

LITTLE MACHIAVELLIANS: DECEPTION IN EARLY CHILDHOOD

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ABSTRACT

The analyses in this dissertation were designed to identify 1) whether there is an age effect among three-, four-, and five-year-old preschool children for false-belief understanding, deceptive ability, and deception detection ability, 2) whether there is a gender effect among preschool children for false-belief understanding, deceptive ability, and deception detection ability, 3) whether there is a relationship between false-belief understanding, deceptive ability, and deception detection ability in preschool children, and 4) whether there is a relationship between peer acceptance and false-belief understanding, deceptive ability, and deception detection ability among preschool children. Participants were 78 (34 male, 44 female) preschool children of mixed ethnicity who were between three to five years of age. All subjects completed four tasks that assessed false-belief understanding, deceptive ability, deception detection ability, and peer acceptance. Results from the four-way repeated measures mixed-model analysis of variance (2 Gender x 3 Age x 2 False-Belief Understanding x 2 Deception) suggest that there is a task effect, age effect, gender effect, and false-belief understanding effect for deception among preschool children. Children received significantly higher scores on the deception detection ability task than they did on the deceptive ability task. This indicates that young children find deception detection to be easier than deceptive ability. In addition, this also provides evidence that deceptive ability and that deception detection are two separate constructs. This is further supported by the principal components analysis, which extracted two separate components for deception intelligence. In addition, three-year-old children perform significantly lower than four- and five-year-old

children on deception tasks. However, there is not a significant difference between the performances of four- and five-year-old children on deception tasks. This supports previous research that four years of age appears to be the critical age for the emergence of Machiavellian Intelligence (Peskin, 1992; Peterson, 2003). Moreover, males perform significantly better on deception tasks than females. Furthermore, there is a significant positive correlation between deception detection ability and peer acceptance. Children who obtain higher deception detection ability scores are ranked as being more liked by their peers.

CHAPTER 1. INTRODUCTION

Niccolò Machiavelli (1469-1527) was born on May 3, 1469 in Florence, Italy.

Machiavelli was a political philosopher and diplomat during the Renaissance.

Throughout the sixteenth and seventeenth centuries, his name became synonymous with deviousness, cruelty, and willfully destructive rationality. The source of this association resulted from his book *The Prince* (1513), which is a short treatise on government that lays out methods to secure and maintain political power. According to Machiavelli, there is only one primary concern in politics – acquiring and retaining power. Things such as religion and morality are only important aspects of politics if they help the ruler gain and keep power. Further, the successful politician must be able to use careful calculation in order to obtain and sustain power. In other words, the successful politician knows what to do and say in every situation. Machiavelli's refusal to allow ethical judgments to enter into political theory resulted in the public demonizing him and branding him throughout the Renaissance as a kind of anti-Christ. Today, Machiavelli's work excites so much passion because it divides readers into two camps: those who admire his clear-sighted pragmatism and those who are repelled by his casual amorality.

The term Machiavellian Intelligence refers to the ability to outwit another person through cunning and deceit. Evolutionary psychologists have proposed that Machiavellian Intelligence is an adaptive mechanism that has evolved along with our big brains as a way to survive in complex social groups. According to the Machiavellian Intelligence hypothesis, it might have been advantageous for survival for individuals to

possess a mental device that helped with the assurance of food and protection via social manipulation, deception, and cooperation (Byrne & Whiten, 1988).

Many animals and plants are equipped with survival mechanisms, which are controlled by genes and do not involve intellectual input, that enable them to trick their predators. Humans, however, have the ability to use sophisticated mental processes in a way that makes deception an art form. Humans must practice highly sophisticated methods of trickery in order to deceive others successfully because humans are highly intelligent and are continuously on watch for individuals who are trying to mislead them.

In order to be good deceivers, humans must possess a cognitive mechanism that allows them to be highly attuned to the thought processes of others. In addition, in order to ensure that individuals live long enough to rear their offspring to reproductive age, they must begin to practice using the mechanism at a very young age. Research suggests that the necessary skills for such Machiavellian deception in humans develop during early childhood through an ability called theory of mind.

