996) originally invoked Twin Earth to argue for semantic externalism, the view that meanings are not just private mental properties. Twin Earth was proposed as a planet where there is a substance that looks, behaves, and for all intents and purposes is exactly like water and is even called “water,” but whose chemical composition is not H<sub>2</sub>O, but some different and complex formula, abbreviated XYZ. Because in an ordinary person’s head Twin Earth “water” had the same meaning as Earth “water,” this thought experiment convinced many that meanings are not just “in the head” and must partly reside in the entities which they are about. Pessin and Goldberg (1996) describe Twin Earth as “the most influential single philosophical episode in the past half century,” having “left almost no area of contemporary analytic philosophy untouched” (p. x).

very early pretending in social contexts is important to theory of mind for two reasons. One is that early pretense with parents jump-starts the child's own pretending: when pretense activity is modeled children are apt to imitate it (Fenson & Ramsay, 1981; Jackowitz & Watson, 1980; Watson & Fischer, 1977). Pretense with more skilled partners thus facilitates pretending oneself. Pretending earlier oneself stimulates the cognitive skill of decoupling the represented from the real, which figures later in the model. Second, several skills believed to be important to early aspects of theory of mind (Wellman, 1993) are proposed also to be important to early pretense encounters (Lillard et al., 2001). These skills are reading intentions, engaging in joint attention, and social referencing, discussed next.

Interpreting a pretense act must involve reading the pretender's intentions. A child who watches her mother talking into a banana must interpret that her mother intends that the banana serve as a telephone. Merely reading the behavior, without reading her mother's intention, would lead to confusion on the child's part. One might argue that the child might interpret the intention but not see it as *the mother's* intention per se. In other words the child might understand "the banana is a telephone" without understanding "mother intends that the banana be a telephone." This should be experimentally tested, perhaps by examining whether children respond similarly to mistakes as to pretense acts. Even if children fail to see the intention as specific to and emanating from the pretender, reading an act as its pretend form, superceding the real identity of the objects involved in that act, could be a step toward theorizing about minds.

The intention-reading aspect of early pretense has not been previously highlighted, although intention understanding has received increasing attention outside of pretense, as an early-appearing mental state understanding. In one demonstration of this, 18-month-olds who watched an adult try to pull apart the ends of a barbell, but not succeed, proceeded fully to carry out the action themselves later (Meltzoff, 1995). They appeared to read past the visible actions to the actor's intention. Woodward (1998) suggests that even younger children might have some understanding of goals in that even by 9 months of age, they interpret grasping actions as directed at specific objects rather than locations. When an object that a hand had repeatedly grasped was moved to a new place, infants recovered looking time when the hand moved to a new object in the old place, but not when the hand moved to the old object in a new place. Understanding another sort of intention, speaker intent, is implicated in early word learning by the middle of the second year (Baldwin, 1993; Tomasello, 1999). Hence children appear to have intention-deciphering skills at least by midway through the second year, and they must use these skills in interpreting pretense acts. This constitutes a relation between early pretend play encounters and theory of mind.

A second early social-cognitive skill that appears to be implicated in pretending is social referencing. In social referencing, the child looks to the

adult when confronted with an ambiguous situation and then takes the adult's attitude to that situation: If the adult portrays fright, the child retreats, and if the adult portrays comfort, the child approaches (Campos, 1980; Mumme, Fernald, & Herrera, 1996). Social referencing is often considered a precursor to theory of mind because it involves interpreting an attitude, although the attitude is not necessarily appreciated to be mental (Wellman, 1993).

Social referencing also appears to be implicated in early pretense. Novel pretense acts are surely sometimes ambiguous for children. If an adult is pretending to be a lion, but the child has never seen a lion before, something must assist the child's interpretation of this act as pretense rather than as some new really serious aggressive behavior. Likewise, even a familiar behavior, like eating, might confuse children if adults did not assist with a pretense interpretation—otherwise, why not assume that pretend eating is another new real action? Adults may signal that pretense acts are silly in the same way that they signal that a toy is dangerous or a stranger is okay. Even animals appear to give signs that one should interpret their play acts as “not for real” (Bateson, 1955/1972). Canids, for example, use a stereotypic play bow before, and sometimes during, play fighting bouts (Bekoff, 1977). Parents who pretend with young children do signal pretense via their behaviors including facial expressions, mistimed (relative to ordinary actions) gestures, and increased looking at the child (Lillard et al., 2001). With parents who engage in pretense acts frequently, infants may become particularly attuned to social signals from the parent (no. 2 in the model), which might then promote theory of mind (Baron-Cohen, 1995). Early pretense with children can assist theory of mind by leading children to attend to such social signals. If so, perhaps individual differences in theory of mind might be to some degree predicted from differences in frequency of parental pretend play.

Another early aspect of theory of mind that may well be implicated in early pretense is joint attention. Like social referencing, this behavior is usually seen by the end of the first year and indexed by such behaviors as referential pointing (simply to share an observation) and following others' points (Butterworth & Grover, 1999; Wellman, 1993). Joint pretense by definition entails joint attention because both pretenders must focus on the same set of objects, activities, and events, with a set of shared presuppositions. Until ages 3 or 4 years, pretend play with peers is more often parallel than social, but at younger ages, parents and older siblings scaffold younger children in social pretense. Because parents are not apt to engage in some sorts of pretense (tea parties, for example) alone, it seems likely that parents make every effort to ensure that children are jointly attending to their pretense acts. Increased looking time to child during pretense supports this (Lillard et al., 2001). By age 3 children also behave as if pretense were a joint attention activity: They are more likely to look at an experimenter while engaging in pretense acts than while engaging in nonsymbolic ones (Striano, Tomasello, & Rochat, 2001).

