

1992

Young children's understanding of the representational aspects of photographs

Laura M. Bassi
Lehigh University

Follow this and additional works at: <http://preserve.lehigh.edu/etd>

Recommended Citation

Bassi, Laura M., "Young children's understanding of the representational aspects of photographs" (1992). *Theses and Dissertations*. Paper 119.

This Thesis is brought to you for free and open access by Lehigh Preserve. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Lehigh Preserve. For more information, please contact preserve@lehigh.edu.

AUTHOR:

Bassi, Laura M.

TITLE:

**Young Children's
Understanding of the
Representational Aspects
of Photographs**

DATE: October 11, 1992

**YOUNG CHILDREN'S UNDERSTANDING
OF THE REPRESENTATIONAL
ASPECTS OF PHOTOGRAPHS**

by

Laura M. Bassi

A Thesis

Presented to the Graduate Committee

of Lehigh University

in Candidacy for the Degree of

Master of Science

in

Psychology

Lehigh University

September, 1992

This thesis is accepted and approved in partial fulfillment of the
requirement for the Master of Science.

Sept. 30, 1992

Date

Asst. Prof. Susan E. Barrett
Thesis Advisor

Asst. Prof. Padraig O'Seaghdha

Prof. Martin L. Richter

Prof. John G. Nyby
Department Chairperson

ACKNOWLEDGEMENTS

I would like to express my gratitude to my advisor, Prof. Susan E. Barrett, for her continuous guidance throughout the last two years and for her insightful suggestions on the drafts of this thesis. I would also like to extend my thanks to Prof. Pat O'Sheaghda for his invaluable comments and Prof. Marty Richter for his extensive and patient assistance throughout the course of this project. Special thanks go to the staff, parents and children of Montclair Pre-YMCA's Early Adventures Day Camp, Montclair Pre-Y's After School Program, and Montclair YMCA's Child Day Care.

Additionally, I extend my thanks to my colleagues (Diane Mello, Maurice Sipos, Peter Phipps, and Joseph Marin) for their suggestions, comments and unfailing friendship which proved to be a great source of inspiration throughout the life of this project.

Finally, I would like to thank my sister, Lisa Ann Bassi, for her continuous faith in me and Cathleen Gray, for helping me remain focused.

This thesis is dedicated with sincere gratitude to my husband, Michael Ricciardiello. His support of my work and constant understanding helped bring this project to completion.

TABLE OF CONTENTS

| | Page |
|---|------|
| CERTIFICATE OF APPROVAL..... | ii |
| ACKNOWLEDGEMENTS..... | iii |
| TABLE OF CONTENTS..... | iv-v |
| LIST OF TABLES..... | vi |
| ABSTRACT..... | 1 |
| CHAPTER | |
| 1 GENERAL INTRODUCTION..... | 2 |
| A. Theories of Mind..... | 2 |
| B. Representational Aspects of Mind..... | 4 |
| C. Metarepresentation and False Belief..... | 6 |
| D. Cognitive Changes as a Function of Age?..... | 9 |
| E. Zaitchik (1990), Representation and False Photographs..... | 13 |
| F. Statement of Purpose..... | 18 |
| 2 EXPERIMENT 1: EXTERNALIZING BELIEF..... | 18 |
| A. External "Tracks" and Photographs..... | 18 |
| B. Photographs and Correspondence..... | 21 |
| C. Some Predictions..... | 21 |
| 1. Method..... | 23 |
| 2. Results and discussion..... | 25 |
| 3 EXPERIMENT 2: PHOTOGRAPHS | |
| AS STATIC REPRESENTATIONS..... | 32 |
| A. Method..... | 35 |

| | |
|---------------------------|-------|
| B. Results..... | 39 |
| C. Discussion..... | 41 |
| 4 GENERAL DISCUSSION..... | 43 |
| REFERENCES..... | 48-51 |
| APPENDICES..... | 52-54 |
| VITA..... | 55-56 |

List of Tables

| | |
|--|----|
| Table 1: Total number (of 20 per group) and the percentage of correct responses, in parentheses, for the “belief” question and the “picture” question by age..... | 27 |
| Table 2: Total number (of 20 per group) and the percentage (in parentheses) of correct responses for the “standard false belief” question* and BOTH the “standard false belief” question AND the “photo false belief” question** by age..... | 29 |
| Table 3: Frequency of correct photograph choices made across conditions for three- and four-year-olds..... | 40 |

Abstract

Two studies examined the preschooler's understanding of the representational nature of photographs. In Experiment 1, the effects of externalizing the contents of another's mind through use of a photograph were examined. Within the context of a "false belief" task, wherein children possess information that an actor does not, four-year-olds were more likely to correctly attribute a false belief to a naive actor than were three-year-olds. No differences were found between a task in which the front of the photograph was clearly visible and a task in which only the back of the photo was visible. Four-year-olds were also more likely to report that an actor deprived of pertinent information would act according to his previous belief than were three-year-olds, even when no clues were present in the scenario.

In Experiment 2, both three- and four-year-olds were able to determine that a picture they had taken did not depict the current reality, but rather depicted the scene at the moment the picture was taken. Both groups were able to choose the correct photograph whether they had taken it or had assisted the experimenter in doing so. Thus, while three-year-olds seem to understand that a photograph shows the scene over which the camera had acted, they do not seem to understand that a photograph could help them to ascertain the mental state of an actor.

Chapter 1 -- General Introduction

Theories of Mind

Individuals' first exposure to what has been termed "mental" is their own conscious awareness. One must first recognize that internal states exist before one can intuit that someone else experiences internal states (Perner, 1991). As children become aware that others experience inner states, they begin to form "theories" about how the mind works. The development and complexity of these "theories of mind" have become the focus of extensive research (Astington, Harris, & Olson 1988; Bretherton, McNew, & Beeghly-Smith, 1981; Chandler, Fritz, & Hala, 1989; Estes, Wellman, & Woolley, 1989; Flavell, 1988; Perner, 1991).

Bretherton et al. (1981) stated that infants have the ability to recognize that others possess mental states; they cite evidence regarding infants' successful social interactions to support this claim and argue that nine- to twelve-month-old infants have an "implicit theory of mind". However, other theorists (e.g., Perner, 1991) argue that it is not until the second year that the child begins to understand the inner states of others as mental. When children begin to link the "mental" with the overt actions of other people, they can begin to "theorize" about the mental realm (Perner, 1991). Older children's and adults' theories of mind have their foundation in

a belief-desire paradigm wherein the observer understands that an individual acts according to what he or she believes to be true (Wellman & Bartsch, 1988). Within this belief-desire framework, individuals not only understand the intentional states of others; they also understand that a person may have a belief which is not consistent with reality. In order to have such a theory, individuals must understand that representations are present in the mind and they must understand something about how these representations are formed, changed or otherwise used.

Chandler and Boyes (1982) and Wellman (1990) have proposed that the young three-year-old's theory of mind is a theory in which the child believes the mind to be like a container into which representations are deposited. The young child is a "copy theorist" in that s/he believes that thoughts are simply copies of the world, albeit in mental form, that are impressed upon the mind when s/he perceives events. The mind is not considered active, but a container-like thought depository.