Theory of mind, sometimes also labeled as “mind reading,” refers to the ability to explain the behaviors of ourselves and others based on a variety of mental states, such as emotions, percepts, intentions, desires, and beliefs (Keenan, 2003). This knowledge is essential so that we might better predict and control the various behaviors of others and deal with members of our social group, which, in turn, is essential for survival (Buss, 2004; Bjorklund & Pellegrini, 2002). According to Bjorklund and Pellegrini (2002),

[t]o successfully maneuver the often stormy waters within small groups of long-lived conspecifics, adult humans must be able to represent the knowledge, desires, and intentions of others if they are to succeed. They must learn how to cooperate, how to compete, and which general social

strategy is in their best interest...[I]t was individuals who could both cooperate and compete successfully with one another, who were better adapted than their less socially facile compatriots, who became our great grandfathers and grandmothers. (p. 193)

In short, if a specific cognitive module is responsible for theory of mind, then it could be the product of a selective pressure that conferred fitness advantages to individuals with mindreading abilities.

It has been hypothesized that this tendency to view the self and others as mental mediators buttresses social interaction beginning in the late toddler period (Wellman, 1990; Watson, Nixon, Wilson, & Capage, 1999). There is increasing evidence that theory of mind, more specifically false-belief understanding, plays an important role in children's social functioning (e.g., Lalonde & Chandler, 1995; Watson, Nixon, Wilson, & Capage, 1999; Peterson & Siegel, 2002; Slaughter, Dennis, & Pritchard, 2002). Thus, it is likely that deficits in theory of mind development may have consequences for social development and vice versa (Bartsch & Estes, 1996; Keenan, 2003). Over the years, there have been a number of studies that have linked preschoolers' peer acceptance to the development of social competence (Kemple, 1991), and, unfortunately, being rejected by peers as a preschooler has been linked to an endless cycle of rejection and isolation that persists throughout the school years (Katz, 1988). It is essential, therefore, to develop a greater understanding for how and when young children use theory of mind and deception skills with regard to social functioning.

Purpose of the Present Study

This dissertation represents a unique evaluation of the characteristics associated with deception and social development in early childhood. While autism research has begun to address the issue of individual differences in theory of mind (e.g., Baron-Cohen, 1995; Tager-Flusberg, 2003), information about individual differences within the general population is limited. In addition, there has been little, if any, tasks used in previous research to assess desire understanding. In other words, in virtually no case have subjects been presented with a situation in which they must predict the desire of another person while themselves holding a conflicting current desire. Previous deception tasks have dealt with an appreciation for a third party's desire for personal gain that is not associated with an alternative first person personal gain. The data will also help shine some light on whether deception detection ability, like deceptive ability, can be learned or whether the individual has to have a cognitive module that handles deception already enabled. Another issue that has not been addressed in previous research is whether there is a difference between deceptive ability and deception detection ability. Specifically, the question as to whether one ability develops before the other or whether they develop conjointly has not been addressed. Finally, this dissertation seeks to contribute to the existing literature on the relationship between deception and peer acceptance in early childhood. The overall purpose of this research, therefore, is to provide more detailed empirical evidence on deceptive ability and deception detection ability and to assess further the role that theory of mind and deception play in early childhood social functioning.

Specific Aims and Hypotheses

The specific aims of this study are:

- a) To identify whether there is an age effect among three-, four-, and five-year-old preschool children for false-belief understanding, deceptive ability, and deception detection ability.
- b) To identify whether there is a gender effect among three-, four-, and five-year-old preschool children for false-belief understanding, deceptive ability, and deception detection ability.
- c) To identify whether there is a relationship between false-belief understanding, deceptive ability, and deception detection ability in three-, four-, and five-year-old preschool children.
- d) To identify whether there is a relationship between peer acceptance and false-belief understanding, deceptive ability, and deception detection ability among three-, four-, and five-year-old preschool children.