In sum, three skills that infants likely bring to bear in understanding early pretense acts of their parents and older siblings also are important for theory of mind, suggesting a mutually reinforcing relationship between the two domains. There are cultural differences in pretending, with some cultures discouraging pretense altogether (Carlson, Taylor, & Levin, 1998; Farver, 1992). Future work should examine theory of mind skills in such cultures and even individual differences within our own. If pretending and early theory of mind are mutually reinforcing, it is possible that, in general, cultures that discourage pretending might also be cultures that are less psychologically oriented than are Northern Europeans and middle-class Americans (Lillard, 1998a; 1999). However, other activities also enhance theory of mind (like conversations about mental states; Dunn, Brown, & Beardsall, 1991), so a relationship might not be clear from such data alone.

*The symbolic function (3).* In order not to be confused by a parent's pretend acts, the child must interpret pretense events as what they stand for. For example, they must see pretend eating as symbolizing real eating, and they must see a talked-into banana as symbolizing a telephone. Evidence that early pretense involves the symbolic function stems from the many studies showing correlations between early acquisition of words—symbols for referents—and use of pretense gestures (e.g., Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Tamis-LeMonda & Bornstein, 1994). Recent experiments by Tomasello and his colleagues shed light on the extent to and circumstances under which early pretense is understood as symbolic (Tomasello, Striano, & Rochat, 1999).

In this experiment, children were asked to select objects that had been suggested by either gesture (the gesture condition) or a replica (the symbol condition). For example, to indicate a hammer, children were shown either a hammering gesture (using a fist as the head of the hammer) or a dollhouse-sized hammer (the symbol). Twenty-six-month-olds succeeded in selecting the real hammer in both conditions, but 18-month-olds succeeded only in the gesture condition, suggesting a failure even to see a dollhouse-sized hammer as a symbol for a larger one. In a more difficult phase of the experiment, children watched the experimenter throw a wadded up bit of paper as if it were a ball. Children were later asked to retrieve the wadded up paper in one of two ways. In the gesture condition, they were shown a different action one could make on a ball (pretending to roll an imaginary ball). In the symbol condition, they were shown a real ball. Only 33-month-olds (not 26-month-olds) could do this, and only in the gesture condition. These results suggest that young children's understanding of pretense is sometimes not symbolic and is heavily guided by their ability to read gestures.

This may suggest that young children understand pretense by reading gestures out of context, perhaps only in the face of supportive social signals indicating pretense rather than by employing a symbolic function. On the other hand, as Tomasello et al. discuss, their symbolic tasks may be particu-

larly difficult in the same sense as DeLoache's (2000) scale model tasks are: the child has to see an object both as a thing in itself and as symbolizing something else. Understanding pretense gestures and real words do not generally entail this, although they are still symbolic in the sense that one entity stands for another. The correlational relationship between producing pretense gestures and word comprehension suggests some underlying substrate, like the symbolic function. Data from children with autism are also suggestive of a such a substrate: children with autism generally do not pretend play nor learn language normally (half never speak, and the other half do so late). Further, children with autism who do engage in some pretending are generally those whose language skills are more advanced (Jarrold, Boucher, & Smith, 1993; Wolfberg & Schuler, 1993). Future research should be aimed at exploring these relations.

*The decoupled world (4).* A decoupled or quarantined world is at the heart of pretend play and is central to the model of pretend play–theory of mind relations. Leslie (1987) pointed out that for a child to converse in this not-real world and avoid confusing her representations of the real world, there must be some cognitive architecture devoted to quarantining pretense. If pretending that a banana is a telephone were not in some way quarantined from the real-life representation, in which telephones are telephones and bananas are bananas, the child's representational system would suffer abuse: Bananas would become telephones and vice versa. Nichols and Stich (2000) concur that some piece of cognitive architecture must be devoted to keeping the real and the fictional separate; they propose a "Possible World Box" into which real representations can be dropped and which (in combination with other specified units) allows both pretense and hypothetical reasoning. This insight that pretense is decoupled is an important one. Leslie (1987) pointed out the similarity between quarantining pretend worlds and quarantining mental worlds, and it may be that pretending serves theory of mind (or vice versa) in that both rest on such quarantining processes.

In the quarantined world, an object or person can be something or someone else and will partake in the scripts and schemas associated with that new identity. But the change is not a permanent one: At the end of the pretense, everything reverts to its real status. Animals are apparently unable to deal in decoupled worlds (Tomasello & Call, 1997), suggesting this is a uniquely human capacity (but see Bekoff, 1977). Entry into this decoupled world appears to stem more from biological than social forces, as suggested by the fact that even children in cultures where pretending is discouraged still pretend (Carlson et al., 1998; Danziger, in press).<sup>3</sup> Yet the social environment

<sup>3</sup> Danziger (personal communication, July 2000) notes that the Mopan Mayan culture appears to have recently changed in this way: on a June 2000 visit, young parents allowed their children to pretend, yet admitted that when they were children, they had to hide pretending from their own parents.

can encourage its earlier appearance, as suggested by the facts that children whose parents or siblings pretend with them pretend earlier themselves (Dunn, 1988) and that complexity of children's play is related to complexity of mother's (Tamis-LeMonda & Damast, 1993).

In sum, pretend play involves dealing with a quarantined world, as does understanding minds. The facility in dealing with such worlds that is accrued in pretending might well transfer to understanding minds. Importantly, this transfer may not be without limits: correlational studies of the relationship between pretending and understanding minds suggest that the relation to all pretense is weak at best, and the stronger predictor of theory of mind skill is pretense role play, which also occurs in a decoupled world but involves entities with psychologies.

