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# Do Actions Speak Louder Than Knowledge? Action Manipulation, Parent-Child Discourse And Children'S Mental State Understanding In Pretense

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**DO ACTIONS SPEAK LOUDER THAN KNOWLEDGE? ACTION  
MANIPULATION, PARENT-CHILD DISCOURSE AND CHILDREN'S MENTAL  
STATE UNDERSTANDING IN PRETENSE**

A Dissertation Presented

by

DAWN K. MELZER

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment  
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

February 2009

Department of Psychology

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Melinda Novak, Department Head  
Psychology Department

## **DEDICATION**

To my parents, Kathleen and Robert Melzer,  
and to my grandmother, Margaret Melzer.

## ACKNOWLEDGMENTS

This project would not have been possible without my advisor, Marvin Daehler. I would like to thank him for all of the time and effort that he invested in this project and in me over the years. His encouragement of me to continue my degree even during difficult times and contributions to the entire process has been immeasurable. Not only was he readily available for me, as he so generously is for all of his students, but his patience and understanding throughout my graduate school years enabled me to complete my Ph.D and for this I am especially grateful.

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## **ABSTRACT**

### **DO ACTIONS SPEAK LOUDER THAN KNOWLEDGE? ACTION MANIPULATION, PARENT-CHILD DISCOURSE AND CHILDREN'S MENTAL STATE UNDERSTANDING IN PRETENSE**

FEBRUARY 2009

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In the current study children 3-5 years of age ( $N = 75$ ) participated in a mental state task to investigate the effect of action saliency on young children's appreciation of mental states during pretend play activities. They also engaged in a parent-child interaction period, including storybook reading and pretend play activities, in order to examine the relation between mental state term utterances and performance on the mental state task. Two actors appeared side-by-side on a television screen, either in motion or as static images; one actor had knowledge of the animal he was pretending to be; the other actor did not have the same knowledge. The actors' behaviors were identical and related to the behavior of the animal, identical and unrelated, or the knowledgeable actor behaved contradictory to the animal's behavior while the unknowledgeable actor behaved appropriately for that animal. Children were asked to select the actor who was pretending to be the animal.

Children selected the appropriate knowledgeable actor significantly more often than a non-knowledgeable actor. Older children performed better than younger children.

Children's performance was unaffected by whether actors were shown in motion as compared to simply a static image. Children performed most successfully on trials where actors were both engaged in behaviors unrelated to the animal's behavior and poorest when the actor's behavior was contradictory to his knowledge. The mental state utterances of parents and children were correlated with the children's performance on the mental state task. Hierarchical regression analyses revealed parent's mental state utterances used during the parent-child interactions - specifically cognitive terms and modulations of assertion - were predictive of their children's performance on the mental state task. The current study's results support an understanding of the mind in pretend play activities by some children younger than five years of age and this understanding may be influenced by their parents' use of mental state language. Children who do not do well in appreciating that the mind is essential during pretense activities may have difficulty inhibiting responding to action, thus interfering with their ability to maintain focus on the mental state of the pretender.

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# CHAPTER 1

## INTRODUCTION

Children accept the most extraordinary scenarios in their play. They are princesses and dragons and can live in the most elaborate moat-protected castles or find joy in tasks that we as adults go about begrudgingly (e.g., making dinner). In the past decade there has been considerable research conducted on the cognitive mechanisms underlying pretense. Theories tend to differ, specifically on one main point, the child's awareness of mental states during pretend play. Pretend play obviously involves mental representations, the debate involves children's knowledge of this information and the manipulation and monitoring of their mind's content. Divisions exist in the literature as to whether children, under five years of age, appreciate the mind's role in pretend play or not. Certain researchers and methodologies suggest children as young as three have an understanding of mental states whereas other studies indicate this understanding does not appear until years later. If children do indeed have an understanding of mental states during pretend play, why do they have such difficulty expressing it in various situations and why is there a discrepancy in the research findings?

The present study attempts to provide further insight into young children's true capabilities concerning mental states on pretend tasks. Mental state understanding is the ability to appreciate the mind as a crucial element in interpreting other people's emotions and behaviors. This understanding of the mind's role in one's own behaviors as well as in other people's is essential in a child's theory of mind development. Lillard (1993b) has become the leading researcher attempting to provide data indicating that children as old as eight years of age do not fully comprehend the mind's role in pretend activities. While

Lillard has many supporters, many other researchers contend that it is her methodology that interferes with children's true expression of their understanding and not their ability.

### **Views of Children's Understanding of Mental States During Pretend Activities**

Lillard (1993b) and Perner (1991) are both skeptical about the ability of younger children to understand the mental states of others and their theories reflect this skepticism. Lillard (1993b) believes that children learn about pretense before they understand mental representations and therefore associate pretend play with actions before realizing the mind's involvement. Even though it may appear that children understand mental states early in their pretense activity, Lillard (1993a) has argued that children lack mental awareness and instead rely on overt behaviors to inform them as to the context in which they are involved. Her position is similar to one outlined in Perner's (1991) notion of "acting as if."

Perner (1991) states that children do not have a mental representational understanding of pretense or that pretense is symbolic in nature early in life. Perner (1991) believes that children are reacting to an "alternative external situation," not a mental one. Perner acknowledges the need for separation between pretense and reality for a child. He proposes that children understand the difference between pretense and reality by creating separate models of each. They knowingly control which model they are engaged in at the moment and they also can switch back and forth between the pretend and reality models. For example, a child using his or her backyard as a castle is treating the yard "as if" it were a castle, not as a symbol for a castle.

In an effort to support her position Lillard (1993b) presented four- and five-year-olds with dolls that acted out certain behaviors. For example, if "Moe" had never seen a



rabbit and had no information regarding rabbits, but was hopping up and down like a rabbit, was he pretending to be a rabbit? Most four-year-olds responded that Moe was pretending to be a rabbit, therefore ignoring the lack of information Moe possessed mentally in favor of concentrating on his actions.

Lillard (1996) extended her original study (1993a) to investigate six- and eight-year-olds understanding of pretense activities. Based on work done by Wimmer and Perner (1983), she asked the children to sort different activities, depicted on cue cards, into one of three boxes, “Mind,” “Body,” or “Both Mind and Body.” For example, children were asked which box should receive “*deciding to pretend something*” (classified as mind) and “*actually pretending something*” (classified as both mind and body) cards. Although the six-year-olds had difficulty associating the mind with pretending, most eight-year-olds replied that the mind plays a role in planning to pretend, and half of these children thought the mind was involved in pretending itself.

Lillard (1994) suggested that the ability to understand the internal representational nature of pretend play does not emerge until elementary school and is not consistently expressed until eight years of age. These results seem surprising given that children as young as four exhibit theory of mind understanding. A criticism of Lillard’s (1993b) research is the nature of the questions being asked of the children. Children might be confused by the contradictory information contained in being told that Moe (in the earlier example) does not know what a rabbit is, but then being asked if he is hopping like a rabbit (Joseph 1998). Aronson and Golomb (1999) presented children with a similar tale to that used by Lillard (1993b), except without conflicting cues in their questions. They eliminated the original wording that Moe did not know what a rabbit was, but was acting

like a rabbit and replaced it with a narrative explaining that the character, from a different planet, had no knowledge of animals but did know what jumping beans were. They then asked the children if the character, who was hopping up and down like a rabbit, was pretending to act like a rabbit, jumping bean, or a boy, thus giving them three choices to select from. They found four-year-olds did express an understanding of the need for the character to have certain mental abilities, e.g. knowledge of what a rabbit acts like, in order to realize the character was thus pretending, that is, their verbal explanations included references to characters' thoughts and knowledge.

It has been suggested that Lillard (1993b) underestimates the ability of young children by placing all of the emphasis on actions engaged in during pretense instead of the mental nature of pretend. For example, Gottfried, Hickling, Totten, Mkroyan and Reisz (2003) found that three- and four-year-olds had difficulty pretending to be objects with no easily replicated posture (e.g., bicycle) but were successful when asked to pretend to be a stationary object like a rug though no action was involved. Their findings contradict Lillard's theory that children use action as the basis for engaging in pretend activities, though Gottfried et al. (2003) do agree that children are more focused on the body than the mind during pretense activities.

Gottfried et al. (2003) also asked three- and four-year-olds to pretend to be a galaprock, a fictitious character created for their study. Children refused to act out any behavior when requested to be this unknown entity, usually responding that they could not pretend since they did not know what it was. This study demonstrates that even at three years of age children understand that knowledge is necessary in pretend although

this understanding is limited to the child's own knowledge of an object or action, not the knowledge or perspective of another individual.

Further evidence exists indicating children show greater insight concerning their own knowledge and thoughts when engaged in pretending than the knowledge and thoughts of others. Rosen, Schwebel and Singer (1997) showed three-, four- and five-year-olds two videos, one depicting a real activity (e.g., cleaning) and the other a pretend activity (e.g., flying a plane, while in reality they were sitting on a wooden bench). Most four- and five-year-olds were able to make the distinction between which video showed pretending and which a real activity, though only 60% of three-year-olds were capable of answering correctly. When the children who were successful at determining which video showed pretend versus which did not were asked a question regarding the characters thoughts, the numbers who responded correctly dropped significantly. For example, when the children were asked, "Are they thinking about being on a bench or about being on a plane?" Even at five years of age only half of the children were able to infer which of these two alternatives the character was thinking about when pretending. Only 32% of four-year-olds and 17% of three-year-olds were able to associate mental state with pretend play in the study. Rosen, Schwebel and Singer (1997) argue that a child can initially recognize someone is engaging in a pretend activity using the actions or words of the pretender but only later understands the role of representations in another's thoughts.

Supporting and providing further insight into Rosen et al. (1997) findings, Mitchell and Neal (2000) told four-year-olds that they looked like a cat when they were reaching for an out-of-reach object (and therefore were not thinking about a cat when asked if they were pretending to be one). The children denied they were pretending. If, on

the other hand, they were shown another child engaging in the same reaching behavior, four-year-olds commented that the child on the video was indeed pretending to be a cat. Children demonstrated greater insight into their own intentions and awareness that they themselves were not thinking about the cat and were therefore not pretending to be one. They had difficulty extending the absence of pretense to other children's behaviors. Lillard, Zeljo and Curenton (2000), too, found that children in this same age range reported that inanimate objects (e.g., a spinning top) were pretending when in motion even though they successfully answered that the object was not capable of thought. Therefore, even when young children are given information that should help to negate the possibility of pretense in others or with objects, they still have difficulty. The children seem to ignore the fact that objects that cannot think or have intentions also cannot engage in pretend activities because they seem to be basing their decision about pretense in others on actions alone.

### **Additional Views of Children's Understanding of Mental States During Pretend**

#### **Activities**

Though the studies already cited have indicated a lack of knowledge regarding the mental states of others by young children, the findings from other studies have suggested some limited understanding of mental state in others. These findings have led researchers such as Leslie (1987) to develop alternative theoretical interpretations with regard to young children's understanding of pretense. Understanding mental state is a central feature of Leslie's (1987) pretense account and he believes this understanding is a precursor to theory of mind development and mental state appreciation. Theory of mind capacities are not normally attributed to children until about four years of age (Flavell & Miller 1998).

According to Leslie (1987), pretend play provides a starting point for this ability. Around 24 months of age, other-directed active play, which includes the ability of a child to recognize that emotional attributes of pretend play partners can be different from his or her own point of view, begins to appear. This kind of pretend play encourages the child to think about how imaginary events may affect others (e.g., that if the child took away a toy from his or her doll “playmate,” the doll would be sad). The child could resort to and extend this understanding to processing real events and eventually separate his or her own feelings and emotions from those of others, elements that are essential for theory of mind.

Other researchers have investigated an alternative ability young children have to assess their understanding of mental states in pretend play (Harris, Kavanaugh & Meredith 1994, Harris & Kavanaugh 1993). To understand the intentions of another individual, these researchers believe it is necessary to have some knowledge of mental states. Harris and Kavanaugh (1993) claim even children of two and a half years of age understand the intentions of others. After engaging the children in various pretend activities with a toy monkey, Harris and Kavanaugh (1993) found that 2.5-year-olds were quick to retrieve a cleaning object after they were told by an experimenter that “toothpaste” was on the monkey’s tail. Children correspondingly looked concerned and seemed to rush to obtain a cloth to clean the monkey, seemingly acknowledging the intention of the experimenter to engage in pretend play and therefore help the monkey. Of course, it is possible that even though children were behaving as if they understood the experimenter’s desires, that they were simply following a script of how to act when something needed to be cleaned after the experimenter informed them that the monkey had toothpaste on its tail, actions having

little to do with understanding intentions and more to do with pleasing the experimenter after she made the statement.

Though still a point of debate, nevertheless most researchers have found that children from three years of age and beyond have the ability to understand another individual's intentions in both the real world and in pretend play (Rakoczy, Tomasello, & Striano 2004). Rakoczy et al. (2004) found that the majority of three-year-olds and some older two-year-olds demonstrated an understanding of intention. Children were shown a video of a man either "trying" to pour a glass of juice unsuccessfully (e.g., he kept missing the cup or could not turn the pitcher over) or "pretending" to pour a glass of juice (e.g., he used exaggerated movements and displayed expressions of success after pouring even though no liquid came out). When these children were given the identical props to those used in the video, those in the "trying" condition actually poured juice into a cup, successfully completing the task they believed the man intended to accomplish. The children in the "pretending" condition did exactly as the man did and did not actually pour juice into the cup, but simply made the motions and pretended similarly to the actor. The researchers believe this demonstrates that children can differentiate the intentions of someone in the real world attempting to perform an action versus in the pretend world where the goal is to engage in fantasy.