My research hypotheses came from findings from previous literature on the development of theory of mind.

- a) Aim A – I hypothesized that there would be an age effect among three-, four-, and five-year-old preschool children for false-belief understanding, deceptive ability, and deception detection ability. I hypothesized that three-year-olds would perform the lowest on these three tasks and that five-year-olds would perform the best.

- b) Aim B – I hypothesized that there would not be a gender effect among three-, four-, and five-year-old preschool children for false-belief understanding, deceptive ability, and deception detection ability.
- c) Aim C – I hypothesized that there would be a positive relationship between false-belief understanding, deceptive ability, and deception detection ability among three-, four-, and five-year-old preschool children.
- d) Aim D – I hypothesized that there would be a relationship between peer acceptance and false-belief understanding, deceptive ability, and deception detection ability among three-, four-, and five-year-old preschool children. However, I do not have a hypothesis regarding the direction of the relationship.

CHAPTER 2. REVIEW OF LITERATURE

One of the interests of evolutionary psychologists is how humans deal with such a complex physical and social world. One explanation is that humans have an advanced general problem-solving ability that enables them to deal with the people, objects, and situations that they encounter. This view of how the mind operates is known as a domain-general mechanism. According to the domain-general perspective, “the mind is one.” That is, there is a single, general-purpose mechanism that is responsible for most aspects of cognition. The alternative is that the mind is composed of a set of independent, special-purpose cognitive mechanisms. This perspective is referred to as domain-specificity or modularity. According to modularity, certain areas of the brain are responsible for specific cognitive tasks. As such, various aspects of children’s understanding of social functioning, including theory of mind and social reasoning, are hypothesized to be specific evolved psychological mechanisms (Cosmides, 1989; Baron-Cohen, 1995; Leslie, 1994).

A basic principle of evolutionary psychology is that psychological mechanisms evolved to solve adaptive problems that our ancestors faced. In terms of the social intelligence hypothesis, living in highly social groups selects for the capacity both to manipulate and mindread. According to Orbell, Morkawa, and Allen (2002), manipulation allows the actor “to convey information to other group members that, if believed, will lead those individuals to actions that rebound to the manipulator’s own interest” and mindreading allows the actor “to penetrate to the truth of signals that are emitted by other group members” (p. 614-615). Cosmides (1989) proposes that such

capacities are adaptations rather than the product of drift or cultural learning and are evidence of the existence of a domain specific “cheater detection” mechanism for social relationships. This phenomenon is known as a theory of mind. A theory of mind enables an individual to have knowledge about not only the mental states of the self but the mental states of others as well. The role of theory of mind in social interactions is based on what Wellman (1990) has labeled “belief-desire reasoning.” That is, there comes a time at which a human functioning in a social group discovers that, like their own, other people’s behaviors are based on their beliefs and that these beliefs and desires can, and do, vary across individuals.

Frameworks for Theory of Mind

One of the first people to study the development of children’s intelligence was Jean Piaget (1896-1980). Through his research, Piaget (Piaget & Inhelder, 1969) created a four-stage theory of child development. As such, Piaget believed that children’s cognitive performance is directly associated with the specific developmental stage that they are in. Such a view of children’s development is compliant with a domain-general view of cognition since cognition is homogenous within a stage. Piaget said that a child’s cognitive system is limited to motor reflexes at birth (ages 0 to 2), but the child builds on these reflexes over time to develop more sophisticated procedures. In addition, children in the preoperational stage (ages 2 to 6/7) cannot successfully master tasks of the concrete operational stage (ages 6/7 to 11/12). During the preoperational stage, according to Piaget, children acquire representational skills in the area of mental imagery. However, they have an egocentric view and can only use these representational skills to view the

world from their own perspective. This is different from children in the concrete operations stage, who are able to take into account another person's point of view and consider more than one perspective simultaneously. According to this stage theory then, children are incapable of possessing a theory of mind until six to seven years of age. Piaget's theory of cognitive development has had a tremendous influence on modern developmental psychologists, with many of them debating over whether children develop in the way that Piaget proposed. One specific aspect of Piaget's theory that has prompted a flood of research is the age at which children develop a theory of mind.