*Pretend role play (5).* From pretense with mothers and peers, children increasingly engage in self-initiated solitary pretense (Haight & Miller, 1993; Howes, Unger, & Matheson, 1992). Increasingly, children's play with same-age peers becomes social, and role play pretense is common by 4 or 5 years of age (earlier for children with older siblings, Dale, 1989; Dunn, 1988). Role play pretense is correlated with theory of mind abilities, and this relation might be due to either activity driving the other or to a third variable driving both. Most likely all three developmental paths are followed.

Pretend play may lead directly to theory of mind abilities in three ways. For one, children might learn about minds when taking on the role of characters in pretend play, simulating their beliefs, desires, and emotional responses to situations (Bretherton, 1984; Garvey, 1990; Gordon, 1995; Harris, 1994; Harris, 1995; Schwartzman, 1978). Pretending to be other people, in training studies, has been shown to improve one's ability to take their perspective (Chandler, 1975), which could also stem from simulation. Simulation also receives support from the fact that most children come to pass theory of mind tasks at the age that has been called the "high season" of sociodramatic pretend play (Howes et al., 1992; Rubin et al., 1983). And it makes sense that younger siblings, who are often marshaled into sociodramatic play games earlier than are children without older siblings (Dunn, 1988), pass theory of mind tasks earlier (Ruffman, Perner, Naito, Parkin, & Clements, 1998). Indeed, as compared with pretending alone and with mother, pretending with siblings specifically involves role identities/enactment and psychological states (Dale, 1989). Via simulation, then, role play can lead directly to theory of mind understanding.

As a possible caution against this view, one might note that the concept of acting by taking on another's psychological state is a relatively recent invention in drama, generally attributed to Stanislavsky at the turn of the past century (Stanislavsky, 1922/1984). Given that prior to that time people saw acting as merely taking on roles rather than as taking on the psychology of the character, one might wonder whether the latter is indeed how children naturally engage in sociodramatic play. Harris (2000) presents interesting

evidence that adults' read narratives with psychological engagement, but work on children's psyche's during pretense is yet to be accomplished.

Second, children might learn about minds in sociodramatic pretense when they work through the mind-related events they postulate, not only simulating their own pretense characters' mental states, but also watching how other simulated characters respond and experimenting with how they themselves can deal with those responses. Sociodramatic play frequently concerns social-emotional conflicts that are then resolved (Giffin, 1984). As Eibl-Eibesfeldt (1989) and others have argued, the emotional detachment and reduced anxiety of play may enhance players' ability to learn and reason about all manner of things (Dias & Harris, 1988; Hawkins et al., 1984; Kuczaj, 1981), including mental states. As with simulation, by this view, it makes sense that pretense engagements that entail other people, real or imagined, are usually the very ones that are correlated with passing theory of mind tasks (Astington & Jenkins, 1995; Dunn & Cutting, 1999; Hughes & Dunn, 1997; Lalonde & Chandler, 1995; Schwebel et al., 1999; Taylor & Carlson, 1997; Youngblade & Dunn, 1995).

Sociodramatic play also contributes to understanding the mind via its out-of-frame aspects. Children encounter and may well learn about other minds when setting the stage for pretend play encounters, negotiating with other children about who will play whom, what the props will stand for, and what events will take place (Garvey & Berndt, 1975; Matthews, 1977). Such negotiations probably involve discussions about desires, and frequency of conversations about folk psychological concepts is correlated with better folk psychological understanding (Denham, Zoller, & Couchoud, 1994; Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991) and more cooperative interaction (Brown, Donelan-McCall, & Dunn, 1996). Such conversations have been shown to occur more frequently in pretense contexts than other contexts (Howe, Petrakos, & Rinaldi, 1998; Hughes & Dunn, 1997). These conversations occur out-of-frame, in negotiating pretense, as well as in-frame.

In sum, in role play, children learn to be other people, complete with thoughts and feelings; within social pretense children tend to work with emotional themes, and they also come face to face with other (real) people's minds and emotions in the working out of pretense. The correlational evidence cited earlier supports the possibility that pretend role play is related to theory of mind (but see Lillard, 1998b, for other possible reasons for the relation). Role play might lead to theory of mind understandings (6), but it also in part can rely on them; its sometimes reliance is the reason for the pretend role play box resting partly inside the theory of mind one (6). Social pretend play may also facilitate understanding that minds are involved in pretense (8), as it is in this context that children might have the type of experience most likely to make that apparent: someone asking them to be what they do not know about (7). This was discussed previously, with regard

to the metarepresentational theory. Understanding that pretense involves minds, as was tested in the experiments reviewed above, is part of a mature theory of mind.

The Twin Earth model sketches how the social context of pretend play, in combination with the cognitive resources children bring to bear, may be related to the development of a theory of mind. The model may thus explain existing data showing correlations across the two domains, beginning with the social skills involved in interpreting early pretense with parents and siblings and moving through the understandings accrued through pretense role play with peers.

## SUMMARY

Pretending and theory of mind have been thought to be related on conceptual grounds in that several theories about the development of an understanding of mind give a prominent role to pretend play. The first part of this article assessed evidence for the relationship between pretense and theory of mind being a metarepresentational one. It was concluded that although in some facilitative circumstances a majority of 4-year-olds appear to appreciate that pretending involves minds and thoughts, these facilitative circumstances are not likely to be encountered in real-life pretense prior to false belief understandings. Therefore they must not be a primary cause of children coming to such understandings.