Although present at a young age, the understanding of intentions in pretend play may remain fragile until five years of age. Ganea et al. (2004) had characters on a television screen tell three- and four-year-olds what their intentions were ("I am going to fly like a bird now") even though they were acting contradictory to that intention (e.g., they were jumping up and down). They found that some three-year-olds and the majority

of four-year-olds could ignore the actions of the pretender when the actor's thoughts were made salient by verbally informing the child of their intentions. This task was more difficult for children if the actor described above (behaving contradictory to the animal he used in the verbal example, "bird") was side-by-side an actor that behaved appropriately for the animal he used in the example ("I am going to fly like a bird now") and he behaved like a bird. They relied more on action when a comparison was presented between the appropriately and inappropriately behaved pretenders and ignored the intentions of the character.

In an effort to minimize language demands Sobel (2004) presented children with a forced choice task and asked them to choose between two identical pictures, one where the children were told the character was sleeping and the other awake. Three- and four-year-olds were able to attribute engaging in a pretense activity to the character that was awake versus the one sleeping. Although successful, children may also appreciate that a sleeping individual cannot be engaged in actions and perhaps the children were basing their responses on this fact rather than on the mental states of the characters being presented to them. Sobel (2004) then presented children with two characters, one who intended to look like a cat but failed and one who accidentally looked like a cat, a procedure similar to Lillard's (1993b) Moe task except it used a forced choice paradigm involving two characters with conflicting knowledge and behavior instead of one. Three-year-olds in the experiment appeared to be guessing as to which girl was pretending. Four-year-olds were mostly successful at selecting the girl who wished to be a cat as the one pretending. Thus, these results suggest that by four years of age, children are capable of appreciating the mind's role in others' actions when a direct comparison can be made

between two characters with different thoughts. Sobel (2004) concluded that children possessed mental awareness of the pretender's thoughts at a substantially younger age than Lillard (1993b), but this understanding was fragile, as children did not use mental state information to explain their answers and had difficulty if accidentally conflicting information was present.

Bruell and Woolley (1998) believe that preschoolers must have some understanding of perspectives and mental states of others to interact with their peers during pretend play. Three- and four-year-olds were shown videos (action condition) or line drawings (non-action condition) depicting individuals interacting with an object. Thought bubbles appeared above each of the characters to indicate what they were pretending the object to be. For example, both actors were sitting in front of a cardboard box but one actor had a thought bubble containing a horse and the other had a bubble containing a drum. In subsequent questioning, children were asked what the actors were pretending to be and what the actors were actually doing since the actors were not always acting in accordance with the identity above their heads. Four-year-olds were able to answer the questions correctly in both the action and non-action conditions. They displayed a clear understanding of the mental representations and multiple perspectives incorporated in pretend play. Three- and four-year-olds performed well when given the thought bubbles, but when the bubble was removed or when the actors complicated the scenario with excess dialogue regarding their thoughts or actions, three-year-olds were not successful at distinguishing what the actor was actually pretending. The understanding of mental states by the younger children, while present, is fragile and therefore sensitive to extraneous factors. The authors believe they have revealed such mental awareness earlier



than other researchers (Lillard 1993a, Perner 1991) due to methodological differences. However, it is also possible that the thought bubbles were so salient that even the younger children could not ignore the information provided by them.

The literature summarized here suggests that children as young as three do have some, even if limited, understanding of the mind's role in pretend play. Previous researchers have speculated that the poor performance demonstrated by young children is due to the effect of saliency of the actions of the characters or a limited knowledge of other people's perspectives. Some believe the performance is a consequence of poor methodologies where researchers have presented confusing questions or contradictory information that interferes with the children's ability to answer correctly during mental state tasks. Regardless of these possible explanations, researchers have not been able to obtain consistent successful performance on these tasks by children under the age of five and a complete theory to account for why children encounter such difficulties is still needed. Greater attention to individual differences in children's sensitivity to mental states during pretend play might shed additional light on the processes contributing to developmental changes.

### **Individual Differences in Understanding Mental States During Pretend Play**

Few studies have addressed the issue of what contributes to individual differences in children's understanding of mental states in their pretend play. One of the factors that may contribute to individual differences is the way in which caregivers interact and communicate with their children when engaged in pretend play. Discovering the impact parents have on their children's mental state understanding may provide important clues into how children develop this ability and how susceptible this skill is to environmental

influences. For children, communicating about mental states, and therefore referencing the mind, does not emerge until around two-and-a-half to three years of age (Shatz, Wellman & Silber 1983).

Most research on individual differences on children's understanding of the mind has been conducted in the area of theory of mind development. This research has, in particular, looked at parental factors that contribute to the type and quality of interactions between parents and children and that are believed to be factors contributing to a child's understanding of theory of mind (Fonagy 2002). In a longitudinal study Fonagy (1996) followed parents expecting their first child, until that child was five to six years of age. He found that mothers who displayed more secure attachments to their children and engaged in more dialogue containing mental state terminology had children who possessed better theory of mind capabilities at five years of age than mothers who did not. Ruffman, Slade and Crowe (2002) asked mothers to describe pictures to their children. The mother-child dyads were tested when the children were three, four and five years of age. Mothers' mental state utterances were related to their own children's mental state usage and abilities on theory of mind tasks. The authors noted that even when education, children's language ability and the children's initial theory of mind capabilities were controlled for, the mental state terms used by the mother accounted for more variance than other factors.

Adrian, Clemente, Villanueva and Rieffe (2005) showed that both the amount of storybook reading and usage of mental state terms by parents during reading were related to better performance on false belief tasks by their four- and five-year-old children. Similarly, Meins, Fernyhough, Wainwright, Clark-Carter, Gupta, Fradley and Tuckey

(2003) observed mother-child interactions at six months of age and conducted interviews with the same mothers when the child was four years of age and found a relationship between the mothers' use of appropriate mental terms during their interactions with their child at six months of age and the child's theory of mind abilities at four years of age.

Dunn, Brown, Slomkowski Tesla and Youngblade (1991) reported that the greater the amount of discussion between mother, siblings and child about causal relationships, how one object or person affects another in the environment, the greater the younger child's understanding of false beliefs on tasks, Brown and Dunn (1991) expanded on this work and discovered that conversations regarding causal events were not sufficient to aid a child in mental state understanding but that causal language regarding mental states did play a role. For example, if a parent mentioned to his or her child that when one ball hit another, the second one would move, it was not as influential to a child's mental state understanding as when a parent described how the one ball wanted to push the second ball and that is why the event occurred. Observations of families in their home environments resulted in the finding that children who grew up with families that engaged in conversations about feelings and causality were better at four years of age at explaining their own feelings and the actions and desires of a puppet during a task in the laboratory, than children whose families used fewer mental state terms in their everyday conversations (Dunn et. al 1991).

Jenkins, Turrell, Kogushi, Lollis and Ross (2003) categorized mental state terms into three types of speech based on research by Hughes and Dunn (1995): talk of desires, talk of feelings and talk of cognition (Hughes & Dunn 1995). Jenkins et al (2003) observed two- and four- year-old children in their homes interacting with their parents

during two ninety-minute sessions over a two-year period of time. They discovered that cognitive speech increased between two and four years of age, as did parent usage of cognitive speech to their child. The increased use of cognitive speech by both mothers during play and reading time was related to increased use of this speech by the children themselves and frequency of use was related to theory of mind performance. Jenkins et al. (2003) argue that the social-constructivist perspective predicts that it is essential for children to be spoken to regarding mental state terms in order for children to learn about the mind and different perspectives. Social-constructivism was developed by Vygotsky (1978) and is focused on collaborative learning between children and adults in their environment. Children have the potential to achieve beyond their actual abilities within their “zone of proximal development” where more knowledgeable teachers can guide them and advance their understanding of material, more specifically in the present experiment, their mental state language understanding.

Sabbagh and Callanan (1998) further explain the effect parents have on their child’s mental state understanding of others and their later theory of mind accomplishments using Vygotsky’s theory of scaffolding. Parents seem to unknowingly take advantage of the opportunity to teach their children about thoughts and beliefs using more advanced mental state terms than their children could generate on their own. When children in Sabbagh and Callanan’s (1998) study replied to questions with “I don’t know” or would point out contradictions in a situation (e.g., a dog hopping up and down, unlike typical dog behavior), parents provided mental state information and elaborated upon the children’s question with references to the mind (e.g., the dog was feeling pain).

Taumoepeau and Ruffman (2006) conducted a study using a similar picture task as that used by Ruffman et al. (2002) and found that a mother's use of desire terms when the child was 15 months of age was a "unique predictor" of children's mental state language and performance on an emotion task at 24 months of age. Taumoepeau and Ruffman (2008) subsequently found that mothers' references to others' thoughts and knowledge at 24 months of age predicted children's mental state language at 33 months of age. They state that Vygotsky's zone of proximal development "provides a framework within which maternal talk, first, about the child's desires and then about others' thoughts and knowledge, scaffolds children's social understanding."

According to the weak linguistic determinism "hypothesis" thoughts are influenced by a person's language (Kay & Kempton's 1984). This hypothesis suggests that the more exposure and the greater amount of cognitive mental state terms available to children, the more the children will focus on the mind and see it as important in their environment. Lieven (1994) comments that children often use utterances in the appropriate situations when they do not seem to have a clear understanding of what the phrase or words mean, suggesting that they are extracting words from their environment, specifically from their parents. Eventually children learn the meaning of the words and are able to produce them in the appropriate contexts. Therefore, the children who hear and produce more cognitive mental state terms will be more focused on the mind as a pivotal indicator in assessing other peoples' behavior.

Previous research has also investigated the relation between mental state terms and the amount of pretend play in which a child engages (Hughes & Dunn 1997, Nielsen & Dissanayake 2000). Hughes and Dunn (1997) videotaped four-year-old preschoolers

playing with a peer and coded the frequency of mental state terms. They found that children who used more mental state terms were more likely to engage in pretend play than those that did not. Nielson and Dissanayake (2000) further explored this relationship and found that increased usage of mental state terms such as “thinking” “believing” “remembering” by children was correlated with the complexity of pretend play activities when the children interacted with their parents. Youngblade and Dunn (1995) found a strong relationship between the amount and complexity of pretend play and performance on false belief tasks when mental state terms were used frequently outside of the pretense context. Though the types and complexity of pretend play have been looked at, mental state understanding during pretense has not been correlated with mental state terms used by parents.

### **The Current Study**

The current study was designed to explore factors that may affect young children’s performance on understanding mental state tasks and provide further explanations for their errors on these types of tasks. The study had two focuses, addressing the effect of the salience of action and examining how the amount of mental state terminology used by their parents may influence children’s performance on tasks that require an understanding of the mental states of others. Two different age groups were included in the current study: three- and four-year-olds. Although past research has revealed that three-year-old children rarely succeed on standard mental state tasks using forced-choice paradigms and non-contradicting questions, researchers have had success with four-year-olds on these tasks. An important component of this project was not only to compare possible differences in performance between these age groups but also to test

if action saliency is an influential factor on performance in children who usually perform well on these tasks.

As already suggested in previous research, children may have trouble ignoring information about what the intentions of a pretender are due to interference from the action of the pretender. If action interferes with the ability of the child to appreciate and focus on the mental information of the pretender, then varying the saliency of action should affect the performance of the child. Previous researchers have attempted to increase the saliency of the mental state of the pretender by providing information with visual cues. For example, as noted earlier Bruell and Woolley (1998) used thought bubbles above a character to highlight the mental state of the pretender. However, it is unclear if successful performance by younger children was due to an increased focus on the mind or to a focus on the bubble itself due to its prominent placement in the scene.

In the current experiment each child was given background information about two actors. One actor had knowledge of an animal he was pretending to be whereas the other actor had knowledge of a non-animal related activity (e.g., playing soccer). The information afforded them a plausible explanation for each actor's behaviors, which was designed to help them maintain a distinction between the actor's knowledge and behavior. The child saw the two actors moving simultaneously on a television screen in a dynamic condition, or saw only a paused frame depicting actors as if engaged in a particular behavior, the static condition.

On some trials (*Same Related Action* presentation format), both actors were engaged in the same action, one consistent with the knowledge that had been presented to the child about the actor's pretending and one whose actions were similar but was not

described as pretending. Of interest was how a child responded when he or she could not use action as an indicator of what the actor was thinking. More specifically, could the child use the knowledge the actor possessed as the basis for judging who was pretending and who was not when actions were the same and consistent with the knowledge the one character possessed?

On other trials (*Contradictory Action* presentation format) the knowledgeable actor who was pretending to be a particular animal acted inconsistently in terms of the normal behavior of that animal while the actor not familiar with the character's typical actions behaved consistent with the actions of that animal even though that actor had no knowledge of its normal behavior. Based on previous research carried out by Lillard (1993b) it was anticipated that children would have difficulty ignoring action, particularly when it was more salient as in the dynamic condition.

In the third presentation format (*Same Unrelated Action*), both actors engaged in the same action. However, this action was inconsistent with both actors' knowledge about the pretended character. For this presentation format, children needed to ignore the action of both actors since neither actor was behaving in accordance with the pretend animal's identity. Children had to use the knowledge the actor possessed as the basis for judging who was pretending and who was not since the actions were the same but unrelated to the knowledge that either character possessed.