Even though preschoolers' theories seem to fail to account for the mind's active processes, Wellman and Estes (1986) found that very young children could talk about differences between real objects and mental entities. Preschoolers, even three-year-olds, seemed to understand that real world objects can be seen and touched, and that they have a constant existence. At the same time, they understood that thoughts do not have

these properties. For example, children in Wellman and Estes' study were able to report that a real apple could be touched, eaten and seen by others; whereas an apple in one's dream did not possess these qualities. However, while young children seem adept at reasoning about differences between thoughts and physical entities, they seem less skillful at attributing beliefs to others or even to themselves (Wimmer & Perner, 1983; Wimmer, Hogrefe & Perner, 1988). Thus, while young children appear to possess some understanding of mental entities, it seems they have not yet come to think about the mind, representation, or the representational aspect of the mind in the same way as do older children and adults.

Representational Aspects of Mind

In order to assess the child's understanding of the mind as representational, an examination of what constitutes a representation is necessary. One important component that all of the representational elements contain is that they are "about something else" (Perner & Astington, 1990). What this evidences, then, is what is important about a representation: it has a property of being about something other than itself. This property is characteristic of both images and ideas in the mind, as well as physical representations like photographs and drawings (Perner, 1991).

In this context, it may be helpful to draw a distinction between physical representations and mental representations (Perner & Astington,

1990). Leslie (1987) defined a "primary" representation as one in which the representation directly depicts the reality (e.g., a photo of a horse represents an actual horse). According to Perner (1991), during the first year of life, the child's mind operates in such a way as to allow him/her only to grasp this type of representation; the child has a "single updating" model of the world which corresponds to the current reality. With this type of model the child can search for an object that s/he sees being displaced; but s/he cannot search for invisibly displaced objects. Since s/he did not see the displacement, effective search is only possible when the child can compare a model of the present with a model of the past; that is, the child needs to consider where the object was last seen and use this information to guide his or her search. Hence for Perner, the transition to pre-operational thought is signalled by the emergence of "multiple models".

Leslie (1987) states that secondary representations are those representations that do not directly correspond to the current reality. Examples include: the representations children use during play (e.g., a banana is a telephone); the mental replay of past events; and hypotheses formed about future events. As mentioned above, for Perner, the child begins evidencing his or her use of secondary representation at about 1 to 1 1/2 years, through the construction of multiple models. Multiple models replace the single updating model and allow children greater flexibility in

their thinking. For example, children around this age are able to represent past events, as evidenced in their new ability to search for invisibly displaced objects, and can reason about hypothetical situations as is evident in their use of pretend play.

From these multiple models (Perner, 1991), children begin to construct different mental models of the world. The models become more complex with age and experience. The three-year-old begins to develop theories about the world and is termed a "situation theorist". The three-year-old can use his or her models to make inferences and judgements about correspondence. The four-year-old, however, can go a step beyond the abilities of younger children, and uses his or her models to "metarepresent". Metarepresentation is the ability to represent the fact that other organisms have representational states. That is, metarepresentation is "representation of a representation as a representation" (Perner, 1991, p. 35). Metarepresentational abilities allow one to mentally represent the fact that another person possesses representations, factual or non-factual, of the world.

Metarepresentation and False Belief

The false belief task is currently viewed as something of a benchmark in assessing the preschooler's cognitive and metacognitive abilities. As stated above, metarepresentation refers to the idea that a

person can represent what someone else is representing. Thus, if John thinks that Mary thinks a chocolate bar is in the cupboard, then John can “metarepresent”, or represent Mary’s representation.

While children as young as three-years-old have proven adept at tasks which involve predictions about actions based on desires, that is, those tasks that require an understanding of the goal-directedness of individuals whose beliefs are consistent with reality (Wellman & Bartsch, 1988), these same three-year-olds consistently fail false belief tasks (Flavell, Flavell, Green & Moses, 1990; Moses & Flavell, 1990; Wimmer & Perner, 1983). In a false belief task, a child is required to infer that another person will act according to that other person’s false belief. A correct answer demonstrates that the child knows the belief currently held by John is based on his prior knowledge and contradicts the present reality. The “actor”, in one version of this task, entertains a belief that is false, or inconsistent with the current reality. For instance, the child watches as John places his toy in the toy box. In John’s absence, Mary moves John’s toy from the toy box to the laundry hamper. The child has witnessed Mary’s actions, yet John has not. When John returns, the child is asked to predict where John will look for his toy.

In another popular version of this task (Perner, Leekam & Wimmer, 1987), the child is shown a familiar container, e.g., a Cheerios cereal box,

and is asked what is inside. The child is then shown that s/he is incorrect; the experimenter has replaced the well-known objects (Cheerios) with pencils, for instance. The child is then asked what a friend who is waiting outside will think is in the box. Again, a correct answer implies that the child knows that his or her friend's answer will not be consistent with the true state of affairs; instead, the friend's answer will be predicated on the friend's prior knowledge of what that type of container usually holds.

In these versions of the false belief task, children younger than four years of age typically give the incorrect answer. The young preschooler will usually answer the test question with the answer consistent with the current reality. In these tasks, the child has a belief that is not held by the other person, or has some knowledge that is not available to the other person. Four-year-olds are thought to succeed in this task because they are able to separate their own beliefs from those of other individuals. The four-year-old is also beginning to understand that another person's actions will be predicated on beliefs and desires held by that person, even though the child himself or herself may believe or desire something entirely different (Wellman, 1990). In Experiment 1, the standard false belief paradigm, first implemented by Wimmer & Perner (1983), was used in conjunction with a photograph in an attempt to assist the child by externalizing the content of the other person's belief. The photograph depicted the event as witnessed

by the actor. Theoretically, the photograph should help the child because the child may be able to use the photo as an indicator of the actor's false belief. For Perner (1991), the three-year-old is beginning to think about the representational relationship between beliefs and the real world. Thus, a photo, which could potentially assist the child to map out that representing relationship more clearly, may help to externalize the belief of the actor.

Cognitive Changes as a Function of Age?

Generally, the ability to deal effectively with mental representations of the self and of others seems to increase as a function of age. When are children competent enough to infer another person's beliefs? Most researchers (Flavell et al., 1990; Moses & Flavell, 1990; Perner et al., 1987; Wimmer & Perner, 1983) find age four to be the critical age for such abilities. Chandler et al. (1989), however, found children as young as 2.5 years of age to be able to deceive an opponent: based on this evidence, Chandler et al. concluded that even 2.5-year-olds can instill a false belief in another person. The children in their study left false markers, or misleading clues, as deceptive evidence when hiding a prize from an opponent. In their view, children as young as 2.5 or 3 years of age appear to understand that others sometimes base their actions on representations that do not accurately reflect the current state of the world.

Wellman (1990) has offered an alternative explanation for Chandler

et al.'s (1989) findings which depicts the child as using a "go away" strategy. In Wellman's analysis, the child is a "simple desire psychologist" in that s/he believes that people act to satisfy a desire. The child also acts to satisfy his or her own desire and engages in certain behaviors to get the object for himself at the competitor's expense. Without creating a false belief, the child could just send the competitor away from the area where the prize really is, in order to obtain it for himself (Wellman, 1990). Thus, in an experiment like Chandler et al.'s, where the apparatus used to hide a prize left tell-tale markers behind, the child could simply wipe away the marker in an effort to thwart the competitor.

Barrett, Plefka, Sniffen and Bassi (1991) employed hiding games similar to those of Chandler et al. (1989) and found that 3-year-olds would indeed use a "go away" (Wellman, 1990) strategy. The three-year-olds were adept at destroying persisting visual evidence left by a doll which would have led a competitor to find a prize. However, only four-year-olds engaged in manipulating task materials (e.g., leaving false markers after destroying true markers). This suggests that younger children may not be able to use task materials to instill a false belief in an opponent; instead, they only remove clues that would help an opponent.