One of the early theories on the role of theory of mind and social development deals primarily with the concept of the importance for acquisition of representation. Leslie (1987) proposes that theory of mind is a universal, innate, preprogrammed, epigenetic human capacity. Leslie's view of theory of mind, therefore, is one of domain-specificity. According to Leslie, there is a specific neural structure located in the left frontal lobe of the brain that underlies theory of mind, called the theory of mind module, which is responsible for belief-desire reasoning (Leslie, 1994). Evidence for this theory comes from his work with autistic children. While autistic patients display relatively normal intellectual functioning on nonsocial tasks, they have particular difficulty with false-belief and other theory of mind tasks (Baron-Cohen, Leslie, & Frith, 1985). Baron-Cohen, Leslie, and Frith (1985) presented both autistic children and Down's Syndrome children with a series of cognitive tasks as well as with a false-belief task. They found that autistic children had better cognitive performance than Down's Syndrome children in many cognitive tasks. However, they also discovered that autistic children routinely fail

false-belief tasks though Down's Syndrome children do not. In addition, the amount of successful performance did not increase significantly with age. This led to the conclusion that one central component of autism is a specific deficit in mindreading, and not an impairment of general cognitive abilities. Succinctly, theory of mind is not simply a general intellectual ability but is rather a highly specialized module.

A tenet of Leslie's theoretical stance on theory of mind involves the concepts of representation and metarepresentation. Representation is the ability of an organism to represent aspects of the world, such as objects, states of affairs, and situations, in an accurate way so that one then has a perception of the world in which it lives.

Metarepresentation, conversely, is the ability of an organism to represent unobservable representations, such as thoughts, beliefs, desires, and intentions. Leslie labeled the information-processing system that an individual uses for turning representations into metarepresentations the decoupling model. He proposed that it is the "emergence of metarepresentation through the growth of a decoupling mechanism" that allows for the development of a theory of mind (p. 424). He goes further in saying that it is upon this new foundation that the development of specialized inferential knowledge supports a high functioning causal theory.

Baron-Cohen (1995) has presented another perspective on theory of mind, which also supports a domain-specific module. According to Baron-Cohen, there are four separate, highly specialized, interacting modules that are involved in theory of mind: intentionality detector, eye-direction detector, shared-attention mechanisms, and theory of mind module. Baron-Cohen derived his modular view of theory of mind from the data

that he collected from autistic subjects. According to Baron-Cohen, autistic subjects are people who frequently display relatively normal intellectual functioning but struggle with most forms of social interaction. He noticed that most autistic children performed well on the simpler theory of mind tasks, such as those that required the intentionality detector or eye-direction detector, but failed tasks involving the more intensive minding reading tasks, such as shared-attention mechanisms and theory of mind module. Baron-Cohen thus concluded that a primary characteristic of autistic children is the inability to understand that other people may have different beliefs and that this “mindblindness” results in a confusing and frightening world.

Gardner’s (1983, 1999) work on the theory of multiple intelligences also addresses the issue. According to Gardner, there are eight intelligences that arise from unique developmental histories: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist. Gardner’s interpersonal intelligence is responsible for theory of mind abilities. Gardner suggests that these are domain-specific modules that have evolved due to natural selection and that individuals may genetically inherit unique values for each of the eight intelligences. In addition, Gardner believes that varying educations and experiences may result in even more dramatic individual proficiencies. In other words, performances on various theory of mind tasks cannot be classified as an “all-or-none” phenomenon (Jenkins & Astington, 1996; Keenan, 2003). The combination of genetic and learned individual variations in mind reading ability result in differences in not only young children’s predictions and

explanations of behaviors that are based on mental states but in individual differences in theory of mind use as well (Repacholi, Slaughter, Pritchard, & Gibbs, 2003).