Four-year-olds should have more success on each of these three presentation formats; past research using a forced-choice paradigm and a similar presentation format (e.g., contradictory action trials) with this age group has found successful performances on mental state tasks by children this age when mental state information related to the



actor was provided to the children (Sobel 2004). Since three-year-olds' understanding may be sensitive to the contradictory information that was presented, it was anticipated that three-year-olds would have difficulty overriding the action information, and especially if action itself is more salient as should be the case in the dynamic condition compared to the static condition. In contrast, three-year-olds were predicted to perform more successfully on the mental state tasks when the information given to them about each of the actors was more consistent with the actors' behaviors. However, as the behavior of the actor became more inconsistent with the actor's knowledge (that is, did not match the anticipated action associated with that knowledge)- ultimately contradicting it in the Contradictory Action presentation format - it was anticipated that the three-year-olds would have difficulty inhibiting the tendency to use action as a predictor of what the actor was thinking about. Three-year olds could be expected to display even greater performance difficulties during trials when the actor exhibited a dynamic behavior and this behavior contradicted what the actor knew. Overall, three-year-olds' performance was expected to deteriorate as the inconsistencies between the knowledge and behavior of the actors increased across the presentation formats.

In contrast, a finding revealing that children performed poorly when action was static and consistent with knowledge, just as when it was dynamic and inconsistent, would suggest that action saliency had little affect on their performance. These findings would not provide support for Lillard's (1993b) theory that young children view pretend play in terms of the actions of other individuals and their deficient understanding of mental states in others is the basis for their poor performance.

These tasks used a forced choice paradigm. Ganea et al. (2004, Experiment 2) found that both four- and five-year-olds experienced difficulty when asked if a person that looked like a bear, but who was actually looking for her keys, was pretending to be a bear. The majority of children at both ages answered incorrectly that the woman was pretending to be a bear although they were fully aware that her intention was to look for keys. Ganea et al. (2004, Experiment. 3) changed the methodology of the original study by providing children with a forced choice task. Now four- and five-year-olds were more successful when asked, “Is she pretending to be a bear or is she looking for her keys?” The children in the present experiment were asked to point to which of the two characters appearing before them was pretending to be a specific identity. As mentioned previously, Sobel (2004) also found successful performance on a task with 4-year-old children when they needed to decide which character was pretending using a forced choice design. Thus, a forced choice design that seemed easier for younger children to understand and perhaps succeed on earlier than with more complicated tasks or reliance on verbal answers, was used in this study.,

The relation between the amount of mentalistic language used both by the parent and the child during two different activities, pretend play and storybook reading, and the child’s performance on the mental state tasks was also examined in the present study. Observations of the parent and child interactions in the lab were videotaped and coded for usage of mental state terms. As previously pointed out, mental state usage by parents during verbal interactions with children and storybook reading has been found to be associated with performance on theory of mind tasks (Adrian et al. 2005, Jenkins et al. 2003, Youngblade & Dunn 1995). However, the present experiment was the first to

investigate the relation between mental state language and performance on mental state tasks.

An additional interest concerned possible differences between the frequency of mental state utterances during the pretend activity versus the frequency of mental state utterances during storybook reading. Frequency of mental state utterances by parents has been reported to be greater during storybook reading than during naturalistic observations of parents and children or when looking at picture books (pictures without words) together. In the present study an even stronger relation may exist between pretend play utterances and performance on pretend mental state tasks compared to that observed during storybook reading since the play activity shares a more similar pretense context with the mental state task.

In summary, the children in the present study engaged in storybook reading and a pretend play activity with their parent as well as a separate task concerned with their understanding of mental states and pretense. The current study aimed to further explore the influences on children's understanding of others' mental states, specifically in a task involving pretense. In an effort to eliminate some of the confusion and address potential explanations for children's performance, the current study was the first to systematically manipulate presentation format and action (dynamic/static) in mental state tasks.

## **CHAPTER 2**

### **METHOD**

#### **Participants**

The participants were seventy-five children between 3 and 5 years of age from the Amherst and Springfield, MA communities. Children's names and contact information were obtained from town hall birth records, birth announcements, parental responses to flyers distributed to local preschools and information purchased from a commercial firm that offers lists of parents. Two participants were excluded from the analyses due to a failure to sustain attention to the task. These two children had difficulty listening to the experimenter and were easily distracted during the experiment. Forty-one, 3-year-old children (mean age 40 months: ranging from 36 months to 42 months) and thirty-two, 4-year old children (mean age 52 months: ranging from 48 months to 56 months) remained. There were thirty-eight male and thirty-five female participants. The children were predominantly of Caucasian ethnicity and middle to upper-middle class backgrounds.

#### **Materials**

One digital camera was used to record the parent-child interaction and language usage and the child's behavior during the mental state task. A number of objects designed to promote pretend play activities were available in the room while parents and children participated in the pretend play interactions. A bucket containing kitchenware, stuffed animals, plastic figures, dress up clothing and hats (e.g., ballerina outfit, firemen hat, construction hat, etc) were available to the participants (a complete list of the objects provided to the parents and children during the pretend play activity can be seen in Appendix A). Two books were used during the storybook reading activity: "I Forgot" by

Mercer Mayer and “The Rainy Day” by Anna Milbourne and Sarah Gill. After the parent-child interactions, the toys and books were removed and an art box containing stickers, construction paper and markers was brought into the room to create pretend hats that were used for the mental state task.

For the mental state task twelve different animal-appropriate actions produced by actors were videotaped. The animals used as examples and the actors’ behaviors associated with these animals can be seen in Table 1. Twelve different actors were used in the video stimuli (seven females and five males). Each actor portrayed the behaviors of two different animals, resulting in 24 video segments (two versions of each of the 12 animal behaviors). Two versions of each animal behavior were required during the Same-Related presentation format since both actors were exhibiting the same animal behavior, even though one actor was knowledgeable about that animal and the other actor was not.

Each pair of actors had different physical characteristics, including hair color and clothes, so it would be easier for the child to distinguish between the two actors. Actors did not display emotion (e.g., smiling or frowning) or behavioral cues associated with the animals (e.g., sucked in cheeks if acting like a fish) in the examples, with their faces. Actors only used their bodies in demonstrating the animal behaviors.

**Table 1: Animal Identities Used During the Mental State Task and the Actor's Behaviors Associated With Them**

Animal Identity	Actor's Behavior
Bunny	Bouncing up and down, standing up-right, hands curled in front of body
Dog	Walking on hands and knees
Elephant	Waiving one arm up and down in front of face (to suggest elephant trunk)
Chicken	Arms on hips, elbows flapping up and down in a synchronous motion
Monkey	Arms outstretched and uneven on sides moving up and down in a synchronous motion
Frog	Hopping up and down in crouching position
Fish	Swimming arms at shoulder height in a synchronous motion
Bird	Arms outstretched, waiving up and down in a synchronous motion
Spider	Wiggling fingers up and down with hands next to face
Crocodile/Alligator	Open and close entire arm in front of face (to depict a biting action)
Snake	Slithering on floor
Penguin	Waddling back and forth while standing upright

A dvd player and television were used to present the six pairs of static or dynamic stimuli given to each child on the mental states task. Dynamic stimuli were created from the original movie clips of the twelve actors. Using Final Cut Pro the individual movies were spliced together to create a split screen effect. Two actors, side-by-side appeared in the clip moving according to the animal behavior they were assigned. In the static

condition a specific frame from the original video of the actors was captured and paused to create a still image of the actor's behavior thereby eliminating movement from the stimuli.

In both the dynamic and static conditions two actors appeared on screen at the same time using the split screen image. Actors were engaged in animal appropriate or animal inappropriate behaviors based on which of the three presentation formats they were modeling. In the static condition, pairs of actors shown paused in displaying an animal behavior were visible in the televised image on each trial. When using the dynamic images, pairs of actors were also side-by-side on the screen. The actors remained still for five seconds as the experimenter labeled and pointed to each of them. After five seconds, each actor simultaneously began his or her behaviors. The static image or the dynamic sequence of movement continued to be visually available to the child until he had answered the mental state questions.

### **Design and Procedure**

After the parent completed the informed consent form, the experimenter explained the procedure for either the pretend play or storybook phase of the experiment (order was counterbalanced). During this time the child was free to explore the room and play with the available toys.

### **Parent-Child Interaction**

The experimenter instructed the parent to engage the child in pretend play and storybook reading activities for ten minutes each. For the pretend play segment, the experimenter provided examples to the parents on how to keep the pretense structure going throughout the entire time period. For example, the parents were informed they

could use their imaginations to be superheroes or pretend creatures that fly around the room or could cook dinner with the plastic kitchen set, etc. The experimenter asked the parents to involve their child in role-play with themselves or with the toys present in the room. Parents were told that they could improvise and use as many or as few of the toys as they desired. The experimenter emphasized that the parent should try to engage his or her child in pretend play activities for the entire time. The experimenter then left the room. Parent and child were videotaped during their pretend play; no parent objected to the use of videotaping during the experiment.

For the storybook reading activity, the experimenter presented the parent with the two books. Each book had a small amount of written text and detailed pictures. “Rainy Day” was approximately 20 pages long and described the actions of a group of young children as they jumped in puddles and explored nature and animal behavior on a rainy day. This particular book was selected because it had vibrantly colored pictures, few written words and discussed topics interesting to children. “I Just Forgot” was 22 pages long and described a day in the life of a small animal called the “little critter.” Activities included brushing teeth and picking up toys; familiar childhood issues encountered by the main character. Throughout the story the little critter forgets many of these activities and gets into trouble but his friends and family aid him. This book was selected for its references to the mind and the popularity with the little critter character with preschool age children. The parents were told that they should read to their child as they do in their own homes. However, they were also encouraged to elaborate on the pictures in the book. They were informed that they could come up with their own stories associated with the pictures or simply describe what was going on in the book.



After the pretend play and storybook activities, the parents were given a brief survey asking about other children in the house, parental education, time spent on reading and television watching, and the amount of time the child spends out of the home. The survey distributed to the parents can be found in Appendix B.

### **Construction of the “pretend hat”**

After the parent-child interactions, the experimenter removed the books and toys from the room and brought in art supplies that the experimenter and child used to create a “pretend hat.” While the child created the “pretend hat” his or her parent completed the survey described above. The pretend hat was used to further familiarize the child with the experimenter and engage them in an activity designed to make them more comfortable with the pretense activity. The experimenter said:

“ Now we are going to play a pretend game, but first we need to make a pretend hat. You get to pick out the color and then we are going to put stickers and your name on it. When someone wears a pretend hat it means they are pretending. Here is my pretend hat.” (Experimenter placed pre-made hat upon her head) “How about we make one for you too and that way we can pretend with it? After we are done you can take it home and use it to pretend with mom (or dad).”

The experimenter presented the child with stickers, markers, etc and aided them in making the pretend hat. After the hat was made and placed upon the child’s head, the child was then trained to pretend when wearing the hat versus when he or she was not wearing the hat.

“Now that we have our pretend hats, let’s use them to pretend.”

(Experimenter brought out a pitcher and a cup.) “I am so thirsty, are you thirsty? I think I would like something to drink. What do you think we should have?” (Waited for child’s response.) “That sounds great. Could you pour me some? What about some for mom/dad?” (Waited until child engaged in activity to proceed, if necessary the experimenter asked for parent’s help.) “See, when I am pretending I wear my pretend hat and when I am not pretending and I take my hat off.”

The experimenter and the child took off their hats and the experimenter asked the child if anything was in the cup and pitcher in front of them. If the child failed to indicate that “nothing” was in the cup and pitcher, the pretend hat’s purpose was explained to the child again until he responded that nothing was in the cup unless he or she was wearing the hat and was pretending. After the correct response was given, the experimenter and the child placed their hats back on their heads and the experimenter asked the child again what he thought they should drink. After responding with a beverage and pretending to drink out of the cup the experimenter said: “You are terrific at pretending. Now I need some help with another pretend game.” (Experimenter puts away the cup and pitcher.) The child was told that we would be playing a game where he/she must decide who gets the pretend hat.

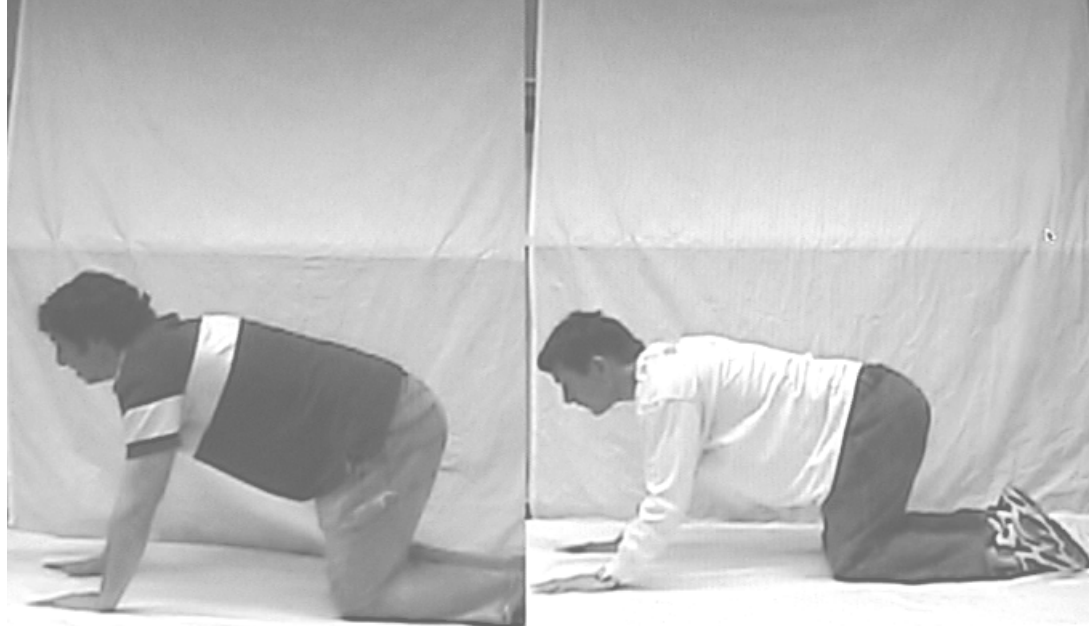
## **Mental State Task**

Children were presented with six trials (all six either dynamic or static) for the mental state task. On each trial one actor had knowledge of the character he or she was pretending to be, even if he was not acting consistently with the behavior of that character, and the other actor did not have the same knowledge. In the Same Related Action and the Same Unrelated Action presentation format each pair of images included characters that were behaving identically. For the Contradictory Action presentation format each character in the pair engaged in activities that were different, the knowledgeable character displaying an activity that did not match his knowledge of the animal, the unknowledgeable character of the animal identity producing an activity that corresponded to what a knowledgeable character might display.