Perhaps using task materials to instill a false belief is actually a step beyond awareness of a false belief. In a second experiment by Barrett et al.

(1991), three- and four-year-olds were shown videotaped puppet shows in which characters left behind persisting visual evidence to help externalize the actor's prior belief. That is, puppets hid a truck which left "muddy" tire tracks when it was pushed across a white board into its "garage". In the actor's absence, the truck was moved (without the tires touching the white board) by another character. Children aged 3 years and 7 months and older were able to attribute a false belief to the actor in the presence of a visual marker. These findings suggest that the visual marker assists children in understanding that the protagonist entertains a now erroneous belief. Thus, children younger than four years of age seem to be able to attribute false beliefs, even if they are unable to instill them.

Mitchell and Lacoheé (1991) used a paradigm in which a familiar container had unexpected contents [for the "standard" task see Perner, et al. (1987)] and found that externalizing the child's former belief through use of a "postcard" enabled three-year-olds to correctly report their own, now mistaken, belief. Children were presented with a "Smarties" (candy) tube and were asked what was inside. Children stated that Smarties were inside and were then asked to "mail" a card that had a drawing corresponding to their answer (pieces of Smarties candy) on it into a sealed mailbox. Then, subjects were shown that pencils were actually inside the container. Whereas children who did not externalize their belief by selecting a picture

of the hypothesized contents consistently gave the wrong answer to questions about what they thought was originally inside the container, subjects who mailed the card with the drawing of Smarties on it usually gave the correct answer pertaining to their previous belief. Hence, perhaps the ability to mentally represent one's previous belief is facilitated when that belief is externalized in the form of a picture or photograph.

Within the literature, the debate continues over the cognitive competencies of preschoolers. It may be that three-year-olds' early competencies with false belief and mental representation may be demonstrated if the children are made explicitly aware of the representation about which they are being questioned. It is important to clarify these issues because ascertaining *when* children understand that other's actions are mediated by mental representations may facilitate our descriptions and explanations of *how* this understanding emerges. For example, if children possess an understanding of another person's inner thoughts only after the age of four, there must be something different about the child's representational abilities at age four than there was at age three. Perner (1991) suggests that the representational abilities become more complex as the child perceives the world and the actions of himself or herself and others within it. The child begins to link the observable behavior of others to the desires and beliefs others might have, and through increased awareness of

situations and goals, the child becomes able to shift his or her perspective outward. Through specification of the developmental pattern of the seemingly qualitative shift in the child's perspective, researchers can begin to assess how and why these changes occur.

Zaitchik (1990), Representation and "False" Photographs

Zaitchik (1990) studied children's abilities to reason about both mental representations (through utilization of the false belief task) and non-mental representations in the form of photographs. According to Zaitchik, even if young preschoolers exhibit problems with mental representations, they should still be able to reason effectively about non-mental representations, such as photographs because they are less complex.

Zaitchik used a paradigm in which three-, four- and five-year-old children were exposed to a "classic" false belief task (e.g., Wimmer & Perner, 1983) as well as to a "false" photograph task, wherein a photograph was taken at "Time 1", the scene changed at "Time 2", and the children were asked to predict what the photograph would show. Zaitchik reasoned that the photograph, a tangible representation, should be easier for children to understand than should a mental, intangible representation or belief. If children did find the photo task easier, researchers would be safe in assuming that there is something difficult about mental representation but not about representation per se. In Zaitchik's task, the developing process

was explicitly pointed out to the child. Then, the child was asked, "In the picture, where is the object?" Results showed that children under five years of age do not perform differently than chance (chance = 50%) when answering the test question. Five-year-olds performed better than chance. Thus, Zaitchik's photograph task seems even more difficult than the standard (e.g., Wimmer & Perner, 1983) false belief task. Zaitchik confirmed this surprising outcome by having subjects participate in the false belief task as well.

Perhaps there was some artifact of the methodology which enabled the children to do better in the false belief task than in the photograph task. For example, the tasks may not have had equivalent requirements. "Probe questions", such as, "where is (the object) now?" and "where was (the object) when they left the scene?" were used in the false belief version in her preceding experiment, but not in the camera task. The lack of probes in the camera task may have meant greater inferential demands were placed on the children. Children's correct answers for the probe questions (essentially all of the children remembered the sequence of events) helped rule out the possibility that they were experiencing problems with remembering the course of events. Zaitchik used an "equated" version of the task, and four-year-olds still performed better in the belief condition (mean percentage of trials correct = 94%) than they did in the photograph

condition (mean percentage of trials correct = 72%).

Finally, Zaitchik attempted to make the action more salient in the photograph condition by asking the child about the contents of the photograph at the time the picture was taken, as well as asking the test question, after the scene was changed. Since it had been suggested (Siegal, Waters, & Dinwiddy, 1988) that asking a child the same question twice may prompt the child to believe s/he was incorrect initially, Zaitchik (1990, Experiment 5) employed a "little game" in order to ask the second question. In the game, the child was told that another experimenter, who had not witnessed the previous action, would like to be shown/told which puppet was in the scene depicted by the photograph. As before, four-year-olds' performance was not different from chance (mean percentage of trials correct = 55%), and three-year-olds performed significantly worse than chance (mean percentage of trials correct = 19%) suggesting that perhaps three-year-olds were using some type of systematic reasoning about the nature of the photograph, while four-year-olds may be making the transition from thinking about representation the way a three-year-old does to thinking about representation in the way older children do so.

Zaitchik (1990) suggested that the children think that the photograph "updates," that it changes to represent the world as it currently appears. However, this could be an artifact of the procedure in which the children

watched the photograph develop *over time*. It was explicitly and repeatedly pointed out to the children that the photograph came into being gradually over a period of approximately 90 seconds. This might lead children to attribute dynamic properties to the photograph.

Zaitchik (1990), however, also argued for the alternative view that the child does understand the temporal character of photographs, (namely, that photographs show what was in front of the camera when the button was pressed), but that the child cannot utilize this knowledge “in the case where the photo conflicts with the true state of affairs,” (p. 64 , italics deleted). Similarly, Perner (1991) argues that the young child’s problem is that he or she is incapable of thinking of the photograph as a physical entity that corresponds to a real scene while thinking of the photograph as having an “interpretation in terms of that scene”, (p. 98). That is, the child can understand the photograph itself; but the child cannot understand that s/he might be able to use the photograph to “stand for” the scene.

Perner (1991) tested another version of the photo task in order to assess whether the representational nature of the photograph was indeed causing the preschoolers’ problems or whether the general idea that one physical entity could correspond to another physical entity was problematic for children. In one condition, a doll was placed in a yellow dress and the child photographed her. The child was told that the camera would make a

picture of the doll “wearing this color” (p. 98). The doll’s dress was then changed to blue and the child was asked to predict what color the doll’s dress would be in the photograph. Children between the ages of 3.5 and 5 years of age mostly opted for the wrong answer (blue), said they did not know, or simply guessed. These results are consistent with Zaitchik’s (1990) findings.