Yet data do show that the two domains are related. An alternative, developmental model of the relation between pretending and theory of mind was proposed as follows. Early theory of mind skills (social referencing, joint attention, and reading intention) may well be involved when parents pretend to young children, leading to facility using those skills toward higher levels of social understanding. Early pretense with parents and siblings could also lead to theory of mind via decoupling. Facility in dealing in a decoupled world is directly implicated both in theory of mind and in a later stage of pretend, role play, which could enhance theory of mind as well. Finally, increased social pretend play would serve to promote the possibility of an experience in which a potential pretender (self or other) did not know about what someone else wanted one to pretend; such experiences could assist the understanding that pretense is mental. The Twin Earth model thus proposes an intertwined developmental relationship between social cognitive skills and the activity of pretend play.

## REFERENCES

- Amsel, E., & Smalley, J. D. (2000). Beyond really and truly: Children's counterfactual thinking about pretend and possible worlds. In P. Mitchell & K. J. Riggs (Eds.), *Children's reasoning and the mind* (pp. 121–147). Hove UK: Psychology Press.
- Anscombe, G. E. M. (1981). *Metaphysics and philosophy of mind*. Minneapolis: University of Minnesota.

- Aronson, J. N., & Golomb, C. (1999). Preschoolers' understanding of pretense and presumption of congruity between action and representation. *Developmental Psychology*, **35**, 1414–1425.
- Astington, J. W., Harris, P. L., & Olson, D. R. (Eds.). (1988). *Developing theories of mind*. New York: Cambridge Univ. Press.
- Astington, J. W., & Jenkins, J. M. (1995). Theory of mind development and social understanding. *Cognition and Emotion*, **9**, 151–165.
- Austin, J. L. (1979). Pretending. In J. O. Urmson & G. J. Warnock (Eds.), *Philosophical papers*. (3rd ed., pp. 253–271). Oxford, UK: Oxford Univ. Press.
- Avis, J., & Harris, P. L. (1991). Belief-desire reasoning among Baka children: Evidence for a universal conception of mind. *Child Development*, **62**, 460–467.
- Baldwin, D. A. (1993). Infants' ability to consult the speaker for clues to word reference. *Journal of Child Language*, **20**, 395–418.
- Baron-Cohen, S. (1987). Autism and symbolic play. *British Journal of Developmental Psychology*, **5**, 139–148.
- Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. London: MIT Press.
- Baron-Cohen, S. (2000). Theory of mind and autism: A 15-year review. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds: Perspectives from developmental cognitive neuroscience* (2nd ed., pp. 3–21). Oxford, UK: Oxford Univ. Press.
- Bartsch, K., & Wellman, H. M. (1995). *Children talk about the mind*. Oxford: UK: Oxford Univ. Press.
- Bates, E., Benigni, L., Bretherton, I., Camaioni, L., & Volterra, V. (1979). Cognition and communication from nine to thirteen months: Correlational findings. In E. Bates (Ed.), *The emergence of symbols: Cognition and communication in infancy*. New York: Academic Press.
- Bateson, G. A. (1955/1972). A theory of play and fantasy. In G. A. Bateson (Ed.), *Steps to an ecology of mind* (Reprinted from American Psychiatric Association Research Reports, 1955, II, 1939–1951). New York: Chandler.
- Bekoff, M. (1977). Social communication in canids: Evidence for the evolution of a stereotyped mammalian display. *Science*, **197**, 1097–1099.
- Bransford, J. D., Barclay, J. R., & Franks, J. J. (1972). Sentence memory: A constructive versus interpretive approach. *Cognitive Psychology*, **3**(2), 193–209.
- Bretherton, I. (1984). Representing the social world in symbolic play: Reality and fantasy. In I. Bretherton (Ed.), *Symbolic play* (pp. 3–41). New York: Academic Press.
- Brown, J. R., Donelan-McCall, N., & Dunn, J. (1996). Why talk about mental states? The significance of children's conversations with friends, siblings, and mothers. *Child Development*, **67**, 836–849.
- Bruell, M. J., & Woolley, J. (1998). Young children's understanding of diversity in pretense. *Cognitive Development*, **13**, 257–277.
- Butterworth, G., & Grover, L. (1999). The origins of referential communication in human infancy. In P. F. C. Llyod (Ed.), *Lev Vygotsky: Critical assessments: Thought and language* (Vol. II, pp. 3–30). New York: Routledge.
- Campos, J. J. (1980). Human emotions: Their new importance and their role in social referencing. *Research & Clinical Center for Child Development, Annual Report*, 1–7.
- Carlson, S. M., Taylor, M., & Levin, G. (1998). The influence of culture on pretend play: The case of Mennonite children. *Merrill-Palmer Quarterly*, **44**, 538–565.