Two trials were presented for each of the three presentation formats (Same Related Action, Contradictory Action, Same Unrelated Action). Before the beginning of the task, parents were asked whether each of the animals and behavioral actions associated with each animal and used in the study was familiar to the child. All 73 children were believed by their parents to be familiar with the animals used for the identities except for the term “crocodile.” Five of the children were more familiar with the term “alligator” and it was substituted during the mental state task trial involving that animal.

In the Same Related Action presentation format, both actors were engaged in the same action, one actor was described as possessing knowledge about an animal consistent with the action that was portrayed and one actor with knowledge that was inconsistent with his actions. Which actor was knowledgeable about the animal during this

presentation format was counterbalanced. An example of the televised image children saw during this trial can be seen in Figure 1a.



**Figure 1a: Example of Televised Image Children Saw During the Same-Related Action Presentation Format Trials on the Mental State Task (The Actor Identified as Knowledgeable Was Counterbalanced)**

The child was also told about an additional piece of information for each actor. For example, the actor who was knowledgeable about the animal consistent with the action he or she was portraying (e.g., knew about dogs and was acting like a dog) was told he does not know about swimming. However, the other actor (who was not knowledgeable about dogs yet was also acting like a dog) was described as knowledgeable about swimming. Therefore this second actor also had some positive knowledge (but not about the action being portrayed) whereas the first actor lacked this knowledge. This information was added to the descriptions about the two actors to rule out the possibility that the child selected the first actor simply because they had

knowledge about something whereas the second actor did not. As an example of the instructions for this presentation format the child was told:

“Look at what I have here. I have a little pretend hat just like our pretend hats and one of these boys is going to wear it.” (The small pretend hat was made of construction paper with a small piece of double stick tape adhered to the paper so it could be attached to the television.) “This is Bill.” (The experimenter pointed to the character on the right of the screen.) “This is James.” (The experimenter pointed to the character on the left of the screen) (Position of frames and order of descriptions were counterbalanced). “Both Bill and James are crawling around on their hands and knees. But they are different because Bill knows so much about dogs. He has a dog and reads all about dogs (pointing to Bill). James is from far away and has never seen a dog. He has never read about dogs and does not know what a dog is (pointing to James).” “There is something Bill does not know about though. He does not know about swimming. He has never read about swimming and has never seen anyone swimming before (pointing to Bill). James does know about swimming. He reads all about swimming and has seen people swimming before (pointing to James). One boy is pretending to be a dog and one boy is swimming. “Can you point to the boy pretending to be a dog so we can give him a pretend hat just like our hat?”

If the child displayed apprehension or did not point, the experimenter prompted him/her by saying. “You are such a great pretender and I can’t figure

out which of these boys should get to wear a hat like ours, the boy pretending to be a dog should get it. Which one do you think it is?" After the child selected the actor to place the "pretend hat" upon, the experimenter praised the child's effort, regardless of if the child chose the knowledgeable or unknowledgeable actor.

If the child understood that only someone who had knowledge of a dog was able to pretend to be a dog, even though both actors were engaged in the same action, he or she should choose Bill. In contrast, if the child did not understand that knowledge was important in pretend play and instead based his or her response only on the behavior of the actors, the child should be equally likely to choose either Bill or James to assign the hat to since both actors were behaving in the same way.

In the Contradictory Action presentation format instructions were similar to the Same Related Action presentation format except that the experimenter informed the child of the actor's knowledge but that actor performed actions that did not support that knowledge. In contrast, the actor who had no knowledge of the appropriate behavior nevertheless produced actions consistent with that knowledge. An example of the televised image children saw during this trial can be seen in figure 1b.



**Figure 1b: Example of Televised Image Children Saw During the Contradictory Action Presentation Format Trials on the Mental State Task (The Actor Identified as Knowledgeable Was Counterbalanced)**

For example the experimenter said:

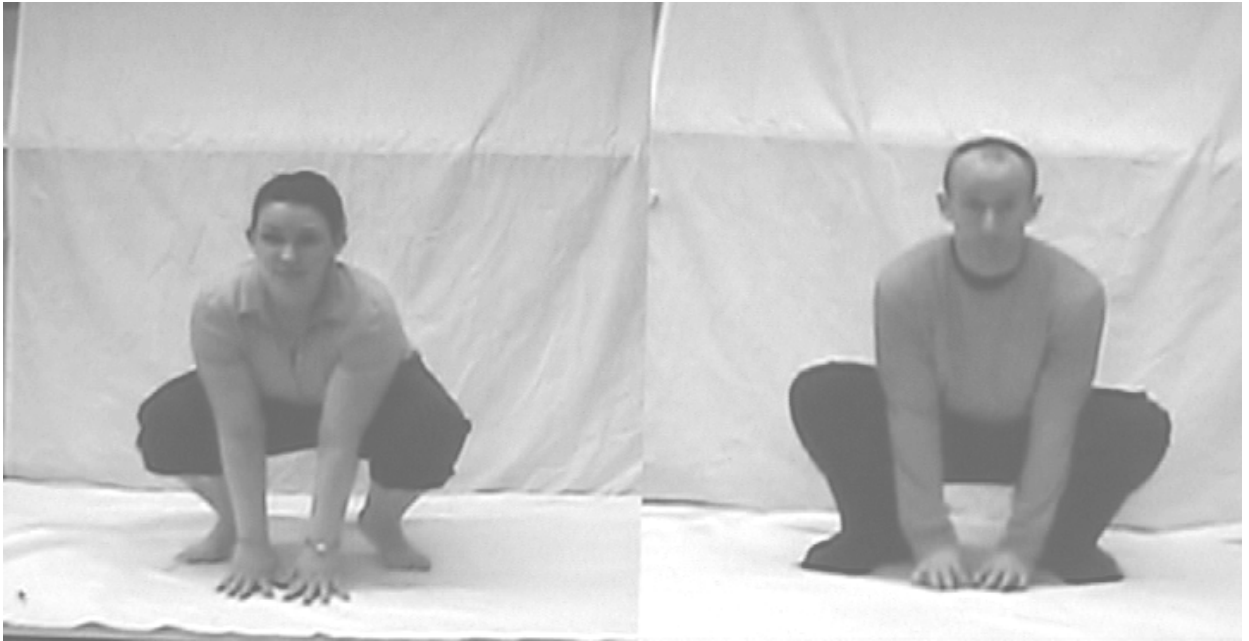
“This is Kate and this is Susie.” The experimenter pointed to the character on the left of the screen (order of images and descriptions were counterbalanced). “Kate is waiving her hands back and forth and up and down. Susie is slithering on the floor. They are also different because Kate knows so much about snakes (pointing to Kate). She has a snake and reads all about snakes. Susie is from far away and has never seen a snake. She has not read about snakes and does not know what a snake is (pointing to Susie). But there is something Kate does not know about. She does not know how to do gymnastics (tumbling). She does not know what gymnastics is and has never seen anyone do gymnastics (pointing to Kate). Susie does know what gymnastics is. She reads all about gymnastics and has seen people do gymnastics (pointing to Susie).” “Now I need your help. One girl is pretending to be a snake and one girl is doing

gymnastics, can you point to the girl pretending to be a snake so we can give her a pretend hat just like our hat?”

If the child understood that only someone who had knowledge of a snake was able to pretend to be a snake, regardless of action, he or she was expected to choose Kate for the pretend hat. If the child did not understand that knowledge was important in pretend play or could not inhibit the tendency to select a prototypical action to make his or her decision, then Susie would be expected to be chosen more often since the child would look at her behavior as indicative of her pretending despite lack of knowledge of that animal.

Instructions for the Same Unrelated Action presentation format were similar to those described above for the other two conditions in that the experimenter informed the child of the actor’s knowledge. However, now both actors behaved in a similar manner and for the actor who was described as possessing knowledge, unconventionally with respect to this knowledge. An example of the televised image children saw during this trial can be seen in figure1c.





**Figure 1c: Example of Televised Image Children Saw During the Same-Unrelated Action Presentation Format Trials on the Mental State Task (The Actor Identified as Knowledgeable Was Counterbalanced)**

For example the experimenter said:

“This is Jenny and this is Kevin.” The experimenter pointed to the left of the screen (order of images and descriptions were counterbalanced).

“Jenny is hopping up and down. Kevin is also hopping up and down.

They are different because Jenny knows so much about frogs. She has seen a frog and reads all about frogs (pointing to Jenny). Kevin is from far away and has never seen a frog. He does not read about frogs and does not know what a frog is (pointing to Kevin). There is something Jenny does not know about though. Jenny does not know how to dance. She does not know what dancing is and has never seen anyone dance (pointing to Jenny). Kevin, on the other hand, knows all about dancing. He reads

about dancing and has seen people dancing (pointing to Kevin). ” “Now, one person is pretending to be a frog and one person is dancing. Can you point to the person pretending to be a frog so we can give him/her a pretend hat?”

If the child understood that only someone who had knowledge of a frog was able to pretend to be a frog, regardless of action displayed, he or she should choose Jenny for the pretend hat. If the child did not understand that knowledge was essential for pretend play, he could not rely on the irrelevant behaviors of either of the actors in this condition. In this case, the child was expected to randomly choose Jenny or Kevin.

Following the child’s selection on each trial, he was asked why he chose the actor for the pretend hat. If the child did not respond that he or she chose the actor because “He *knew* about the animal.” the experimenter asked the child to point to the actor who knew what the animal was. If the child chose the actor who had no knowledge of the animal, the experimenter pointed out which actor has such knowledge before proceeding to the next trial.

After completing all six trials on the mental state task, the experimenter then thanked the parent and child for participating and presented the child with a small token of appreciation (e.g., play-doh, coloring book, stuffed animal, etc.).

Children were randomly assigned to one of three different orders of trials for the presentation formats. One trial of Same-Related, Contradictory, and Same-Unrelated presentation formats occurred in each block of three trials and the same presentation format was never displayed in succession.

Children were also randomly assigned to one of two animal identity groups. The animals used and their accompanying actions for the two groups can be found in Appendix C. These two groups differed by reversing the roles of the Contradictory Action trials of the two animal behaviors. During the Contradictory Action presentation format each child saw contradictory behaviors more closely associated with an animal not described in that presentation format. For example, for group A, the child was told the actor knew about dogs but saw the knowledgeable actor flapping arms up and down more prototypical of a bird's behavior. On the other hand, for group B, the child was told the actor knew about a bird but saw the knowledgeable actor walking around on his hands and knees more prototypical of a dog's behavior.

### **Data Scoring and Analysis**

#### **Parent-Child Interactions**

The experimenter coded the parent and child's mental state utterances from the videotape recordings obtained during each of the ten-minute pretend play and storybook phases of the experiment. The criteria selected for scoring mental state utterances was based on previous approaches developed by Jenkins et al. (2003) and Ruffman et al. (2002) that showed a consistent relationship between certain categories of mental state terms and performance on false belief tasks and increased complexity of pretend play.

Mental state talk was divided into four categories: desire, emotion, cognitive, and modulations of assertion. Desire talk included terms used to describe the parent or child's wants or goals during the reading and pretend play activities and included expressions such as *want*, *hope* or *wish* and variations of such terms (Shatz et al. 1983). For example, utterances like "I want to read this book" or "I wish we had real food" were

coded as desire talk. *Like* and *love* were also coded as desire talk if they were used to convey a want (e.g., “I like to have ice cream for dinner.”) Repetitions of other or one’s own utterances were excluded. For example, if a parent said “Do you want a plate?” and their child responded, “I want a plate” only the *want* uttered by the parent was coded as desire talk, as the child’s response may have been an imitation of the parent’s initial usage of the word.

Emotion talk included terms used to denote an emotional state or feeling. *Mad*, *excited*, *happy*, *afraid* and variations of these words were coded as emotional talk (Dunn et al., 1987). *Like* and *love* were included in this category if they referred to emotions or enjoyment (Jenkins et al. 2003). Physical states including pain, hurt, smile and hungry or nonverbal expressions like crying or laughing were not included as emotion talk as they are not considered referencing the mind or an internal emotional state. Repetitions or unclear use of the term were excluded from coding.