Perner (1991) also used a “control” condition called the “color transmission task”. In this task, the child was shown a yellow screen and told that the camera (machine) would produce a piece of paper the same color as the screen when the button was pressed. Following this, the screen was changed to blue and the children were asked to predict what “color is the paper?” The younger children in the color transmission task significantly outscored the younger children in the photo task. Perner states that the non-representational nature of the paper, (“merely taking on the same color as the screen outside”, p. 99), as opposed to the representational nature of the photo, rendered this task cognitively accessible to the three-year-olds. Perner argued that this result shows that young three-year-olds’ difficulty with the photograph task is that they cannot “metarepresent”. That is, they cannot represent something (the photo) as representing something else (the doll), but they can understand that a machine can produce a piece of paper the color of the screen (now removed) that it

acted upon. Perhaps interpreting the representational aspect of the photo is qualitatively different for the children than is the simple memory of the color of the paper when the "machine" was pointed at it.

Statement of Purpose

Experiment 1 will examine the question of whether externalizing a mental representation enables the preschooler to understand another person's mental representation within the false belief task. Experiment 2 will attempt to ascertain if three-year-olds can reason about a photograph under certain conditions (e.g., participating in an action which is especially salient and temporally organized and being able to behaviorally, instead of verbally, answer the test question).

Chapter 2 -- Experiment 1: Externalizing Belief

External "Tracks" and Photographs

In this experiment, the metarepresentational aspect of the false belief task was externalized through the use of photographs. If the child can understand a photograph in representational terms, perhaps he or she can also understand the photograph's ability to represent the false belief of an actor. If this is the case, the child would be exhibiting metarepresentational skills that research on the standard false belief task suggested were at most marginal (see e.g., Perner, 1991; Wellman, 1990).

As discussed above, Barrett et al. (1991) found that enduring physical traces left behind as markers of an actor's belief assisted preschoolers in correctly predicting the false belief of an actor. Barrett et al. used particularly salient clues (tire tracks leading into the location where the actor placed his truck). The present experiment uses this idea of an enduring trace, but the character takes a photograph of the object. The photographing action and the photograph itself may help improve the saliency of the time when an actor formed a belief. The photograph was placed on an easel within the scene in the center of the two hiding places. In one condition the photograph faced forward, for maximum saliency; in a second condition the photograph faced backward so its contents were not visible, thereby reducing saliency. However, the photographing and the actual photograph's presence could highlight the formation of a belief by an actor.

Whereas the tire tracks in Barrett et al. (1991) were a direct result of the truck being pushed inside its hiding place, the photograph is a clue that is not readily linked with, was not created by, and is not part of the object. Sodian, Taylor, Harris & Perner (1991) found that this type of "leading" trail may help children predict the actor's false belief. However, a photograph does not "lead" the child to the correct location as overtly as do tire tracks, nor does it stand out in the scene as saliently as do large, brown tracks on a

white surface.

As mentioned earlier, Mitchell and Lacoheé (1991) found that three-year-olds succeeded on one version of the false belief task (one pertaining to the child's previous false belief about the contents of a container) involving photographs. They found children could ignore current physical evidence, provided that traces of a past event were present.

“In view of the suggestion that young children are biased towards the physical, an obvious way to examine whether they are capable of acknowledging that the mind is representational would be to get them to register beliefs in an event that leaves a physically enduring trace in the world and then help them to make a link between the test question about the false belief and this event” (Mitchell & Lacoheé, 1991, p.111).

It is important to keep in mind that Mitchell and Lacoheé used the false belief paradigm in which the child had a prior false belief. The method used to create this false belief in the child is most simply called a “change of contents” (e.g., from Smarties candy to pencils). In the present study, it was hypothesized that children might succeed on the false belief task in which the actor had a false belief, if physical evidence about the actor's belief was left behind. The actor's false belief was created through a “change of location”. Thus, although differences exist between the two types of false belief tasks above, their correlates prompted the examination of the idea that a photograph could serve as evidence of the protagonist's

prior belief and could enable three-year-olds to override their preference to report the current state of affairs. Additionally, all children in Experiment 1 participated in a "standard false belief" task, which provided no external clues, so that their performance on each of these tasks could be assessed.

Photographs and Correspondence

Additional support for the photograph's potential role as facilitator in tasks which assess preschoolers' cognitive competencies can be found in correspondence comprehension studies. DeLoache (1989, 1991) found preschoolers have difficulty dealing with correspondence between two real entities, yet they can determine correspondence between a photograph and an actual space, such as a room. DeLoache's (1991) data suggest it should be possible to take advantage of the child's knowledge of correspondence to test if use of a photograph, taken prior to the actor's leaving the scene and left in the scene throughout the task, would make the actor's previous belief more salient. If the child understands the correspondence between the photograph and the actor's belief, this understanding may assist the child and allow him or her to be successful in the false belief task.

Some Predictions

A photograph that depicts a previous state of affairs may assist young children in understanding that an actor holds a belief that corresponds to that previous state, even though the child himself or herself has been made

privity to information (the current whereabouts of the object) that the actor does not possess. If children understand the photograph as a representational medium, then it is predicted that young three-year-olds would be able to use the photograph to assist them in understanding that the actor's belief was formed before the object was moved. The photograph may help the child externalize the belief of the actor. When the child sees the photograph of the object in its original location, s/he might infer that the actor's belief corresponded to the photograph which depicted a previous reality. When the child only sees the back of the photo, it is expected that s/he will be somewhat more successful in reporting the actor's belief than in the standard false belief task, because, although the photo's contents are not visible, it may help the child to better understand that the actor took the photograph and formed his belief while the object was in its original location. However, children are expected to perform more poorly in this "back of the photo" condition than in the condition where the contents of the photograph were visible. Children younger than four years of age are expected to perform poorly on the false belief task in which no clues were present, as they have done in previous experiments.

Method

Subjects

Forty children, aged 3.0 years to 5.1 years, participated in this experiment. Children were recruited from Montclair YMCA's Early Adventures Day Camp, Montclair YMCA Child Care, and Montclair Pre-YMCA's After School Hours program. The three-year-old group consisted of children aged 3:0 to 3:11 (mean age: 3:6). The four-year-old children were aged 4:0 to 5:1 (mean age: 4:5). Groups included approximately equal numbers of boys and girls.

Design

All children viewed a "warm-up" videotape followed by one of the two "photograph" videotapes. The design was a 2 (age) X 2 (videotaped scenario) factorial. One age group consisted of 3-year-olds, while the other group consisted of 4-year-olds. In one videotape the face of the photograph was visible, while in the other videotape only the back of the photograph was visible. Lastly, the children viewed the "standard" false belief videotape.

Procedure

"Warm-up" task

Children were told that they were going to view three videotaped puppet shows. The child was told to watch very carefully as he or she

would be expected to answer some questions about each puppet show. All children first viewed a "warm-up" puppet show in which Sesame Street's Ernie gives Bert a birthday present. Prior to the presentation of the present, (a Winnie the Pooh doll), Bert claps enthusiastically. Bert is then given the present, which he takes off screen "to his room". The child was then asked, "*What did Bert do before Ernie gave him the present?*" The purpose of the warm-up task was to alert children to the need to watch carefully. Most children answered the warm-up question incorrectly; apparently, the action (clapping) was not at all salient.