- Chandler, M. J. (1975). Egocentrism and anti-social behavior: The assessment and training of social perspective-taking skills. *Developmental Psychology*, **9**, 326–332.
- Crawley, S. B., & Sherrod, K. B. (1984). Parent-infant play during the first year of life. *Infant Behavior & Development*, **7**, 65–75.
- Currie, G. (1996). Simulation, theory-theory, and the evidence from autism. In P. Carruthers & P. K. Smith (Eds.), *Theories of theories of mind* (pp. 242–256). Cambridge, UK: Cambridge Univ. Press.
- Currie, G. (1998). Pretence, pretending and metarepresenting. *Mind and Language*, **13**, 35–55.
- 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.
- Dale, N. (1989). Pretend play with mothers and siblings: Relations between early performance and partners. *Journal of Psychology and Psychiatry*, **30**, 751–759.
- Danziger, E. (in press). Relatively speaking: Language, thought, and kinship in Mopan Maya. Oxford: Oxford University Press.
- Davis, D. L., Woolley, J., & Bruell, M. (in press). Young children's understanding of pretense as a mental representation. *British Journal of Developmental Psychiatry*.
- DeLoache, J. (2000). Dual representation and young children's use of scale models. *Child Development*, **71**, 329–338.
- Denham, S., Zoller, D., & Couchoud, E. (1994). Socialization of preschoolers' emotion understanding. *Developmental Psychology*, **30**, 928–936.
- Dias, M. G., & Harris, P. L. (1988). The effect of make-believe play on deductive reasoning. *British Journal of Developmental Psychology*, **6**, 207–221.
- 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.
- Dunn, J. (1988). *The beginnings of social understanding*. Cambridge, MA: Harvard Univ. Press.
- Dunn, J., Brown, J., & Beardsall, L. (1991). Family talk about feeling states and children's later understanding of others' emotions. *Developmental Psychology*, **27**, 448–455.
- Dunn, J., Brown, J., Slomkowski, C., Tesla, C., & Youngblade, L. (1991). Young children's understanding of other people's feelings and beliefs: Individual differences and their antecedents. *Child Development*, **62**, 1352–1366.
- Dunn, J., & Cutting, A. L. (1999). Understanding others, and individual differences in friendship interactions in young children. *Social Development*, **8**, 201–219.
- Eibl-Eibesfeldt, I. (1989). *Human ethology*. New York: Aldine de Gruyter.
- Fadiga, L., Fogassi, L., Gallese, V., & Rizzolatti, G. (2000). Visuomotor neurons: Ambiguity of the discharge or 'motor' perception? *International Journal of Psychophysiology*, **35** (2–3), 165–177.
- Farver, J. (1992). An analysis of young Mexican and American children's play dialogues. In C. Howes, O. A. Unger, & C. C. Matheson (Eds.), *The collaborative construction of pretend: Social pretend play functions* (pp. 55–66). Albany, NY: State Univ. of New York Press.
- Fenson, L., & Ramsay, D. S. (1981). Effects of modeling action sequences on the play of twelve-, fifteen-, and nineteen-month-old children. *Child Development*, **52**, 1028–1036.
- 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). Cambridge, UK: Cambridge Univ. Press.

- Flavell, J. H., Flavell, E. R., & Green, F. L. (1987). Young children's knowledge about the apparent-real and pretend-real distinctions. *Developmental Psychology*, **23**, 816–822.
- Flavell, J. H., Green, F. L., & Flavell, E. R. (1986). Development of knowledge about the appearance-reality distinction. *Monographs of the Society for Research in Child Development*, **51**(1, Serial No. 212).
- Flavell, J. H., Green, F. L., & Flavell, E. R. (1995). The development of children's knowledge about attentional focus. *Developmental Psychology*, **31**, 706–712.
- Fodor, J. A. (1983). *The modularity of mind*. Cambridge, MA: Bradford Books/MIT 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 Univ. Press.
- Gallese, V. (2000). The acting subject: Toward the neural basis of social cognition. In T. Metzinger (Ed.), *Neural correlates of consciousness: Empirical and conceptual questions* (pp. 325–333). Cambridge, MA: MIT Press.
- Garvey, C. (1990). *Play*. (2nd ed.). Cambridge, MA: Harvard Univ. Press.
- Garvey, C., & Berndt, R. (1975). *Organization in pretend play*. Paper presented at the Paper presented at the meeting of the American Psychological Association, Chicago.
- German, T. P., & Leslie, A. M. (2001). Children's inferences from knowing to pretending and believing. *British Journal of Developmental Psychology*, **19**, 59–83.
- Gerow, L. E., Taylor, M., & Moses, L. J. (1999). *Children's understanding that pretense involves mental representations*. Unpublished manuscript, University of Oregon.
- Giffin, H. (1984). The coordination of meaning in the creation of shared make-believe play. In I. Bretherton (Ed.), *Symbolic play* (pp. 73–100). Orlando, FL: Academic Press.
- Goldman, A. I. (1993). The psychology of folk psychology. In A. I. Goldman (Ed.), *Readings in philosophy and cognitive science* (pp. 347–380). Cambridge: The MIT Press.
- Gopnik, A. (1993). How we know our minds: The illusion of first-person knowledge of intentional states. *Behavioral and Brain Sciences*, **16**, 1–14.
- Gopnik, A., & Astington, J. W. (1988). Children's understanding of representational change and its relation to the understanding of false belief and the appearance–reality distinction. *Child Development*, **59**, 26–37.
- Gopnik, A., & Meltzoff, A. (1997). *Words, thoughts, and theories*. Boston: MIT Press.
- Gordon, R. (1995). Folk psychology as simulation. In M. Davies & T. Stone (Eds.), *Folk psychology* (Vol. 3, pp. 60–73). Oxford, UK: Blackwell.
- Grandin, T. (1995). How people with autism think. In E. Schopler & G. B. Mesibov (Eds.), *Learning and cognition in autism*. New York: Plenum.
- Haight, W. L., & Miller, P. J. (1993). *Pretending at home*. Albany, NY: SUNY Press.
- Hall, W. S., Frank, R., & Ellison, C. (1995). The development of pretend language: Toward an understanding of the child's theory of mind. *Journal of Psycholinguistic Research*, **24**, 231–254.
- Happe, F. (1994). An advanced test of theory of mind: Understanding of story characters' thoughts and feelings by able autistic, mentally handicapped, and normal children and adults. *Journal of Autism and Developmental Disorders*, **24**, 129–154.
- Happe, F. G. E. (1995). The role of age and verbal ability in the theory of mind task performance of subjects with autism. *Child Development*, **66**, 843–855.
- Harris, P. L. (1991). The work of the imagination. In A. Whiten (Ed.), *Natural theories of mind* (pp. 283–304). Oxford, UK: Basil Blackwell.
- Harris, P. L. (1994). The child's understanding of emotion: Developmental change and the family environment. *Journal of Child Psychology and Psychiatry*, **35**, 3–28.