Cognitive talk included references to the mind, specifically knowledge, memories and thoughts. Words including *think*, *know*, *pretend*, *remember* and variations of these words were coded as cognitive talk. “I don’t know” was excluded from coding as this is a common response and there is no indication that the speaker is referencing the mind. If the parent or child elaborated with specific details regarding their thoughts on the “I don’t know” statement with an utterance such as “I don’t know where the bear is” it was included in the mental state coding as a cognitive utterance. Repetitions of one’s own or others’ utterances or unclear meanings of a term were also excluded during coding (Jenkins et al. 2003).

Modulations of assertion are used to strengthen or weaken a statement. Terms including *might*, *perhaps*, *maybe* and *bet* were coded as modulations of assertion (e.g., “He is hiding under the table, perhaps” or “I bet his mom has a surprise for him”) (Ruffman et al. 2002). Though there has been some disagreement as to how to code statements such as “Yes, I know” by past researchers (Brown & Dunn 1991; Jenkins et al. 2003; Ruffman et al. 2002), these utterances were classified as cognitive talk, not modulations of assertion, as they referenced the mind and cognitive talk was a main focus for comparison with mental state task performance.

It was possible for a single sentence to include more than one mental state term (e.g., “I don’t *think* he *wants* his mom to be *mad* at him”) and it was coded according to the number of mental state utterances used during each statement (e.g., 3). For this example “think” would be coded as cognitive, “want” as desire and “mad” as emotional terminology.

To insure reliability a trained research assistant coded 20% of the interactions for mental state talk. Agreements were categorized as the same word labeled by both coders as a mental state term. Disagreements were considered those where one coder believed the utterance to be a mental state term and the other coder did not. Percentage agreement between the main experimenter and the second coder (calculated as  $\text{agreements}/(\text{agreements} + \text{disagreements})$ ) was 94%.

Table 2 summarizes the four categories of mental state utterances and provides examples of utterances given by parent or child to fit these categories.

**Table 2: Coding Criteria for Mental State Utterances Used During the Parent-Child Interactions**

Categories	Examples
Mental State Utterances	
Desire	Any expression that contained words such as <i>want, like, love, hope, wish, dream, prefer</i>
Emotion	Any expression that contained words such as <i>happy, sad, unhappy, feel, grumpy, angry</i>
Cognitive Speech	Any expression that contained words such as <i>think, know, remember, believe, forget, pretend, understand, wonder, expect</i>
Modulations of assertion	Any expression that contained words such as <i>might, maybe, perhaps, possibly, probably, could be, must, certainly, definitely, sure, guess, figure, reckon, certain, suppose, curious, bet</i>

### **Mental State Task**

Each trial of the mental state task was scored on the basis of whether the child picked the actor whose knowledge permitted the opportunity to engage in pretense. This choice was considered correct even if the actions were not typical as in the Unrelated Action condition and the Contradictory Action condition (correct = 1) The maximum number of points a child could obtain for the mental state task was 6 (2 for each presentation format). Examples of the coding sheets used to score the children's performance can be found in Appendix D.

Reliability was assessed by having a trained undergraduate research assistant view the videotapes of the child's mental state task. The second observer viewed 25% of the

experimental sessions. Percentage agreement between the main experimenter and the second observer (calculated as agreements/agreements + disagreements) was 98% for the task.

## CHAPTER 3

### RESULTS

#### Performance on Mental State Trials

A preliminary analysis was carried out to examine the effect of gender, order, and animal identity using a 2 (gender) x 3 (order of trials) x 2 (animal identity) ANOVA. There were no significant main effects or interactions involving any of these factors; therefore, the data were collapsed over these factors.

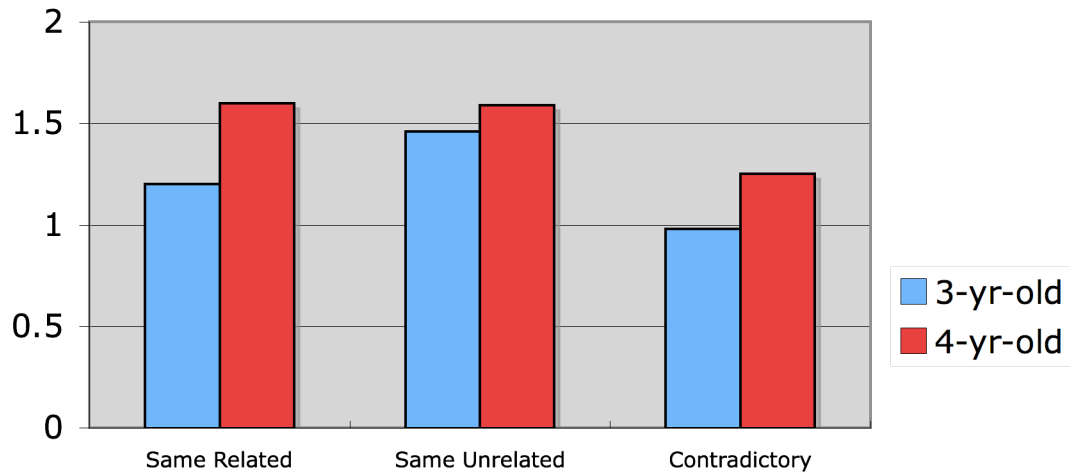
Three-year-olds obtained a score of 3.63 (1.37) and four-year-olds a score of 4.44 (1.52) correct out of 6 trials on the mental state task. A 2 (age) x 2 (dynamic versus static condition) x 3 (presentation format) repeated measures ANOVA demonstrated a main effect for age ( $F(1, 69) = 5.11, p < .05$ ). Both 3- and 4-year-olds performed significantly above chance ( $t = 2.96, p < .01$ ;  $t = 5.34, p < .001$ , respectively). The ANOVA further revealed a significant difference for presentation format ( $F(2, 138) = 8.06, p < .01$ ). However, no significant condition, condition x presentation format, or 3-way interaction was found.

The results indicate that, as anticipated, 4-year-olds selected the appropriate individual as pretending significantly more frequently than the 3-year-olds. It was also hypothesized that if children associate action with pretend play they would have a more difficult time choosing an actor, especially one moving in a contradictory way to the typical actions of an animal in the dynamic condition, compared to an actor who was not moving and only labeled as behaving in a non-prototypical way in the static condition. However, children of both age groups performed similarly regardless of whether the actor



was dynamic (moving) or static on the television screen. More specifically, three-year-olds scored a mean of 3.39 correct for the static condition and 3.94 correct on the dynamic condition. The 4-year-olds' mean was 4.39 on the static condition and 4.5 on the dynamic condition.

Figure 1 displays the mean performances for each of the three presentation formats for the two age groups. As can be seen in Figure 1, four-year-olds performed significantly above chance on the Same-Related and Same-Unrelated trials ( $t = 5.99, p < .01$ ;  $t = .46, p < .01$ , respectively), but not on the Contradictory trials; these trials were, indeed, more difficult even for the four-year-olds. Three-year-olds were significantly above chance but only on the Same-Unrelated trials ( $t = 4.66, p < .001$ ); they were only marginally significantly above chance on the Same-Related trials ( $t = 1.95, p = .058$ ,) and slightly below chance on contradictory trials. Three-year-olds did somewhat more poorly on the second Same-Related trial (27 of the 41 3-yr-olds selected correctly on the first trial, but only 22 did so on the second trial) and this decline in performance may have contributed to this marginal finding for the presentation format.



**Figure 2: Number of Trials Correctly Chosen by 3-Year-Olds and 4-year-olds for Each Presentation Format on the Mental State Task ( $N = 73$ )**

As suspected, it was more difficult for children to correctly select the knowledgeable actor on the Contradictory Action trials where the side-by-side comparison involved a non-knowledgeable actor who behaved more prototypically as the animal. Four-year-olds performed worse on the Contradictory Action trials in comparison to the Same-Related and Same-Unrelated Action trials ( $t = 3.298, p < .01$ ;  $t = 3.23, p < .01$ , respectively). Three-year-olds also performed worse on the Contradictory Action trials in comparison to the Same-Unrelated trials ( $t = 3.19, p < .01$ ) but not compared to the Same-Related trials. Neither 3- or 4-year-olds' performance on the Contradictory Action trials was significantly above chance.

Of particular interest in this study was investigating the difference in performance on the different presentation formats between children who did relatively well on the mental state task compared to children who scored lower on the task. Children who were

classified as doing relatively well on the task successfully selected the knowledgeable actor as the one pretending on 5 or 6 out of 6 mental state trials ( $N = 30$ ). This group included 13 3-year-olds and 17 4-year-olds. Those that scored lower were those that correctly selected the knowledgeable actor on 4 or less out of 6 trials ( $N = 43$ ). Twenty-eight 3-year-olds and 15 4-year-olds were included in this group. The mean levels of performance for those children that over, both age groups, did better compared to those that did not do as well for the three presentation formats can be found in Table 3.

**Table 3: Mean Level of Performance on the Three Presentation Formats Used During the Mental State Task for High vs. Lower Scoring Children Combined Over Both Age Groups ( $N = 73$ )**

	Same-Related	Same-Unrelated	Contradictory Action	Overall Mean
High Scoring	1.73	1.97	1.73	5.43
Low Scoring	1.12	1.21	.65	2.98

High scoring children performed equally as well on the Contradictory (mean = 1.73) and Same-Related (mean = 1.73) presentation formats. Children who scored higher nearly always made a correct response on the Same-Unrelated trials and significantly better on these trials in comparison to the Contradictory and Same-Related trials ( $t = 2.54, p < .05$ ;  $t = 2.54, p < .05$ , respectively).

For children who scored lower on the mental state task performance was similar on the Same-Related (mean = 1.12) and Same-Unrelated (mean = 1.21) trials but these children were significantly less successful on the Contradictory Action presentation format trials compared to the other two presentation format trials ( $t = 3.36, p < .01$ ;  $t = 3.72, p < .01$ , respectively). Children who scored lower on the mental state task performed above chance on the Same-Unrelated trials ( $t = 2.15, p < .05$ ) but this difference did not reach significance levels on the Same-Related trials. Perhaps of

greater interest, these children performed significantly below chance on the Contradictory Action trials ( $t = -3.33, p < .01$ ).

At the end of each mental state trial, the experimenter asked the children why they had selected a specific actor as the one pretending. Interestingly, those children who scored higher on the mental state task used mental state terms in their explanations (e.g., because he knew about birds) on 45 out of 180 trials (25%) but behavioral explanations (e.g., because he was flapping his arms) on only 4 out of 180 trials (2%). Children who scored lower on the mental state task used mental state terms in their explanations on only 17 out of 258 trials (6%) and behavioral explanations on 23 out of 258 trials (9%). On trials where neither explanation was given children had responded with “I don’t know,” “because,” or provided no response. Thus children who scored higher produced responses involving more frequent references to the mental state of the actor.

### **Parent-Child Interactions during Pretend Play and Storybook Reading**

Six participants were excluded from the parent-child interaction analyses due to speaking a foreign language during interactions ( $N = 2$ ) and the disruption of siblings that may have interfered with the language produced during the pretend play and reading portions of the experiment ( $N = 4$ ). A preliminary 2 (gender of child) X 2 (order of presentation of pretend play first versus storybook reading) ANOVA was conducted on the total number of mental state utterances expressed by the parent and child for the remaining 67 participants. Since no significant effects for either of these factors was found, the data were collapsed over these conditions for further analyses of the mental state language used and its relation to the children’s performance on the mental state task.

The means for each of the four categories of mental state terminology used by

children and parents during the parent-child interactions for the reading and pretend play periods can be found in Table 4. Parents expressed more mental state terms in their

**Table 4: Mean Number of Mental State Utterances and Standard Deviations (in parentheses) for Reading and Pretend Play Activities for Parents and Children**

	Desire		Emotion		Cognitive		Modulation Of Assertion		Total	
	Read	Play	Read	Play	Read	Play	Read	Play	Read	Play
3-year-olds ( <i>N</i> = 37)	1.68 (1.58)	3.14 (2.73)	.68 (1)	.32 (.82)	.62 (.68)	1.5 (1.83)	.19 (.57)	.32 (.78)	3.2 (2.58)	5.2 (4.69)
4-year-olds ( <i>N</i> = 30)	1.68 (1.42)	3.8 (3.52)	.73 (1)	.37 (.85)	1.13 (1.17)	2.13 (3.72)	.53 (.73)	.27 (.58)	4.1 (5.14)	6.6 (4.91)
Parents of 3-yr-olds ( <i>N</i> = 37)	4.97 (3.87)	7.65 (3.83)	1.7 (1.82)	1.12 (1.58)	10.43 (5.76)	6.24 (3.9)	1.5 (1.5)	1.5 (1.84)	18.6 (7.88)	16.5 (7.43)
Parents of 4-yr-olds ( <i>N</i> = 30)	4.1 (2.65)	9.1 (4.23)	1.5 (1.76)	1 (2.17)	11.3 (.79)	7.37 (4.74)	1.43 (1.72)	1.47 (1.6)	18.3 (9.3)	18.9 (9.54)

conversations than children; they produced 36 mental state utterances on average compared to children's 9.5 utterances across both age groups ( $t = 14.86, p < .001$ ). Emotion (mean = 2.67) and modulation of assertion (mean = 2.93) mental state terms were used less frequently than cognitive terms (mean = 17.57) ( $t = 14.21, p < .001$ ;  $t = 14.3, p < .001$ , respectively) and desire terms (mean = 12.87) ( $t = 14.07, p < .001$ ;  $t = 15.27, p < .001$ , respectively) by parents during the interaction portion of the study. Children used modulations of assertion (mean = .64) significantly less than emotion (mean = 1.05), cognitive (mean = 2.61) or desire terms (mean = 5.12) during the parent-