Photo Task

Following the warm-up task, each child was randomly assigned within age groups to one of two videotaped puppet shows. Children were shown a videotape of an actor (Bert, a Sesame Street character) placing his doll in a toy barn. Before exiting, the actor took a Polaroid photograph of his doll in the barn and placed the photograph within the scene. Half of the children viewed a puppet show in which the photograph was clearly visible and half of the children viewed a puppet show in which only the back of the photograph was visible (see Appendix 1 for complete puppet show script). In the actor's absence, an antagonist removed the doll from the barn and placed it inside a closet. When the actor returned, the frame was paused on the screen and the children were asked:

Where will Bert think his Mickey Mouse is before he opens the door?

Where is his Mickey really?

Why does Bert think his Mickey is in the _____? (child's answer)

Where is Bert's Mickey Mouse, **in the picture?**

Each child's responses were recorded on audio tape and on a data sheet.

Standard false belief task

In addition, all children viewed another videotape, analogous to the first videotape, except that no traces or clues pertaining to the actor's prior belief were used. At the end of this video, in which Ernie and Bert hid a truck that was relocated in their absence, the tape was paused on the screen and the children were asked:

Where will Ernie think his truck is before he opens the door?

Where is his truck really?

Why does Ernie think his truck is in the _____? (child's answer)

Did Ernie see Oscar move his truck?

The same response and data recording format were followed. See Appendix 2 for a complete list of questions and the order in which they were asked for all tasks presented above.

Results and Discussion

No differences were observed between the "visible" photograph condition and the "not visible" photograph condition and conditions were

collapsed for subsequent analyses. Four-year-olds performed significantly better than three-year-olds both when asked questions about the actor's belief and about the contents of the photograph. When asked the "belief" question i.e., "Where will Bert think his Mickey Mouse is?", four-year-olds gave the correct response significantly more often than did the three-year-olds, $X^2(1) = 13.78, p < .01$. A similar pattern of results was obtained for the "picture" question i.e., "Where is Bert's Mickey Mouse, in the picture?"; four-year-olds were more likely to answer correctly than were three-year-olds, $X^2(1) = 6.66, p < .05$. The total number and the percentages of correct responses are given in Table 1.

Insert Table 1 About Here

Additionally, responses on the belief question tended to correlate with responses on the picture question, $r(38) = .74, p < .05$. Thus, children who were inclined to understand that Bert would search for Mickey Mouse in the place where he had left him, namely, in the barn, tended to report that Mickey was in the barn in the picture as well; whereas children who said that Bert would search for Mickey Mouse in the place where Mickey currently resided, namely in the closet, tended to report that, in the picture, Mickey was in the closet. Eleven of the twenty four-year-olds were correct

Table 1. Total number (of 20 per group) and the percentage of correct responses, in parentheses, for the “belief” question and the “picture” question by age.

| | <u>BELIEF QUESTION</u> | <u>PICTURE QUESTION</u> |
|--------------------|------------------------|-------------------------|
| 3-YEAR-OLDS | | |
| # correct | 1 (5%) | 4 (20%) |
| 4-YEAR-OLDS | | |
| # correct | 12 (60%) | 12 (60%) |

across both the belief and the picture questions, while only one of the twenty three-year-olds answered both questions correctly. Sixteen 3-year-olds were incorrect across both questions and seven 4-year-olds answered both questions incorrectly. This was the case even when the front of the photograph was visible to the children: seven out of ten 3-year-olds in this condition answered both questions incorrectly; nine 3-year-olds answered the belief question incorrectly and seven 3-year-olds said that, in the photo, Mickey was in the closet! Of the ten 4-year-olds in the photo visible condition, only two children were incorrect on both questions, three children were incorrect on the belief question and three children said that Mickey was in the closet in the picture.

Insert Table 2 About Here

In the standard false belief task, the older group again outscored the younger group, $X^2(1) = 6.66, p < .05$. The total number and the percentage of correct responses are given in Table 2. Thus, four-year-olds were more likely to report that Ernie would look for the truck where he had left it than were three-year-olds. Subsequent analyses, however, did not reveal any overall relation between performance on the standard false belief task and the photo task. As a group, children who answered the belief question in

Table 2. Total number (of 20 per group) and the percentage (in parentheses) of correct responses for the "standard false belief" question* and BOTH the "standard false belief" question AND the "photo false belief" question** by age.

| | <u>False Belief</u> | <u>Photo Belief</u> | <u>Both Questions</u> |
|---------------------|---------------------|---------------------|-----------------------|
| 3-Year-Olds: | | | |
| # correct | 4 (20%) | 1 (5%) | 0 (0%) |
| 4-Year-Olds: | | | |
| # correct | 12 (60%) | 12 (60%) | 10 (50%) |

*Where does Ernie think his truck is? (no photograph or clues present)

**Where does Bert think his Mickey Mouse is? (photograph present; either facing front or back)

the photograph format correctly were no more likely than their peers to answer the belief question correctly in the standard version of the task. However, four-year-olds' responses, when assessed without consideration to the three-year-olds' responses, were significantly correlated, $r(18) = .58$, $p < .05$. Thus, four-year-olds who answered the photo belief question correctly, also tended to answer the standard false belief question correctly. Thus, four-year-olds seem to have a better understanding for false belief tasks in general than do three-year-olds.

Clearly, the false belief task continues to be a difficult task for preschoolers to understand. Four-year-olds are more adept at making inferences regarding a character's false belief than are three-year-olds. However, contrary to expectation, the externalization of the actor's belief through use of a visible photograph did not seem to facilitate performance for the older group. With the picture of the displaced object visible, one might hypothesize that children would perform at ceiling on this task. Yet, that certainly was not the case. Four-year-olds' performance, while significantly better than three-year-olds' performance, was not near ceiling levels. Three-year-olds gave the incorrect response the majority of the time across conditions. This may suggest that three-year-olds are consistently responding with the reality-based answer in spite of the character's naivety. Certainly, it is quite interesting that many three-year-

olds reported that the photograph depicted Mickey Mouse in the closet, while they were looking at the photograph of Mickey in the barn. This result could be due to the three-year-olds' tendency to respond with "reality", or due to the wording of the question (e.g., "in the picture" translated to the children as "in the video"), or due to the three-year-olds' understanding of action predicated on desire.

Wellman (1990) suggested that perhaps something about the young child's knowledge about the desires of the character and his or her knowledge of goal-seeking behavior, leads the child to predict that the actor will act to satisfy his desire, regardless of evidence to the contrary. Obviously, the ability to attribute a false belief to another in the presence of current information is an advanced ability as the photograph did not seem to facilitate performance in three-year-olds (who performed equally poorly across all conditions) nor did it allow four-year-olds to perform at ceiling levels. These results raise the question of whether children understand that the photograph represents the object's prior location. This issue is explored further in Experiment 2.

Chapter 3 -- Experiment 2

Photographs as Static Representations

In Experiment 2, the young preschooler's ability to use photographs as representations was assessed and preschoolers' ability to understand the representational nature of the photographs when the task was somewhat more accessible to them was examined. Perhaps the procedure used by Zaitchik (1990) was responsible for the children's poor performance in her version of the photograph task. If so, perhaps choosing which of a pair of photographs was correct instead of verbally responding to a probe question would be a more sensitive measure. In Experiment 2, the child was presented with two photographs (one which depicted the current reality and one which depicted the previous reality that was actually photographed by the child) and asked to choose the photograph he or she had taken. It was expected that even the youngest three-year-olds would choose the photograph they had taken because they viewed the scene through the viewfinder while taking the picture on their own. It was expected that three-year-olds would choose the photograph they had helped the experimenter take as well, although choosing correctly in this condition was expected to be slightly more difficult than choosing correctly in the condition where the children took the photograph on their own. Additionally, the developing

process was not pointed out to the children, but was downplayed throughout the task. This was accomplished by keeping the developing photo intentionally out of sight. Therefore, the children should not be predisposed to believe that the photograph is dynamic in any way.