- Harris, P. L. (1995). From simulation to folk psychology: The case for development. In M. Davies & T. Stone (Eds.), *Folk psychology* (Vol. 3, pp. 207–221). Cambridge, UK: 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).
- Hawkins, J., Pea, R. D., Glick, J., & Scribner, S. (1984). Merds that don't like mushrooms: Evidence for deductive reasoning by preschoolers. *Developmental Psychology*, **20**, 584–589.
- 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.
- Holmes, H., Black, C., & Miller, S. (1996). A cross-task comparison of false belief understanding in a Head Start population. *Journal of Experimental Child Psychology*, **63**, 263–285.
- Howe, N., Petrakos, H., & Rinaldi, C. (1998). "All the sheeps are dead. He murdered them.": Sibling pretense, negotiation, internal state language, and relationship quality. *Child Development*, **69**, 182–191.
- Howes, C., Unger, O. A., & Matheson, C. C. (1992). *The collaborative construction of pretend: Social pretend play functions*. Albany, NY: State University of New York Press.
- Hughes, C., & Dunn, J. (1997). "Pretend you didn't know": Preschoolers' talk about mental states in pretend play. *Cognitive Development*, **12**, 381–403.
- Jackowitz, E. R., & Watson, M. W. (1980). The development of object transformations in early pretend play. *Developmental Psychology*, **16**, 543–549.
- Jarrold, C., Boucher, J., & Smith, P. (1993). Symbolic play in autism: A review. *Journal of Autism & Developmental Disorders*, **23**, 281–307.
- Jarrold, C., Carruthers, P., Smith, P. K., & Boucher, J. (1994). Pretend play: Is it metarepresentational. *Mind and Language*, **4**, 445–468.
- Johnson, C. N., & Wellman, H. M. (1982). Children's developing conceptions of the mind and the brain. *Child Development*, **52**, 222–234.
- Joseph, R. M. (1998). Intention and knowledge in preschoolers' conception of pretend. *Child Development*, **69**, 979–990.
- Kavanaugh, R. D., Whittington, S., & Cerbone, M. J. (1983). Mother's use of fantasy speech to young children. *Journal of Child Language*, **10**, 45–55.
- Kuczaj, S. A. (1981). Factors influencing children's hypothetical reference. *Journal of Child Language*, **8**, 131–137.
- Lalonde, C. E., & Chandler, M. J. (1995). False belief understanding goes to school: On the social-emotional consequences of coming early or late to a first theory of mind. *Cognition and Emotion*, **9**, 167–185.
- Leslie, A. (1994a). Pretending and believing: issues in the theory of ToMM. *Cognition*, **50**, 211–238.
- Leslie, A., & Roth, D. (1993). What autism teaches us about metarepresentation. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds: Perspectives from autism*. Oxford, UK: Oxford Univ. Press.
- Leslie, A. M. (1987). Pretense and representation: The origins of "theory of mind." *Psychological Review*, **94**, 412–426.
- Leslie, A. M. (1994b). ToMM, ToBy, and Agency: Core architecture and domain specificity. In L. A. Hirschfield & S. A. Gelman (Eds.), *Mapping the mind: Domain specificity in cognition and culture* (pp. 119–148). Cambridge, UK: Cambridge Univ. Press.
- Leslie, A. M. (2000). "Theory of mind" as a mechanism of selective attention. In M. S.