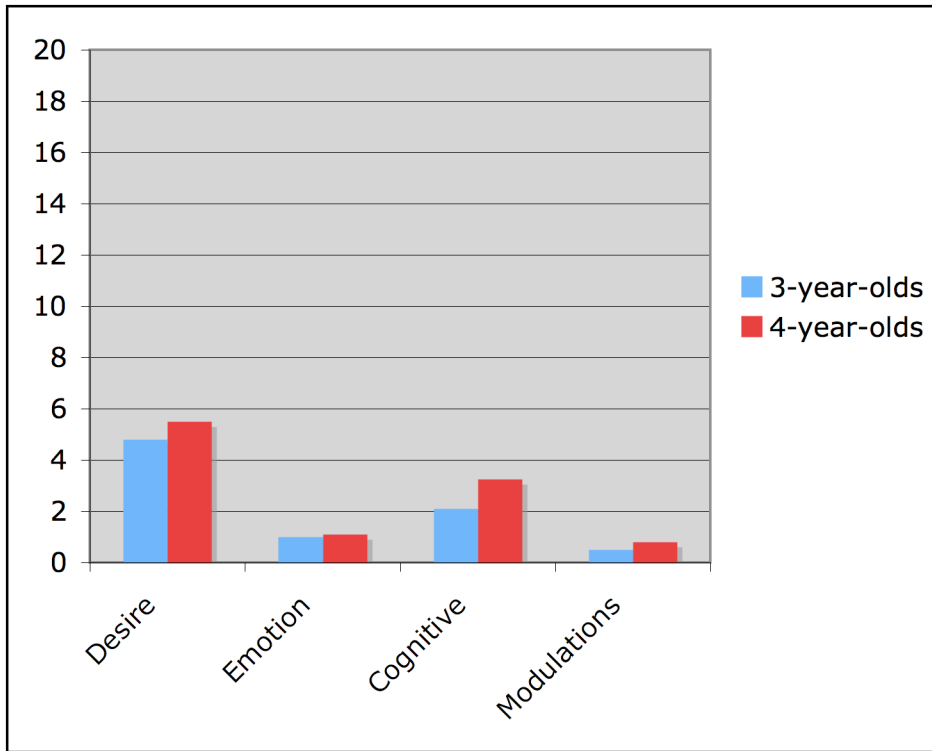
child interactions ( $t = 2.42, p < .05$ ;  $t = 5.2, p < .01$ ;  $t = 9.72, p < .01$ , respectively).

Emotion mental state terms were used less than cognitive or desire utterances ( $t = 4.12, p < .01$ ;  $t = 8.49, p < .01$ , respectively). Cognitive terminology was used less than desire mental state terms, the category used most often by children during the interaction period ( $t = 4.49, p < .01$ ).

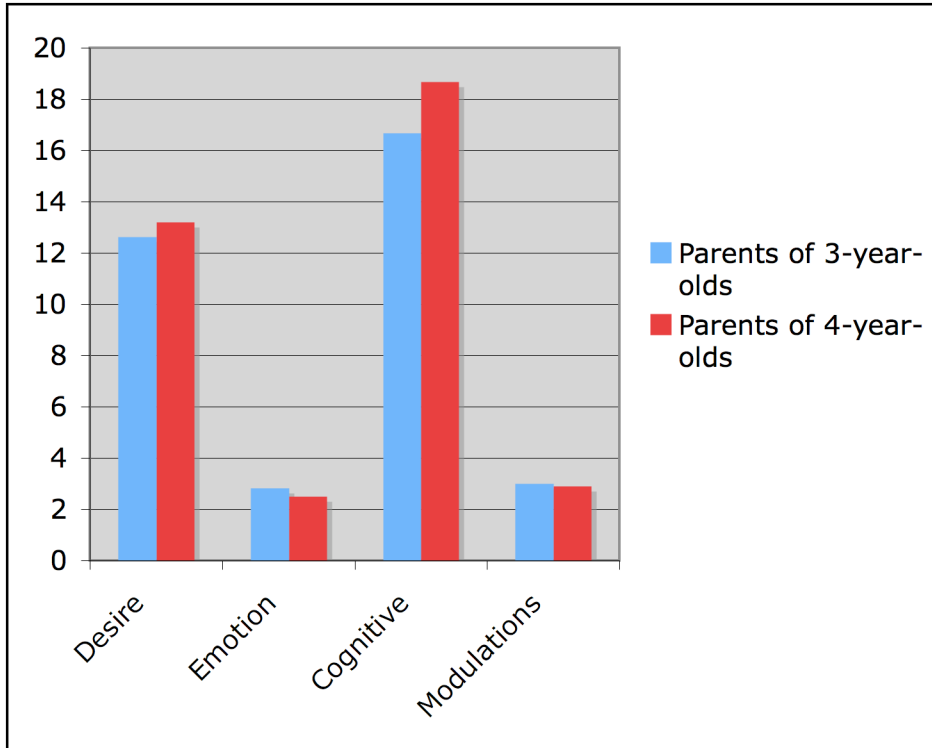
For both age groups combined, there was a greater frequency of desire mental state terms produced during pretend play than produced during reading activity by both parents and children ( $t = 7.08, p < .001$ ;  $t = 4.61, p < .001$ , respectively). Parents produced emotion and cognitive speech more frequently during the reading activity than during pretend play ( $t = 2.14, p < .05$ ;  $t = 3.3, p < .01$ , respectively). In contrast, children produced cognitive mental state terms more during the play period than the reading period ( $t = 2.74, p < .01$ ) but they, along with their parents, voiced more emotional mental state terms during the reading period compared to the pretend play period ( $t = 2.08, p < .05$ ). There were no significant differences found in the use of modulations of assertion between the play and reading periods.

Children in both age groups produced emotion and desire language about equally frequently, but four-year-olds produced cognitive language and modulations of assertion more frequently than the younger children during the reading activity ( $t = 2.24, p < .05$ ;  $t = 2.17, p < .05$ , respectively). The frequency of mental state language utterances produced by 3- and 4-year-olds for each mental state term can be found in Figure 3a. No differences were found between 3- and 4-year-olds' parents' usage of mental state terms in either the play or reading activity. The frequency of mental state language utterances

produced by parents of 3- and 4-year-olds for each mental state term can be found in Figure 3b.



**Figure 3a: Frequency of Mental State Language Utterances Produced by 3- Year-Olds and 4-Year-Olds for each Mental State Term Category ( $N = 67$ )**



**Figure 3b: Frequency of Mental State Language Utterances Produced by Parents of 3-Year-Olds and 4-Year-Olds for Each Mental State Term Category ( $N = 67$ )**

### **Language Use and Its Relationship to Mental State Task Performance**

The total number of mental state terms used by the parents was correlated with the children's performance on the mental state task ( $r = .321, p < .05$ ); children who scored higher on the mental state task had parents that produced more mental state utterances during the reading and pretend play interactions than children who scored lower. As can be seen in Table 5, when correlations with different types of mental state terms are considered, the strongest indicators of a higher score on the mental state task were use of modulations of assertion and cognitive language by the parents during the interaction periods ( $r = .27, p < .05$ ;  $r = .28, p < .05$ , respectively).

Children's total number of mental state utterances was not correlated with their performance on the mental state task. However, further analyses showed that during the



reading activity children's use of cognitive utterances was correlated with their performance on the task. There was also a relation between the overall number of modulations of assertion produced by children of each age group and the children's performance on the task. The total number of modulations of assertion and those used during the reading activity were significantly correlated with children's performance, but the number used during the play activity alone were not significantly related.

**Table 5: Correlations between Mental State Utterances and Children's Performance on Mental State Task for the Play and Reading Activities ( $N = 67$ )**

	Correlation with Mental State Score
<b>Parents' Utterances</b>	
Desire Total	.13
Reading	.13
Play	.13
Emotion Total	.06
Reading	.12
Play	-.03
Cognitive Total	.28 *
Reading	.21
Play	.23
Modulation of Assertion Total	.27 *
Reading	.19
Play	.21
<b>Children's Utterances</b>	
Desire Total	.04
Reading	.07
Play	.01
Emotion Total	-.04
Reading	-.01
Play	-.04
Cognitive Total	.17
Reading	.27 *
Play	.12
Modulation of Assertion Total	.26*
Reading	.28 *
Play	.12

\* Correlation is significant at the .05 level (2-tailed)

### **Parent Survey Information and Performance on the Mental State Task**

Parents reported that 3-year-olds watched an average of one hour of television a day and parents read to their children for about one hour a day as well. Four-year-olds averaged 45 minutes of television watching and an hour and fifteen minutes of storybook reading by their parents each day. The average years of education for each age group was 16.5 for mothers and 16 for fathers. The largest average difference found between the age groups was for hours spent outside the home with someone other than their primary caregivers. Three-year-olds averaged 3.6 hours a day while 4-year-olds averaged 5.6 hours each day under the supervision of someone besides their parents. Although past research has found a relation between the two, no significant correlation was found between the age of the siblings the children lived with and their score on the mental state task (McCalister & Peterson 2007, Ruffman, Perner, Naito, Parkin & Clements 1998).

The correlations between all survey responses and the mental state task performance of the children can be found in Table 6. Data bearing on questions pertaining to pretense activities in the home (e.g., the child alone or with his or her parents) were not included in the table due to a lack of variability on the Likert scale used with all parents selecting either a 4 or 5 (Very Often). However, a significant correlation was found between maternal educational level and the children's mental state task performance ( $r = .33, p < .01$ ). Even though fathers' education was correlated with mothers' education ( $r = .66, p < .01$ ), it was not related to the children's performance on the mental state task.

**Table 6: Correlations of Survey Responses and Mental State Task Performance (N = 67)**

	1	2	3	4	5	6	7
1. Years of Education (Mother)		.66 **	.03	-.12	-.35 **	-.09	.33 **
2. Years of Education (Father)			.01	-.04	-.26 *	-.03	.08
3. Hours in Daycare or Preschool				.04	.3 *	-.27*	.04
4. Amount of Reading With Child					-.02	-.22	-.01
5. Amount of Television Viewing by Child						.13	-.08
6. Age of Siblings							-.09
7. Mental State Task Performance							--

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

### **Regression Analyses**

A series of hierarchical regression analyses were carried out to assess whether any of the parent-child interactions involving mental state language usage remained predictive of children's mental state task performance after accounting for children's age and maternal education information obtained from the survey. Age of the child emerged as a significant predictor of the total number of successful trials on the mental state task ( $B = .24, p < .05$ ) and the change in  $R^2$  for this step was significant; in addition, maternal education was also found to be a significant predictor at step I ( $B = .34 p < .01$ ). The change in  $R^2$  for this step was also significant. The correlation coefficient was .41, indicating that approximately 17% of the variance of the mental state task performance in the sample can be accounted for by the age of the children and years of education of their mothers.

In step IIa parents' use of modulations of assertion was also entered and a significant increment in the prediction arose ( $B = .25, p < .05$ ), and the change in  $R^2$  for this step was significant. In Step IIb parents' cognitive mental state term utterances were

entered and a significant increment in the prediction arose ( $B = .24, p < .05$ ); the change in  $R^2$  for this step was also significant. The full model including both parents' modulations of assertion and cognitive mental state utterances was not statistically significant. The results of these analyses are presented in Table 7, with each of the alternative lines for Step II representing results from a different equation in which Step I entered age and maternal education and Step II entered the variable listed.

These results reveal that parents' modulations of assertion and cognitive mental state language significantly contributed to the prediction of children's performance on the mental state task over and above age and maternal education. These predictors accounted for 23% and 22% of the variance, respectively. Thus, even after accounting for age and maternal education mental state utterances by parents were associated with children's performance on the mental state task. Although these factors independently predicted children's performance on the mental state task, the combination of these predictors did not account for any additional variance. This result could be attributed to the correlation between these two variables ( $r = .43$ ) and it is possible that they are independently accounting for the same variance.

Children's usage of cognitive language during the reading activity and overall modulations of assertion did not add significantly to the prediction of children's performance on the mental state task. Thus, after accounting for parents' own cognitive mental state language and modulation of assertion usage in parent-child interactions, observations of children's cognitive language or modulations of assertion production did not contribute further to understanding mental state task performance.

**Table 7: Summary of Hierarchical Regression Analysis for Variables Predicting Children's Performance on the Mental State Task ( $N = 67$ )**

Variables Predicting Children's Performance on Mental State Task	Step		
	I	IIa	IIb
Age	.06*	.06*	.05†
Maternal Education	.16**	.15**	.15**
Parents' modulation of assertion utterances		.16*	
Parents' cognitive utterances			.04*
$\Delta R^2$	.17**	.06*	.06*
$R^2$	.17*	.23**	.22*

*Note.* Values are unstandardized regression coefficients.

\* Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is significant at the 0.01 level (2-tailed)

† Correlation is marginally significant  $p < .10$  (2-tailed)

## CHAPTER 4

### DISCUSSION

#### Mental State Task

One of the primary purposes of the present study was to explore more fully the capabilities of children as young as 3 years of age to appreciate the mind's role in pretense activities, and specifically, to investigate the role of action saliency in this appreciation. Children needed to select one of two actors on each trial of the mental state task as the individual pretending. Actors were shown as moving or static on the television screen. On Same-Related Action trials, both actors displayed behaviors appropriate to a particular animal, but only one actor was knowledgeable about how that animal normally behaved. On Same-Unrelated Action trials, both actors displayed behaviors that did not match a particular animal, but the child was informed that one actors was, nevertheless, knowledgeable about the animal and pretending to engage in that animal's behavior. On Contradictory Action trials, the actor knowledgeable about a particular animal's behavior did not produce actions appropriate to the animal, however, the actor who was not knowledgeable, did so. By systematically manipulating action (through movement and altering the relationship between knowledge and appropriate/inappropriate behaviors) the current results provided insight into whether children under the age of 5 primarily focus on mental states versus action during pretend activities.