In addition, Nelson's (1986) work on event memory suggested that temporally organized photographed scenes, (where the scene events follow logical order), would help boost performance as well because the children might more easily follow the sequence of events. Photographed scenes depicted a birthday party and a bicycle race. In the birthday party scene, the doll initially sat at table with a birthday cake; the doll was then moved to a scene which contained birthday presents. In the bicycle scene, the doll initially sat at a finish line; the doll was then moved to a scene which contained a "winner's chair". Also, it was hypothesized that if the children actively participate in taking photographs of salient scenes, they will succeed at this type of task as their attention may be greater when actively participating in the event. Previous studies required the children to watch passively as events unfolded.

Thus, while Experiment 1 seemed to show that younger children could not understand that the photograph represented, or stood for, the actor's belief, Experiment 2 tested whether or not children could understand more straightforward properties of a photograph. Experiment 1 required

children to take their understanding of photographs a step beyond the understanding required in the present experiment. That is, in the previous experiment's belief question, the children not only had to recognize that the photograph was a static representation, they also had to understand that the photograph of Mickey Mouse in the barn represented Bert's belief.

Zaitchik (1990) has suggested that children mistakenly attribute a dynamic property to photographs, that is, they think that photographs "update" to depict the present situation. If children believe this, then the results of Experiment 1 may be less surprising. That is, since three-year-olds often gave the incorrect response across conditions, there may be some systematic way in which these children were interpreting the photograph. Indeed, the "updating" hypothesis would help explain the results of Experiment 1's "photo not visible" condition. In the "photo visible condition", it seems that the hypothesis that young children respond with the reality-based answer best explains the results. In this experiment, if children do believe in the "updating" of photographs, they will be more likely to choose the "distractor" photograph (of the current reality). However, children who understand that the photograph shows what was in front of the camera when they (or the experimenter) pressed the button will tend to choose the correct picture.

In contrast to Experiment 1's results, children's behavior in

naturalistic settings suggests that they appreciate that photographs can depict past events. Children are often exposed to photographs-- photographs of themselves as infants; of holidays gone by; of many types of past events--and the children do not appear confused by them. Hence, it seems reasonable to suggest that perhaps the procedure in Zaitchik's task, and the complexity of the task in Experiment 1, did not allow the children to exhibit what they know about photographs. Additionally, perhaps the children's active participation in the task would help increase the saliency for the children.

Method

Subjects

Children were selected from the developmental subject pool at Lehigh University. This "pool" was created by faculty through use of birth announcements published in local papers. Parents were contacted by telephone and an overview of the study was outlined for them. Twenty subjects, aged 2:10 to 4:9, participated. Children were assigned to one of two groups depending upon their age. One group consisted of 13 three-year-olds, (range: 2:10 to 3:10; mean age: 3:3) while the other group consisted of 12 four-year-olds (range: 4:0 to 4:9; mean age: 4:4). Groups included approximately equal numbers of boys and girls.

Design

The design was a 2 X 2 factorial in which one factor was age (three-year-olds vs. four-year-olds) and the other was the manner in which the photo was created (child takes the photo vs. child watches experimenter take the photo). The scenes themselves (birthday party and bicycle race) were counterbalanced across subjects, but the area photographed (birthday cake table and finish line) remained constant. The dependent measure required the child to physically choose which of the two (prior scene or present scene) photographs s/he had taken.

Procedure

During the familiarization task, each subject was shown a Polaroid camera and was told that to use the camera, one looks through the little window until one sees the object to be photographed. Once one sees the object one wishes to photograph, one can press the button. The experimenter explained that when the button is pushed, a light flashes and the camera makes a noise. The photograph then emerges from the camera but it is "wet" and must be put on a shelf to dry. The subject was then instructed to take a picture of the parent who had accompanied him or her to the lab; the photo emerged and the experimenter and the subject viewed it when "dry". The child was then praised for taking such a nice picture, told to give the photo to his or her parent, and told s/he could take the picture

home.

After this familiarization task, the experimenter informed the subject that s/he could take another picture. The child then photographed either a doll in a scene with a birthday cake or a doll in a bicycle race scene. The scene the child photographed was counterbalanced across conditions. The child always took the first picture rather than helping the experimenter do so. This aspect was held constant so as to assess order effects, if any.

After the picture emerged, the child was told that the picture was "wet" and must be placed in a "special picture drying box" to dry. The camera was placed near the picture box and the child assisted the experimenter in moving the doll to another location.

Following the birthday cake scene, the doll was moved to a scene with birthday presents. The sequence of birthday cake-present opening may assist the child in keeping the course of events clear as this is typically the "script" at young children's birthday parties (Nelson, 1986). Following the bicycle race finish line scene, the doll was moved to a "winner's chair" where the doll was presented with a trophy. Again, the idea here was that a natural temporal sequence might assist the child to remember a scene s/he photographed.

After the child took the first photograph, and the doll was moved to its new location, the child was told that the photo was "dry". At this point, the

experimenter drew two photographs from the picture box. The experimenter feigned surprise and stated that one of the photos must be in the box from another time. One picture depicted the scene where the doll was first placed and the other picture depicted the scene where the doll currently sat. The child was asked to assist the experimenter by choosing the photo he or she had taken. The experimenter placed both photographs in front of the child's parent and said, "(Child's name), can you please show your mom the picture that you took." The child showed the picture to the parent, both pictures were returned to the box, the doll was removed from the scene entirely and the child was directed to the second scene to be photographed. The subject was not given any feedback as to whether her choice was correct or incorrect; the experimenter only said "that's a nice picture". Parents were instructed to state the same.

Next, the child was told that this time the experimenter would look through the "little window". The camera was pointed at the scene that the child had not yet photographed. The experimenter told the child when she could see the doll "in the window" and asked the child to assist her by pressing the button. The same developing and choice procedure was used as for the first scene except the child was asked to "show your mom the picture you **helped** me take." Subjects' responses were then recorded on a data sheet.

Results

The results were tested to determine whether children's responses differed from chance through use of a binomial test. Since analyses revealed no differences between the scenes, they were collapsed for subsequent analyses. The data collected from the four-year-olds were subjected to the binomial test, results revealed that they differed from chance, $p < .05$, in both conditions (see Table 3). Thus, four-year-olds were significantly better than chance at choosing the photograph they had taken and at choosing the photograph they had helped take. Although the results from the 3-year-olds failed to reach significance, as Table 3 makes clear, chi square analyses revealed the younger children's responses were not significantly different from those of the 4-year-olds; thus, the age groups were collapsed in order to analyze the effects of photographer.

Insert Table 3 About Here

When the children took the photograph, their responses significantly differed from chance, $p < .05$; when the children helped the experimenter take the photograph, their responses significantly differed from chance, $p < .01$. Therefore, the children were very good at choosing the photograph whether they took the photograph or assisted the experimenter.

Table 3. Frequency of correct photograph choices made across conditions for three- and four-year-olds.