- Gazzaniga (Ed.), *The new cognitive neurosciences* (2nd ed., pp. 1235–1247). Cambridge, MA: The MIT Press.
- Leslie, A. M., & Thaiss, L. (1992). Domain specificity in conceptual development: Neuropsychological evidence from autism. *Cognition*, *43*, 225–251.
- Lillard, A. S. (1993a). Pretend play skills and the child's theory of mind. *Child Development*, *64*, 348–371.
- Lillard, A. S. (1993b). Young children's conceptualization of pretense: Action or mental representational state? *Child Development*, *64*, 372–386.
- 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: Erlbaum.
- Lillard, A. S. (1996). Body or mind: Children's categorizing of pretense. *Child Development*, *67*, 1717–1734.
- Lillard, A. S. (1998a). Ethnopsychologies: Cultural variations in theory of mind. *Psychological Bulletin*, *123*, 3–33.
- Lillard, A. S. (1998b). Playing with a theory of mind. In O. Saracho & B. Spodek (Eds.), *Multiple perspectives on play in early childhood education* (pp. 11–33). New York: SUNY Press.
- Lillard, A. S. (1998c). Wanting to be it: Children's understanding of intentions underlying pretense. *Child Development*, *69*, 979–991.
- Lillard, A. S. (1999). Developing a cultural theory of mind: The CIAO approach. *Current Directions in Psychological Science*, *8*, 57–61.
- Lillard, A. S. (2001a). Pretending, understanding pretense, and understanding minds. In S. Reifel (Ed.), *Play and culture studies* (Vol. 3). Westport, CT: Ablex.
- Lillard, A. S. (2001b). Pretend play and theory of mind: Explaining the connection. In S. Reifel (Ed.), *Play and culture studies* (Vol. 3). Westport, CT: Ablex.
- Lillard, A. S. (in press). Just through the looking glass: Children's understanding of pretense. In R. Mitchell (Ed.), *Pretending in animals and children*. Cambridge, UK: Cambridge Univ. Press.
- Lillard, A. S., & Flavell, J. H. (1992). Young children's understanding of different mental states. *Developmental Psychology*, *28*, 626–634.
- Lillard, A. S., & Joffre, K. (1999). *The robustness of children's conceptualization of pretense as action*. Unpublished manuscript, University of Virginia.
- Lillard, A. S., & Sobel, D. (1999). Lion Kings or Puppies: Children's understanding of pretense. *Developmental Science*, *2*, 75–80.
- Lillard, A. S., Witherington, D., & Robinette, A. (2001, April). *How mother's toddler-directed pretense acts differ from their real acts*. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Minneapolis.
- Lillard, A. S., Zeljo, A., Curenton, S., & Kaugars, A. S. (2000). Children's understanding of the animacy constraint on pretense. *Merrill-Palmer Quarterly*, *46*, 21–44.
- Lloyd, B., & Goodwin, R. (1995). Let's pretend: Casting the characters and setting the scene. *British Journal of Developmental Psychology*, *13*, 261–270.
- Mannering, A. (1999, April). *The impact of sibling interaction on young children's pretense understanding*. Paper presented at the The Biennial Meeting of the Society for Research in Child Development, Albuquerque.
- Matthews, W. S. (1977). Modes of transformation in the initiation of fantasy play. *Developmental Psychology*, *13*, 212–216.

- Meltzoff, A. (1995). Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children. *Developmental Psychology*, **31**, 838–850.
- Mitchell, P. (1994). Realism and early conception of mind: A synthesis of phylogenetic and ontogenetic issues. In C. Lewis & P. Mitchell (Eds.), *Children's early understanding of mind: Origins and development* (pp. 19–46). Hove, UK: Erlbaum.
- Mitchell, R. W. (2000). A proposal for the development of a mental vocabulary, with special reference to pretense and false belief. In P. Mitchell & K. J. Riggs (Eds.), *Children's reasoning and the mind* (pp. 37–65). Hove, UK: Psychology Press.
- Moses, L. J., & Chandler, M. J. (1992). Traveler's guide to children's theories of mind. *Psychological Inquiry*, **3**, 286–301.
- Mumme, D. L., Fernald, A., & Herrera, C. (1996). Infants' responses to facial and vocal emotional signals in a social referencing paradigm. *Child Development*, **67**, 3219–3237.
- Nelson, K., Plesa, D., & Henseler, S. (1998). Children's theory of mind: An experiential interpretation. *Human Development*, **41**, 7–29.
- Nichols, S., & Stich, S. (2000). A cognitive theory of pretense. *Cognition*, **74**, 115–147.
- Nicolich, L. M. (1977). Beyond sensorimotor intelligence: Assessment of symbolic maturity through analysis of pretend play. *Merrill-Palmer Quarterly*, **23**, 89–99.
- Overton, W. F., & Jackson, J. P. (1973). The representation of imagined objects in action sequences: A developmental study. *Child Development*, **44**, 309–314.
- Perner, J. (1991). *Understanding the representational mind*. Cambridge, MA: MIT Press.
- Perner, J., Baker, S., & Hutton, D. (1994). Prielief: The conceptual origins of belief and pretense. In C. Lewis & P. Mitchell (Eds.), *Children's early understanding of mind: Origins and development* (pp. 261–286). Hillsdale, NJ: Erlbaum.
- Pessin, A., & Goldberg, S. (Eds.). (1996). *The twin earth chronicles*. London: M. E. Sharpe.
- Piaget, J. (1945/1962). *Play, dreams, and imitation in childhood*. New York: Norton.
- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, **1**, 515–526.
- Putnam, H. (1975/1996). The meaning of "meaning." In A. Pessin & S. Goldberg (Eds.), *The twin earth chronicles*. London: M. E. Sharpe.
- Pylyshyn, Z. W. (1978). When is attribution of beliefs justified? *Behavioral and Brain Sciences*, **4**, 592–593.
- Richert, R., & Lillard, A. S. (2001, April). *Children's understanding of how knowledge constrains external representations of pretense and drawing*. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Minneapolis.
- Rogoff, B. (1990). *Apprenticeship in thinking*. New York: Oxford Univ. Press.
- Rosen, C., Schwebel, D., & Singer, J. (1997). Preschoolers' attributions of mental states in pretense. *Child Development*, **68**, 1133–1142.
- Rubin, K. H., Fein, G. G., & Vandenberg, B. (1983). Play. In E. M. Hetherington (Ed.), *Handbook of child psychology: Socialization, personality, and social development* (Vol. 4, 4th ed., pp. 693–774). New York: Wiley.
- Ruffman, T., Perner, J., Naito, M., Parkin, L., & Clements, W. (1998). Older (but not younger) siblings facilitate false belief understanding. *Developmental Psychology*, **34**, 161–174.
- Russell, J., Mauthner, N., Sharpe, S., & Tidswell, T. (1991). The 'windows task' as a measure of strategic deception in preschoolers and autistic subjects. *British Journal of Developmental Psychology*, **9**, 331–350.
- Ruther, N., & O'Reilly, A. W. (1995). *Do preschoolers understand the role of knowledge in pretense*. Paper presented at the The Biennial Meeting of the Society for Research in Child Development, Indianapolis.