Finally, Mitchell has presented a framework for theory of mind that deals specifically with deception and takes on a more evolutionary model. According to Mitchell (1984), there are four levels of deceptive ability. Level one refers to situations in which the acts of the receivers have no influence on the acts of the sender in one lifetime, although there may be evolutionary consequences. This is a hardwired mechanism that both plants and animals are capable of having. An example of the first level is camouflage. For example, stick insects avoid predation by blending into their environment but are unaware of their deceptive ability. Level two occurs when the receiver's actions influence the occurrence of the behavior and its intensity but not its form. Though the second level of deception is more active, it still operates by genetic coding and does not involve learning. For instance, piping plovers deceive potential predators by luring them away from their nests using a feigned broken wing display and running in the opposite direction of their nests. If the predator stops following, the birds will modify their innate behavior by flapping harder and squawking louder. Level three occurs in situations in which an innate behavior has worked before and in similar circumstances is tried again. Animals acting in this way can be considered to be acting with intention because the behavior previously brought about a particular result without the animal actually having an explicit intent to deceive. For example, a dog may hold up a foot and whine when it is sore. This results in the dog receiving attention. Later, when the dog wants attention even though the foot is not sore, it will repeat the sore foot

behavior in order to obtain it. Unlike the other three levels, the fourth level of deception requires psychological sophistication and involves outwitting others by understanding their mental processes. Level four deception occurs in situations when the sender corrects its actions to match the receiver's behavior in such a way as to encourage desired acts or beliefs of the receiver. In short, the sender is manipulating the receiver's understanding of a situation. It is the fourth level of deception that is attributed to adult humans. In addition, there is emerging literature that suggests that young children are also capable of level four deception.

Methods for Assessing Theory of Mind

A great deal of research on social understanding during the preschool period has been conducted using theory of mind tasks (Astington & Jenkins, 1995; Frye & Moore, 1991; Wellman, 1990; Whiten, 1991). Through their work with various theory of mind tasks, scholars have proposed that children come to acquire the key aspects of theory of mind such as false-belief, appearance-reality understanding, and deception by four years of age (Perner, Leekam, & Wimmer, 1987; Wellman, 1990).

One very popular method of assessing theory of mind in children is through the use of a false-belief task. False-belief tasks are used in order to see if children can discern the differences between reality and the mental states of other people. A false-belief task requires an individual to understand that other people who are not currently present may have different and conflicting mental states from the participant regarding the state of a situation. In order to be able to succeed on a false-belief task, children must be able to separate their own beliefs, *i.e.*, the true belief, so that they can attribute a false-belief to

the task's third party participant. Hence, children's performances on false-belief tasks represent their ability to reason about mental states, which in turn provides evidence for the presence of an intact theory of mind. As such, false-belief has been considered to be the litmus test for the presence of a theory of mind since Premack and Woodruff's (1978) work with chimpanzees (Wellman, 1988).

Premack and Woodruff's work led to an interest in developmental psychology as to what would be required as firm evidence for a theory of mind (*e.g.*, Bennett, 1978; Dennett, 1978). In response, Wimmer and Perner (1983) developed the first false belief task. In their task, Wimmer and Perner (1983) presented children with a story in which a character, "Maxi," places some chocolate in a cupboard in the kitchen and leaves. While Maxi is away, another character removes the chocolate from the first cupboard, places it into a second cupboard, and then also leaves. When Maxi returns, the participant is asked to predict where Maxi will look for the chocolate. The correct answer is to predict that Maxi will look in the empty cupboard and not in the cupboard where the chocolate really is. Wimmer & Perner (1983) found that it was not until about four to five years of age that children perform correctly on this task. Younger children typically judged according to the real location of the object. Wimmer & Perner (1983) concluded that what develops at this age is the understanding that beliefs are attitudes towards representations of reality rather than towards reality itself.