PHOTOGRAPHER :

| | <u>Child</u> | <u>Experimenter</u> |
|---------------------------------|--------------|---------------------|
| 3-Year-Olds: (n = 13) | | |
| # correct: | 9 | 10 |
| | | |
| 4-Year-Olds: (n = 12) | | |
| # correct: | 10 | 10 |

In the three-year-old group, six of the thirteen children were correct across both conditions and seven children were correct on only one of the two tests. Incorrect responses were not more likely when the child took the photograph than when the child helped the experimenter to do so. In the four-year-old group, ten of the twelve children were correct across both conditions; of the two remaining children, one child was correct on only one of two conditions and one child was not correct on either of the two conditions.

Discussion

The children in the present study were more likely to choose the correct photograph than were the children in Zaitchik's (1990) study. While three-year-olds in the present experiment did not differ from chance, they tended to respond by choosing the correct photograph; the four-year-olds chose the correct photograph more often than chance. The children in Zaitchik's study, however, were unlikely to correctly predict what a photograph would show. Even five-year-olds in the Zaitchik experiment were not performing at ceiling; and the three- and four-year-olds performed much worse than did their peers in the present experiment. Several reasons may be cited for the differences in the results.

The children in the Zaitchik (1990) study were shown the developing

process of the photograph. Thus, the child might believe that the photograph somehow “updated” over time. Perhaps watching the developing process biased the children to believe that the photographs were dynamic. In the present study, the children were told that the photograph was “wet” and would need to dry before they could look at it. Additionally, children in the current study took the photograph or assisted the experimenter in doing so. Instead of watching puppets act within a scene, the children in this study actively participated in the task. Finally, and perhaps most importantly, children were not required to verbally respond to questions about photographs; instead they chose the photo they believed they had taken. Even three year-olds performed rather well on this modified version of the task. Additionally, they were no more likely to correctly select the photo that they had taken than they were to correctly select the photo they helped the experimenter take. This finding may suggest that children do not find it any easier to reason about a situation they viewed than they find it to reason about a situation which someone else viewed. Thus, the claim that children fail because they are “egocentric”, meaning they cannot perceive someone else’s view does not seem plausible here. Additionally, the fact that the “change of contents” false belief task requires the child to reason about his or her own prior belief and the “change of location” false belief task requires the child to reason about

another's previous belief may not mean that different results should be expected. Three-year-olds do poorly on both types of tasks while four-year-olds perform relatively well.

Most four-year-olds were very good at choosing the correct photograph across conditions. This ability involves more than a simple identification of the photograph and more than remembering the photograph because the child never saw the photo until s/he was asked to choose it. These findings suggest that even though preschoolers are unable to solve tasks that require understanding another person's mental representations, they can choose the correct photograph because they recognize that the picture corresponds to the scene that was displayed at the time the photograph was taken.

Chapter 4 -- General Discussion

Results from Experiment 1 were consistent with previous false belief findings (e.g., Flavell et al., 1990; Moses & Flavell, 1990; Wimmer & Perner, 1983; Wimmer et al., 1988), and with the hypothesis that age determines performance. Preschool children, especially three-year-olds, found it difficult to reason about the false belief of another. The four-year-olds performed significantly better than the three-year-olds across conditions. However, the hypothesis that the externalization of an actor's mental representation (via a photograph) would facilitate performance was not

supported. The ability to reason about the mental realm of another must be an advanced cognitive ability, as even attempts directly aimed at facilitation of performance did not produce the desired results. Overall, three-year-olds performed poorly, and four-year-olds, while they outscored the younger group, did not perform near ceiling levels even when provided with distinct markers. In fact, four-year-olds performed no better on the photograph false belief task than they did on the standard false belief task, in which no clues at all are present. Also, the way the photograph was displayed within the scene, either facing front or facing back, did not assist children's performance on this task. Thus, the hypothesis that children in the "photograph visible" task would be able to reason more effectively about the belief of the actor was not supported.

Perhaps children have such difficulty with false belief because they have a tendency to report the true state of affairs or perhaps children realize that the character is goal-directed, thus, the character will search for his object where he is most likely to find it (Wellman & Bartsch, 1988; Wellman, 1990). Even the photograph in the scene may not be a salient enough cue to assist the children in overriding their tendency to report the true state of affairs. This finding is consistent with the false belief (Moses & Flavell, 1990; Perner et al., 1987; Wimmer & Perner, 1983) findings which suggest that three-year-olds seem to assume that a naive actor will search

for his relocated object in the place where it really is, even though the actor was not present for the relocation.

The current results are not consistent with the findings presented in Barrett et al., (1991). In the current study, a clear marker left by the character in the situation did not aid the children in reporting that the character would act on the basis of that marker. Thus, while the "tracks" left by the truck in Barrett et al.'s study seemed to increase even three-year-olds correct responses, the photograph in the photograph false belief task did not seem to assist the children. Perhaps there is something more salient about tracks or a "trail" (Sodian et al., 1992) that leads directly to the place where the character originally placed the object than there is about a photograph. Additionally, the tracks were created by the truck's tires, therefore it can be argued that the tracks were more clearly a "part" of the truck than the photograph was a "part" of the Mickey Mouse. For this reason, in the "photo false belief" task, the photo may not provide enough evidence to aid young children. The photograph may be a poor type of external marker; perhaps certain types of persisting evidence or certain degrees of salience (e.g., tire tracks) better enables children to extrapolate from the clue's presence to the mind of the actor. However, when the photograph is facing front, and the object is seen by both the child and the actor inside its original container, it becomes more difficult to employ the

above argument and to postulate what reasoning skills the children are using when they make the incorrect inference. Perhaps, the children are answering the questions in such a way as to “ensure” the character’s retrieval of the object (Wellman, 1990). In any case, the younger group’s abundance of errors is interesting because, for the most part, these children are systematically wrong; thus, it seems they are responding with reality-based responses no matter what the task.

In addition, the present findings are inconsistent with those reported by Mitchell and Lacoheé (1991) since the photograph did not help children to externalize the belief of the actor. In Mitchell and Lacoheé’s study, children were able to successfully report that they had a false belief about the contents of a container when they were asked to “mail” a drawing as a means of externalizing that previous belief. But there seems to be an important difference between the Mitchell and Lacoheé study and the present study. In Mitchell and Lacoheé’s task, the children were asked to reason about a belief that he or she once possessed; in the current task, the children were asked to reason about a belief that a character once possessed. Therefore, perhaps the ability to reason about one’s own false belief is easier, or appears earlier, than the ability to reason about someone else’s false belief.

Experiment 2 attempted to ascertain whether children have trouble

with the type of representation depicted by a photograph (Zaitchik, 1990). As expected, when the task demands are kept to a minimum, young children can better understand that a photograph will correspond to a previous reality. In fact, all the children, including three-year-olds, usually gave correct responses. They were able to choose the photo they had taken even though one of their potential responses included as an option the current state of reality. This finding was consistent regardless of whether the children took the photograph or whether they only assisted the experimenter in doing so. Therefore, it seems children understand static, physical representations, yet they possess immature theories regarding mental representations.