The results of the present experiment revealed that children of 3 and 4 years of age were able to select the appropriate knowledgeable actor as the one pretending more

than a non-knowledgeable actor during certain presentation formats. As expected, four-year-olds performed better than 3-year-olds.

Researchers, including Lillard (1993b) and Perner (1993) have contended that children see pretend play as solely action based, or “acting as if,” and that children do not appreciate that the mind or the knowledge an individual has, is important when engaging in pretend play. To investigate this behavioral emphasis in pretend play, the saliency of action was manipulated in the current study by showing children actors dynamically moving or static on the television screen. Children performed similarly in both of these conditions and even scored somewhat higher on the dynamic than in the static condition. If action was an important contributing factor in how children viewed pretend play activities, then an actor engaged in non-prototypical or contradictory activities for a specific animal should be more difficult to ignore than an actor for whom only having a physical description of their activities could serve as a determining factor in children’s decisions. The added movement during the dynamic trials did not interfere with children’s performance and this finding gives little support to Lillard’s (1993b) hypothesis emphasizing actions as a primary influence on children’s interpretation of pretend play.

Although children’s performance was unaffected by whether actors were shown engaged in a dynamic activity as compared to simply a static image, presentation format did affect children’s performance with some children especially affected by the Contradictory Action trials. Those children who scored above the mean on the mental state task, performed most successfully on the Same-Unrelated Action trials and equally as well on the Same-Related and Contradictory Action trials. Children who scored below



the mean on the mental state task performed about equally on the Same-Related and Same-Unrelated Action trials, but only significantly above chance on the Same-Unrelated trials. They scored significantly below chance on the Contradictory Action trials unlike the children who scored higher on the task. In other words, children who generally did not do well on the mental states task were heavily biased toward choosing the action that matched the behavior expected by the knowledgeable model, but which instead, was produced by the non-knowledgeable actor. These findings are very similar to results obtained by Ganea et al. (2004). As previously described, both 3- and 4-year-olds in their study had a difficult time selecting an actor whose behaviors were contradictory to his intentions when presented side-by-side with an actor whose behavior more closely resembled those intentions, similar to the Contradictory Action trials in the current study. The children's performance in the low scoring group clearly demonstrates the importance of action on children's views of pretense activities and is in line with the theory put forth by Lillard (1993b) that some children associate pretend with action before realizing the mind's involvement. Though high scoring children had less difficulty on the mental state task overall in comparison to low scoring children, their performance was affected by action as well, performing best on the Same-Unrelated trials when action interference was minimal but less successful on trials where appropriate behaviors were presented and children needed to ignore this action information.

As mentioned, children in both groups performed best on the Same-Unrelated Action trials. This suggests it is easier for children to focus on what the actor knows or the role the mind plays in pretense activities when they do not have to attend to multiple forms of information, e.g., knowledge and behavior. According to Lillard (1993b) young

children view pretend play as action based. When an appropriate action is eliminated as a basis for making a judgment about mental state, as on the Same-Unrelated Action trials, children did find it easier to rely on knowledge that the actors had. Eliminating distracting prototypical behavior, appears to have allowed children to focus their attention on the knowledge of the actor and ignore his or her behavior. On Same-Related Action trials children can rely on action or knowledge to aid in their selections and this factor may be why children performed somewhat less well on the Same-Related trials. On these trials both actors are providing behavioral information appropriate for the animal identity used as an example on that trial. For those that view pretense as action, not knowledge, these actions would interfere with their selection, and this may have especially been the case for those in the low scoring category. This finding, then, does give limited support for Lillard's theory; action can have some influence on performance on mental state tasks.

An interesting finding with the children that scored higher on the mental state task is that they performed similarly on the Same-Related trials as the Contradictory Action trials. A sub-group of 3- and 4-year-olds ( $N = 30$ ) were able to ignore very salient atypical behavior to choose the correct knowledgeable actor as pretending as often as they did when no contradictory information was provided during the trial. The contradictory actions of the actors did not interfere with these children's performance more than when both actors exhibited the same appropriate actions. Thus, even some three-year-olds demonstrated an appreciation of the mind during the pretend activity, a finding not reported in other studies using similar contradictory behavior trials (Sobel 2004, Ganea et al. 2004). This finding highlights the value of investigating individual

differences in children's performances when assessing mental state understanding by these young children.

The current study found relatively high scores on the mental state task for some children as young as 3 years of age. Many children in the high scoring category, including 6 of the 13 children who were 3-year-olds in this group and 12 of the 17 children who were 4-year-olds in this group, responded using mental state terms (e.g., "she knew") when asked why they selected the correct knowledgeable actor. As mentioned previously, this occurred on 25% of the overall mental state trials for this group of children. This further supports the view that children who scored higher did appreciate the mental state of the actors and used that knowledge as a factor in their decision making process during the mental state trials.

For high scoring children it is possible the pretend context emphasized in the mental state task aided children's performance in the current study and resulted in children as young as 3 years of age doing well on this task. In the present experiment a strong pretend play context was created for the children before they began the mental state task. Children engaged in 10 minutes of pretend play with their parents and participated in a separate pretend activity with the experimenter before they started the experimental trials. All of the children created pretend hats that matched the small pretend hat used during the mental state trials as well, further linking their own experiences and understanding of pretend play with that of the actors on the television screen. These activities may have made it easier for some children to realize the knowledgeable actor was the correct choice by relying on their own knowledge of

pretend play with their parents and the experimenter shortly before the mental state task began.

The results found for differences in performance on the presentation formats give some limited support for Lillard's (1993b) views on action and children's understanding of pretend play. However, an alternative theory may provide a better explanation for the current findings. Perhaps it is not that young children are responding only on the basis of action, as suggested by Lillard (1993b), but rather, they have difficulty in maintaining an appreciation of the importance of mental knowledge in the face of behavioral action.

If children initially use action to guide their inferences regarding another person's behaviors they may have difficulty inhibiting their responsiveness to action during the mental state trials. Poor performance could be a reflection of little understanding of mental states or a limitation associated with poor executive functioning. Two significant components of executive functioning are planning and cognitive flexibility, that is, the ability to shift strategies in response to changing task demands and various cues (Deak & Narasimham 2003). The child must be able to recognize the problem, evaluate the various strategies available and create a plan (i.e., rule use).

Children who demonstrate poor performance on the task may have difficulty inhibiting their attention to irrelevant information and difficulty strategically shifting from using action to using knowledge in their decision making process on the mental state trials. In the present experiment the actions associated with the actors were irrelevant since the knowledge of the actors was provided to the children orally and this information was vital to their success on the task. On the Same-Unrelated Action trials children focus on the oral information since neither actor exhibited the appropriate

behavior. On the Same-Related Action trials both actors are behaving properly and children need to ignore this action while resorting to mental state information to achieve correct responses more frequently than chance. The greatest interference would arise on the Contradictory Action trials where they need to ignore the behavioral information completely and maintain their focus on knowledge even though the behavior of the actor contradicts his or her knowledge. Children demonstrated a pattern of performance, especially those in the low scoring category, suggesting inhibition and maintaining knowledge information are important factors in assessing pretend actions. The demands of each type of presentation format can be seen in Table 8. It is important to point out that the children in low scoring group did not perform better than chance in the Same-Related Action presentation format and therefore could be responding randomly during this presentation format.

**Table 8: Processing Demands of Each Presentation Format on the Mental State Task**

	Same-Unrelated	Same-Related	Contradictory Action
Inhibit Processing of Behavioral Action	NO	YES	YES
Maintain Mental State Knowledge	YES	YES	YES

Zelazo, Frye and Rapus (1996) speculate that prefrontal cortical functioning may aid in strategy selection when new and old information are in conflict with one another. It is the frontal cortex that aids in planning and problem solving. Children, with a less well-developed prefrontal cortex, may have greater difficulty ignoring the irrelevant behavioral information or integrating the information regarding the actors' knowledge with behavioral action in order to correctly select the actor as pretending.

The mental state trials additionally required processing of a large amount of language. Not only did the child hear a description about the relevant activity each character did or did not know about the animal but, in addition, were orally provided with another, alternative description regarding an unrelated activity that each character knew or did not know about. He or she also were informed, and or, witnessed the actors engaged in various behaviors associated or not associated with the animal identity used in the example. It was necessary for the child to ignore the behavioral information presented to him or her in order to respond correctly on the mental state task. The distraction created by the actors' behaviors may have interfered with the child's ability to focus and sustain attention to the copious amount of information regarding knowledge being presented to them.

Children's performance on the mental state task could have been limited further by another factor related to social information processing biases. The Contradictory Action trials required children to ignore critical behaviors they have learned to look for when processing the motives of others. Crick and Dodge's (1994) information-processing model of social competence outlines how the process of assessing another's behaviors and facial features lead us to respond or think about a situation with which we are faced. Social competence may begin with encoding cues or physical behaviors of another individual, interpreting those cues, clarifying the goal of the individual we are trying to assess and eventually constructing a response and behaving on it, all the while accessing a database of stored memories, acquired social rules, social schemas and social knowledge. In the present study, children are asked to interpret a seemingly conflicting behavior. Instead of encoding the behavior, children are asked to ignore the behavioral

information in favor of verbal information regarding knowledge. Children need to integrate this verbal information with what may be a pre-existing schema of how to assess other people's intentions. This integration may have been difficult for children, especially those who scored lower on the task and whose understanding of the mind in pretend play may be more fragile.

Lillard (1993b) and other supporters of a later understanding of the role of mental states in pretend play seem to have overestimated the importance of action in how children view pretense activities. Many children under the age of 5 were capable of demonstrating an understanding of mental states during pretend play. However, action may play a more pivotal role for children when they have not yet developed a strong understanding of mental states. Children who scored high on the mental state trials did not seem to have difficulty ignoring dynamic or contradictory actions during the mental state task. Children who scored low had more difficulty on all of the trials, but especially on the contradictory trials. These children may not place importance on the knowledge an individual has and instead view the behaviors of pretend play as action guided, not knowledge guided. However, factors such as language, attention and executive function skills may have also influenced performance on the mental state task and therefore poorer performance may not be entirely attributable to an inadequate understanding of the mind's role during pretend play.

### **Parent-Child Usage of Mental State Terms**

Previous studies have found a link between mental state language and performance on theory of mind tasks and the complexity of pretend play (Meins, Fernyhough, Wainwright, Clark-Carter, Gupta, Fradley & Tuckey 2003; Adrian,

Clemente, Villanueva & Rieffe 2005; Jenkins et al. 2003, Nielson & Dissanayake 2000). The current study further revealed a relationship between the frequency of use of mental state language by parents and children and performance on a mental state task. Children who scored higher on the mental state task, produced more cognitive mental state terms during the reading activity and more modulations of assertion during the reading and pretend activities. Their parents expressed more cognitive mental state terms and modulations of assertion throughout the parent-child interaction period than children who scored lower on the mental state task. However, differences in the frequency of desire and emotion expressions by either the children or the parents were not found for children who scored higher or lower.

Children do not begin to spontaneously use mental state terms, or reference the mind until 2.5 to 3 years of age (Shatz, Wellman & Silber 1983). Past longitudinal research has found that children are exposed to mental state utterances, including cognitive speech, by their parents some time before they themselves consistently produce this category of speech (Jenkins et al. 2003). However, children may begin to use mental state terms before they have a concrete understanding of the mind and what the terms refer to, imitating their parents' production of this category of speech. As already pointed out, Lieven (1994) noted that children often use utterances in the appropriate situations when they do not seem to have a clear understanding of what the phrase or words mean, suggesting that they are extracting words from their environment, specifically from their parents. While children are learning to produce mental state terms, their parents also may be helping children to learn the meanings of these words.



The current findings support a number of general theoretical perspectives in speech and mental state understanding such as the social constructivist view or the weak linguistic determinism hypothesis. According to these views it is necessary for parents to use cognitive speech in order for children to learn about the mind and use these terms in their own conversations (Jenkins et al. 2003). As a result, children who hear and produce more cognitive mental state terms will be more focused on the mind as a pivotal indicator in assessing other people's behavior. Related to the views of these theories, parents may utilize scaffolding techniques to further encourage their children's understanding of mental states, that is, explain the relationship between these terms and the mind until the children are capable of using them independently (Bruner 1981). Parents that engage in this activity and expose their children to more mental state terms may have children that understand mental states earlier than parents who do not challenge their children's mental state understanding by elaborating on issues related to the mind and emphasizing an association between these terms and the mind, although this particular issue was not tested in this study.

Parents show an increase in cognitive mental state utterances when their children turn approximately 2 years of age, but then the frequency of use remains stable throughout 4 years of age, even though the children's use increases over this period of time (Jenkins et al. 2003). In addition to the correlations with complexity of pretend play found by other researchers, other studies (Jenkins et al. 2003, Nielson & Dissanayake 2000) have found that cognitive speech is correlated with performance levels on theory of mind tasks, including false belief tasks, and is a better predictor than other forms of mental state language. The current findings revealing a correlation between cognitive

mental utterances and mental state task performance lend support to the belief that the use of cognitive speech by parents is important in assisting children to develop an understanding other people's thoughts and perspectives as well as predictive of the children's performance on the current mental state task.