- Scholl, B. J., & Leslie, A. M. (1999). Modularity, development, and 'theory of mind.' *Mind and Language*, **14**, 131–153.
- Schwartzman, H. B. (1978). *Transformations: The anthropology of children's play*. New York: Plenum.
- Schwebel, D. C., Rosen, C. S., & Singer, J. L. (1999). Preschoolers' pretend play and theory of mind: The role of jointly constructed pretence. *British Journal of Developmental Psychology*, **17**, 333–348.
- Searle, J. (1975). The logical status of fictional discourse. *New Literary History*, **6**, 319–332.
- Shorter, J. M. (1952/1964). Imagination. In Gustafson (Ed.), *Essays in philosophical psychology*. New York: Anchor Books.
- Smith, P. K. (1982). Does play matter? Function and evolutionary aspects of animal and human play. *Behavioral and Brain Sciences*, **5**, 139–184.
- Sobel, D., & Lillard, A. S. (2001a). The impact of fantasy and action on young children's understanding of pretense. *British Journal of Developmental Psychology*, **19**, 85–98.
- Sobel, D. M., & Lillard, A. S. (2001b). Do words bend the truth? Children's understanding of the mind's involvement in pretense. *Developmental Science*, **4**, 485–496.
- Sodian, B., Huelsken, C., Ebner, C., & Thoermer, C. (1998). Children's differentiation of mentality and reality in pretense-precursor to a theory of mind? *Sprache & Kognition*, **17**, 199–213.
- Stanislavsky, K. (1922/1984). On various trends in the theatrical arts. In O. C. Korneva (Ed.), *Konstantini Stanislavsky: Selected works* (pp. 133–191). Moscow: Raduga.
- Striano, T., Tomasello, M., & Rochat, P. (2001). Social and object support for early symbolic play. *Developmental Science*, **4**, 442–455.
- Tamis-LeMonda, C., & Bornstein, M. (1994). Specificity in mother–toddler language–play relations across the second year. *Developmental Psychology*, **30**, 283–292.
- Tamis-LeMonda, C., & Damast, A. M. (1993). *Individual differences in mothers' play actions and beliefs: Correspondence to toddler play competence*. Paper presented at the Society for Research in Child Development, New Orleans.
- Tamis-LeMonda, C. S., & Bornstein, M. H. (1991). Individual variation, correspondence, stability, and change in mother and toddler play. *Infant Behavior & Development*, **14**, 143–162.
- Taylor, M., & Carlson, S. M. (1997). The relation between individual differences in fantasy and theory of mind. *Child Development*, **68**, 436–455.
- Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard.
- Tomasello, M., & Call, J. (1997). *Primate cognition*. New York: Oxford Univ. Press.
- Tomasello, M., Striano, T., & Rochat, P. (1999). Do young children use objects as symbols? *British Journal of Developmental Psychology*, **17**, 563–584.
- Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard Univ. Press.
- Walton, K. L. (1990). *Mimesis as make-believe*. Cambridge, MA: Harvard Univ. Press.
- Watson, J. K. (1999, April). *Theory of mind and pretend play in family context*. Paper presented at the The Biennial Meeting of the Society for Research in Child Development, Albuquerque.
- Watson, M. W., & Fischer, K. W. (1977). A developmental sequence of agent use in late infancy. *Child Development*, **48**, 828–836.
- Wellman, H. M. (1990). *The child's theory of mind*. Cambridge, MA: Bradford Books/MIT Press.
- Wellman, H. M. (1993). Early understanding of mind: The normal case. In S. Baron-Cohen,

- H. Tager-Flusberg, & D. Cohen (Eds.), *Understanding other minds: Perspectives from autism*. Oxford, UK: Oxford Univ. Press.
- Wellman, H. M. (in press). Understanding the psychological world: Developing a theory of mind. In U. Goswami (Ed.), *Handbook of cognitive development*. Oxford, UK: Blackwell.
- Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory of mind development: The truth about false belief. *Child Development*, **72**, 655–684.
- Wellman, H. M., Hollander, M., & Schult, C. A. (1996). Young children's understanding of thought-bubbles and of thoughts. *Child Development*, **67**, 768–788.
- Werner, H., & Kaplan, B. (1963). *Symbol formation*. New York: Wiley.
- Whiten, A., & Byrne. (1991). The emergence of metarepresentation in human ontogeny and primate phylogeny. In A. Whiten (Ed.), *Natural theories of mind* (pp. 267–283). Oxford, UK: Basil Blackwell.
- Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, **13**, 103–128.
- Wolfberg, P. J., & Schuler, A. L. (1993). Integrated play groups: A model for promoting the social and cognitive dimensions of play in children with autism. *Journal of Autism & Developmental Disorders*, **23**, 467–489.
- Woodward, A., & Guajardo, J. J. (2001, May). *Infants' developing understanding of gaze and pointing: Relations between acting and comprehending the actions of others*. Paper presented at the Jean Piaget Society, Berkeley, CA.
- Woodward, A. L. (1998). Infant's selectively encode the goal object of an actor's reach. *Cognition*, **69**, 1–34.
- Woolley, J. D. (1995a). The fictional mind: Young children's understanding of imagination, pretense, and dreams. *Developmental Review*, **15**, 172–211.
- Woolley, J. D. (1995b). Young children's understanding of fictional versus epistemic mental representations: Imagination and belief. *Child Development*, **66**, 1011–1021.
- Woolley, J. D. (1997). Thinking about fantasy: Are children fundamentally different thinkers and believers from adults? *Child Development*, **6**, 991–1011.
- 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.

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