References

- Astington, J. W., Harris, P. L., and Olson, D. R. (Eds.) (1988). Developing theories of mind. New York: Cambridge University Press.
- Barrett, S. E., Plefka, R. R., Sniffen, J. M., and Bassi, L. M. (1991). Instilling false beliefs in others: Generating deceptive strategies in hiding games. Paper presented at the 1991 Biennial Meetings of the Society for Research in Child Development. Seattle, Washington.
- Bretherton, I., McNew, S., and Beeghly-Smith, M. (1981). Early person knowledge as expressed in gestural and verbal communication: When do infants acquire a "Theory of Mind"? In M. E. Lamb and L. R. Sherrod (Eds.), Infant social cognition, 333-373. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Chandler, M. J., and Boyes, M. (1982). Social cognitive development. In B. B. Wolman (Ed.), Handbook of developmental psychology, 387-402. Englewood Cliffs, NJ: Prentice-Hall.
- Chandler, M. J., Fritz, A. S., and Hala, S. M. (1989). Small scale deceit: Deception as a marker of 2-, 3-, and 4-year-olds' early theories of mind. Child Development, 60, 1263-1277.
- DeLoache, J. S. (1989). Young children's understanding of the correspondence between a scale model and a larger space. Cognitive Development, 4, 121-139.

DeLoache, J. S. (1991). Symbolic functioning in very young children:

Understanding of pictures and models. Child Development, 62,
736-752.

Estes, D., Wellman, H. M., and Woolley, J. D. (1989). Children's

understanding of mental phenomena. In H. Reese (Ed.), Advances
in child development and behavior, Vol 22, 41-87. New York:

Academic Press.

Flavell, J. H. (1988). The development of children's knowledge about the

mind: From cognitive connections to mental representations. In J. W.
Astington, P. L. Harris, and D. R. Olson (Eds.), Developing theories of
mind, 244-267. New York: Cambridge University Press.

Flavell, J. H., Flavell, E. R., Green, F. L., and Moses, L. J. (1990). Young

children's understanding of fact beliefs versus value beliefs. Child
Development, 61, 915-928.

Gordon, F. R., and Flavell, J. H. (1977). The development of intuitions about

cognitive cueing. Child Development, 48, 1027-1033.

Leslie, A. M. (1987). Pretense and representation: The origins of "Theory

of Mind." Psychological Review, 94, 412-426.

Mitchell, P., and Lacoheé H. (1991). Children's early understanding of

false belief. Cognition, 39, 107-127.

Moses, L. J., and Flavell, J. H. (1990). Inferring false beliefs from actions

and reactions. Child Development, 61, 929-945.

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

Perner, J., and Astington, J. W. (1990). The child's understanding of mental representation. Chapter for the Proceedings of the Twentieth Annual Symposium of the Jean Piaget Society, Philadelphia, Pennsylvania.

Perner, J., Leekam, S. R., and Wimmer, H. (1987). Three-year olds' difficulty with false belief: The case for a conceptual deficit. British Journal of Developmental Psychology, 5, 125-137.

Siegal, M., Waters, L. J., and Dinwiddy, L. S. (1988). Misleading children: Causal attributions for inconsistency under repeated questioning. Journal of Experimental Child Psychology.

Sodian, B., Taylor, C., Harris, P. L., and Perner, J. (1992). Early deception and the child's theory of mind: False trails and genuine markers. Child Development, 63, 468-483.

Wellman, H. M. (1990). The child's theory of mind. Cambridge, MA: MIT Press.

Wellman, H. M., and Bartsch, K. (1988). Young children's reasoning about beliefs. Cognition, 30, 239-277.

Wellman, H. M., and Estes, D. (1986). Early understanding of mental entities: A reexamination of childhood realism. Child Development,

57, 910-923.

Wimmer, H., Hogrefe, G.-J., and Perner, J. (1988). Children's understanding of informational access as a source of knowledge.

Child Development, 59, 386-396.

Wimmer, H., and Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. Cognition, 13, 103-128.

Zaitchik, D. (1990). When representations conflict with reality: The preschooler's problem with false beliefs and "false" photographs.

Cognition, 35, 41-68.

Appendix 1: Photograph Vignette

Photograph Task Skit*

(Bert enters the scene where a barn and a closet are in plain sight.)

Bert: Wow, look at this great big Mickey Mouse I won at the fair. I wish I had someone to help me play with it. I'll go find Cookie Monster. But, I will leave my Mickey in the barn so it will be safe.

(Bert puts his Mickey in the barn, leaving the door open)

Bert: Hmm, look at this neat camera. This is the kind of camera where the picture pops out right away. Maybe I should take a picture of my Mickey so I will remember where it is.

(Bert takes a picture, leaves the scene momentarily with the camera and says:)

Bert: The picture is ready.

(Bert returns with the picture and places it on an easel between the barn and the closet. In one condition, the photo is visible to the audience, in the other condition the photo is not visible.)

Bert: This is a nice picture. When I come back, if I look at this

(APPENDIX 1 -- CONTINUED)

picture, it will help me to remember where my Mickey is.

(Bert exits)

(Pirate enters scene)

Pirate: Wow, look at this barn. I wonder what is inside? Hey, look, Bert's new Mickey Mouse. I think I will trick Bert by hiding his Mickey in the closet.

(Pirate takes Mickey out of barn and hides him in the closet)

Pirate: That sure is a rotten trick. Well, I am going to sneak out of here now.

(Pirate exits)

(Bert returns with Cookie Monster)

Bert: Let's play with my new Mickey now, Cookie.

Cookie: OK.

*The false belief skit was identical to the photograph skit, except: no clues (i.e., the photograph) were left; the protagonists were Bert and Ernie, the hiding places were blue and green "garages", and the antagonist was Oscar the Grouch.

Appendix 2: Questions Presented to Subjects

Pretest:

What did Bert do **before** Ernie gave him the present?

Photo:

Where will Bert think his Mickey Mouse is before he opens the door?

Where is his Mickey really?

Why does Bert think his Mickey is in the _____? (child's answer)

Where is Bert's Mickey Mouse, **in the picture?**

False belief:

Where will Ernie think his truck is before he opens the door?

Where is his truck really?

Why does Ernie think his truck is in the _____? (child's answer)

Did Ernie see Oscar move his truck?

CURRICULUM VITA

BIOGRAPHICAL

Name: Laura M. Bassi
Birthdate: April 2, 1964
Place of Birth: Passaic, NJ

Parents' Names: Richard Bassi; Edna Plecs

EDUCATION

Lehigh University, Bethlehem, PA
M.S. Psychology, expected October, 1992

Montclair State College, Montclair, NJ
B.A., magna cum laude, Psychology
January, 1990

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

National Honor Society Phi Kappa Phi

PROFESSIONAL EXPERIENCE

1990 - present Teaching Assistant, Lehigh University:
Child Development, Research Methods in
Experimental Psychology, Seminar in Cognitive
Development, Psychology and Law;
Research Assistant, Lehigh University: Child
Development Lab

1989 -1990 Remedial Lab Assistant, Montclair State College:
Statistical Methods in the Social Sciences

1988-1990 Program Director, Montclair YMCA, Montclair, NJ
After School Child Development and Education Program

PAPERS AND PUBLICATIONS

Bassi, L.M. (1990). Attitudes toward rape victims: Effects of situational factors and sex role stereotyping. Honors Thesis: Montclair State College.

Barrett, S. E., Plefka, R. R., Sniffen, J. M., and Bassi, L. M. (1991). Instilling false beliefs in others: Generating deceptive strategies in hiding games. Paper presented at the 1991 Biennial Meetings of the Society for Research in Child Development. Seattle, WA.

Bassi, L.M., and Barrett, S. E. (1992). Preschoolers' understanding of the representational nature of photographs. Poster presented at the 63rd Annual Meeting of the Eastern Psychological Association. Boston, MA.

END OF

TITLE