Modulations of assertion by parents were also found to be predictive of children's performance on the mental state task according to the regression analyses. Modulations of assertion used by parents was so strongly related to the cognitive mental state terms used by parents that each was only a significant independent predictor in the regression equation and their combination did not account for additional variance. The relation between modulations of assertion and cognitive mental state terms has not been discussed in previous research evaluating the contribution of both categories of speech to theory of mind or pretense activity (Jenkins et al. 2003, Ruffman et al. 2002). The findings from the current study raise the possibility that modulations of assertion should be considered an integral part of using cognitive mental state terms. To utilize modulations of assertion accurately, it seems necessary for the speaker to understand the thoughts of the other person who produced the original statement. The theoretical basis for the relationship between modulations of assertion and cognitive terms needs to be considered more fully in the future.

Parents who used more mental state terms also had children who used these terms more often during the parent-child interactions. However, children's use of cognitive mental state terms during the reading activity and total use of modulations of assertion, while correlated, were not found to be predictors of their performance on the mental state task. Children's utterances were most likely influenced by their parents' mental state term

usage. Therefore the increased use of cognitive mental state terms and modulations of assertion for those children who scored higher on the mental state task was dependent on the higher frequency usage of these terms by their parents during the parent-child interactions. Perhaps this explains why only children's use of cognitive terms during the reading portion was correlated with their performance. Parents used more cognitive mental state terms during the reading portion of the parent-child interaction than the play period. One of the books given to the parents to read to their children may have encouraged producing cognitive mental states ("I Just Forgot") more so than some other books that could have been selected for this activity. Since the theme of this book was related to the mental state of forgetting it may have elicited more talk of the mind from parents discussing the contents of the book than during the play period. The other book given to the parents to read ("The Rainy Day") was more focused on the activities of the characters and nature than mental states and was not believed to have influenced mental state utterances during the parent-child interaction period.

In contrast to findings reported by Jenkins et al. (2003) who reported a decrease in talk of desire for 2-4-year-olds during parent-child interactions in the home, a similar decrease was not observed for the 3- and 4-year-olds tested in the current study. In fact, talk of desire was more prevalent among the 4-year-olds than the 3-year-olds during the pretend activity. Children used a relatively large amount of desire mental state speech, especially during the pretend play period compared to the storybook reading although in this activity, too, children did not show a decrease over age. Pretend play may lend itself to expressions of desire including "I want" "I wish" and "I like." There were many props (e.g., hats, dishes, etc.) used and fantasy storylines created during the 10-minute play

period. Perhaps, then, it is not surprising that children would use language requesting objects or certain actions by the parents during this portion of the interaction period and this may account for the disparity between the current results and those found in past studies. It should be pointed out, too, that parents produced a considerable amount of desire mental state terms, greater amounts during pretend play than reading, another reason their children may have shown more desire utterances during the pretend versus reading activity.

### **Limitations and Future Directions**

Children of both age groups and especially those in the lower scoring category may have encountered other limitations to responding successfully in the mental state task. Even though the present study eliminated the demand to produce verbal responses placed upon children in past experiments (Lillard 1993b, Aronson & Golomb 1999), as already noted, a great deal of information was presented orally to the children by the experimenter on each trial. The experimenter in the current study provided children with six pieces of information regarding knowledge about each animal identity and real activity for each actor (e.g., “Katie knows about birds, reads about birds and has seen a bird before. Katie does not know about swimming, has never seen anyone swimming and has not read about swimming.”). Perhaps if these statements can be decreased in future studies, placing less linguistic demands on children while still providing an adequate amount of information on which to base their selection, children will perform more successfully on the mental state task.

Children in the current study were presented an actor, the pretender, with knowledge of an animal, and an actor with knowledge of a separate real activity, for

example swimming, and asked which one was pretending to be the animal. Being required to maintain a distinction between reality and pretense may have added more strain on the information processing demands of these children, causing their performance to decline, as they were required to mentally switch back and forth between the two contexts. Rakoczy, Tomasello, and Striano (2006) found that 3-year-olds understood the difference between trying and pretending which demonstrated an implicit knowledge of mental states, yet these children had difficulty explicitly conveying which actor was pretending when asked by an experimenter. Rakoczy et al. (2006) speculate that children in their study were unsuccessful because children are not accustomed to processing information regarding pretend play and reality in the same context. The reason for having one actor pretending and the other engaged in a non-pretend activity in the current study was to highlight the differences accounting for the actions of the two actors. Follow-up studies should include trials where both actors are engaged in pretend activities and are knowledgeable about different pretend activities or identities.

Children this age also may have had difficulty understanding that adults would not have knowledge of some of the categories of behavior associated with the animals in the current study. For example, on one trial the experimenter informed children that one actor knew what a dog was, but the other actor did not. Some children may have not have believe or ignored the claim that an adult had never seen a dog before, or did not know what one was. To explore this possibility a fictitious characters could be created and used in the stories. Children may have an easier time believing a new and unfamiliar character would not be knowledgeable about various actions. For example, actors described as being from another planet could also be used on the mental state trials and

may aid children in believing the actor lacks knowledge regarding familiar animal behaviors.

Children were not corrected if they selected the actor who lacked knowledge as the one pretending and were given praise by the experimenter after each trial. Therefore, if children initially selected the unknowledgeable actor as the one pretending it is possible they were then reinforced to select future unknowledgeable actors. A future study should eliminate this potential factor to provide a better test of children's understanding of mental states.

Television programs can impact children's prosocial behavior and cognitive abilities, and programming aimed at socially interacting with children may influence how they view others' thoughts and mental states (Sprafkin, Liebert, & Poulos 1975, Huston & Wright 1998). Rosen et al. (1997) used television clips from the children's program "Barney" and asked 3- and 4-year-olds questions about the thoughts of the characters on the program. Rosen et al. (2007) discovered that children who accurately described what the characters were thinking were more successful on a false belief task than those children who were not able to explain the thoughts of the characters. Television has also been used to aid a child diagnosed with Aspergers to recognize emotions. Bernad (2007) trained a 9-year-old boy with Aspergers with video clip examples of his own emotions as well as those of other people. After viewing the videos and emphasizing the emotional information conveyed in behavior and speech, the boy was better able to identify his own internal emotions and recognize emotions in other people. The characters in interactive children's programs (e.g., "Blues Clues," "Dora the Explorer," "Diego," etc.) ask their audience to help them with tasks, answer questions and respond verbally to these

requests. It is unclear what children are assuming when answering these characters' requests but experience interacting with characters may be beneficial to children's mental state understanding. Children that watch more of these programs may score higher on the mental state task due to these experiences and a future study could look at the relation between them.

Although there are still many issues to address regarding mental state understanding in young children, the current study's results support an understanding of the mind in pretend play activities by children younger than 5 years of age and this understanding may be influenced by their parents' use of mental state language. Young children are not incapable of appreciating that the mind influences a pretender's behavior; difficulties associated with inhibiting action may interfere with children's ability to maintain focus on the mental state of the pretender. It is important that future research investigate individual differences to provide insight into how mental state understanding develops and how it is influenced by a children's environment.

## APPENDICES



## **APPENDIX A**

### **OBJECTS PROVIDED DURING THE PRETEND PLAY PARENT-CHILD INTERACTION PERIOD**

- 1 Large bucket
- 1 Large and 1 small stuffed animal elephant
- 1 Plastic kitchen set (including; dishes, utensils, pots, pans and cups)
- 1 Ballerina tutu
- 1 Set of felt cat ears
- 2 Plastic fireman hats
- 1 Plastic policeman hat
- 2 Plastic construction hats
- 1 Felt pirate hat
- 1 Plastic wand in the shape of a star
- 1 Plastic apple
- 1 Set of plastic figures (including: woman, man, boy and girl)
- 1 Plastic tiara
- 1 Cape



**APPENDIX C**

**EXAMPLE OF ACTIONS ASSOCIATED WITH PRETEND CHARACTERS FOR EACH OF THE THREE PRESENTATION FORMATS**

**Group A**

	<b>Same Related Action</b>	<b>Same Unrelated Action</b>	<b>Contradictory Action</b>
<b>Bunny</b>	A1 = jumping up and down	A1 = swimming arms	A1 = swimming arms
	A2 = jumping up and down	A2 = swimming arms	A2 = jumping up and down
<b>Dog</b>	A1 = walking on hands and knees	A1 = arms waving up and down	A1 = arms waving up and down
	A2 = walking on hands and knees	A2 = arms waving up and down	A2 = walking on hands and knees
<b>Elephant</b>	A1 = waving arm in front of face	A1 = wiggling fingers up and down	A1 = wiggling fingers up and down
	A2 = waving arm in front of face	A2 = wiggling fingers up and down	A2 = waving arm in front of face
<b>Chicken</b>	A1 = arms flapping on hips	A1 = open and close arm in front of face (in biting action)	A1 = open and close arm in front of face (in biting action)
	A2 = arms flapping on hips	A2 = open and close arm in front of face (in biting action)	A2 = arms flapping on hips
<b>Monkey</b>	A1 = arms uneven on sides moving up and down	A1 = slithering on floor	A1 = slithering on floor
	A2 = arms uneven on sides moving up and down	A2 = slithering on floor	A2 = arms uneven on sides moving up and down
<b>Frog</b>	A1 = hopping up and down in crouch position	A1 = waddling	A1 = waddling
	A2 = hopping up and down in crouch position	A2 = waddling	A2 = hopping up and down in crouch position

**\* Note: Knowledgeable Actor = A1, Non-Knowledgeable Actor = A2**

**Group B**

	<b>Same Related Action</b>	<b>Same Unrelated Action</b>	<b>Contradictory Action</b>
<b>Fish</b>	A1 = swimming arms	A1 = jumping up and down	A1 = jumping up and down
	A2 = swimming arms	A2 = jumping up and down	A2 = Swimming
<b>Bird</b>	A1 = arms waving up and down	A1 = walking on hands and knees	A1 = walking on hands and knees
	A2 = arms waving up and down	A2 = walking on hands and knees	A2 = arms waving up and down
<b>Spider</b>	A1 = wiggling fingers up and down	A1 = waving arm in front of face	A1 = waving arm in front of face
	A2 = wiggling fingers up and down	A2 = waving arm in front of face	A2 = wiggling fingers up and down
<b>Crocodile/Alligator</b>	A1 = open and close arm in front of face (in biting action)	A1 = arms flapping on hips	A1 = arms flapping on hips
	A2 = open and close arm in front of face (in biting action)	A2 = arms flapping on hips	A2 = open and close arm in front of face (in biting action)
<b>Snake</b>	A1 = slithering on floor	A1 = arms uneven on sides moving up and down	A1 = arms uneven on sides moving up and down
	A2 = slithering on floor	A2 = arms uneven on sides moving up and down	A2 = slithering on floor
<b>Penguin</b>	A1 = waddling	A1 = hopping up and down in crouch position	A1 = hopping up and down in crouch position
	A2 = waddling	A2 = hopping up and down in crouch position	A2 = waddling

**\* Note: Knowledgeable Actor = A1, Non-Knowledgeable Actor = A2**

APPENDIX D

EXAMPLES OF UNDERSTANDING PRETEND PLAY CODING SHEETS

Example A

Ss # \_\_\_\_\_

Date: \_\_\_\_\_

DOB: \_\_\_\_\_

Dissertation Stimuli: **1Aa**

Dynamic **or** Static (circle one)

1. ***Jenny*** or Kevin  
(knows frogs) \_\_\_\_\_
2. Ben or ***Andrew***  
(knows chickens) \_\_\_\_\_
3. ***Jim*** or Mike  
(knows dogs) \_\_\_\_\_
4. Susie or ***Denise***  
(knows bunnies) \_\_\_\_\_
5. ***Heather*** or Amy  
(knows elephants) \_\_\_\_\_
6. Katie or ***Mary***  
(knows monkey) \_\_\_\_\_

\* **Note: 1 = Order the presentation formats were presented**  
**A = Order the actors/behaviors were presented**  
**a = Animal identity used during these trials (Group A or Group B)**

**The bold/italicized name denotes the knowledgeable actor during this set of trials (knowledgeable actor counterbalanced between participants)**

**Parentheses display what animal the knowledgeable actor knows about**

**Example B**

Ss # \_\_\_\_\_

Date: \_\_\_\_\_

DOB: \_\_\_\_\_

Dissertation Stimuli: **1Bb**

Dynamic **or** Static (circle one)

1. Susie or ***Denise*** \_\_\_\_\_  
(knows fish)
2. ***Katie*** or Mary \_\_\_\_\_  
(knows snakes)
3. Ben or ***Andrew*** \_\_\_\_\_  
(knows crocodiles)
4. Heather or ***Amy*** \_\_\_\_\_  
(knows spiders)
5. ***Jim*** or Mike \_\_\_\_\_  
(knows birds)
6. ***Jenny*** or Kevin \_\_\_\_\_  
(knows penguins)

\* **Note:** **1** = Order the presentation formats were presented  
**B** = Order the actors/behaviors were presented  
**b** = Animal identity used during these trials (Group A or Group B)

The bold/italicized name denotes the knowledgeable actor during this set of trials  
(knowledgeable actor counterbalanced between participants)

Parentheses display what animal the knowledgeable actor knows about

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