In order to further address the issue for an understanding representation, Perner, Leekam, and Wimmer (1987) designed another false-belief task based upon representational change, which is commonly referred to as the Smarties Task. For this

task, the experimenter shows the subject a well-known container and asks the subject to predict the contents. Naturally, the subjects predict that the contents will be the same as the picture on the container. The experimenter then shows the subject the actual contents of the container, which is different from what would normally be expected. In order to ensure that the participant can remember and report what their own false-belief had been and that it was false, the experimenter asks the participant control questions. The experimenter then asks the participant what another individual, who is unaware of what had previously transpired, would think is in the container. Whether he or she appreciates another person's false belief, *i.e.*, the individual will think that the container contains the contents that are pictured on the label. Perner, Leekam, and Wimmer (1987) discovered that children younger than four years of age have difficulty with successfully completing this task. Rather than saying that the other person will think that the container actually contains the expected item that is pictured on the label, three-year-olds respond by predicting from their own knowledge and say that the other person will think that the container contains the unexpected item. This further supports the notion that it is not until four years of age that an individual is capable of appreciating another person's false-belief.

In addition to false-belief tasks, Flavell, Green, and Flavell (1986) designed a measure to assess representational understanding in young children that involves the participant making a distinction between appearance and reality. In their task, which is commonly referenced as the Rock/Sponge Task, the child must realize that something can look like one thing while actually being another. First, children are shown a deceptive

object (*e.g.*, a sponge painted to look like a rock) and, while unaware of the deception, are asked what it looks like. Then the deceptive object's real properties are revealed to them. Next they are asked the appearance question ("What does it look like? Does it look like a sponge or does it look like a rock?") and the reality question ("What is it really? Is it really a rock or is it really a sponge?"). In accordance with previous studies, Flavell, Green, and Flavell (1986) found that four- and five-year-olds generally respond correctly, that the object looks like a rock but is really a sponge, but that most three-year-olds fail to differentiate between the object's appearance and reality.

Another aspect of theory of mind is deception. One of the first tasks designed to assess deceptive ability in young children was created by Lewis et al. (1989) and used a temptation resistance paradigm in which the researchers told preschool children not to peek at a toy when the experimenter left the room. As soon as the children peeked at the toy, the experimenter returned to the room and asked the children if they had peeked. This set-up provided children with an opportunity to lie in order to conceal their own transgressions for self-protection. Lewis et al. (1989) found that while the majority of children peeked due to the highly tempting nature of the situation, three-year-olds who peeked were not as competent at concealing their transgressions as four- and five-year-olds who peeked. Thirty-eight percent of the three-year-olds lied by denying they had peeked, thirty-eight percent confessed, and twenty-four percent gave no verbal response.

One of the main problems with Lewis et al.'s task is that the children were instructed by experimenters to lie about something that they seemed not to care about. As a result, the children might not have been motivated to lie convincingly. In an attempt to

create a deception task that provides personal incentive for the participant to transgress, Peskin (1992) designed the “Mean Monkey” task. The experimenter gives the participant a collection of stickers that contains some that are less desirable and some that are extremely attractive. Meanwhile, the experimenter is controlling a hand puppet named “Mean Monkey.” Using Mean Monkey, the experimenter asks the participant to identify which of the stickers he or she really wants the most and which one he or she does not really want. Mean Monkey then takes the sticker that the participant identified as being the one that he or she wanted most. This procedure is then repeated a number of times. Peskin (1992) found that four- to five-year-old children quickly discover the social dynamics involved in the task and learn to point to the stickers that they would least want. Three-year-old children, however, were incapable of refraining from identifying the stickers that they liked the most and would continue to point to them to their own detriment. This suggests that it is not until four years of age that children come to understand that someone else may have a different goal than they do.

Keating and Heltman (1994) have also assessed deception in their study of children between three to six years of age. The researchers gave each child two glasses of orange juice. One glass contained regular orange juice, and one glass contained orange juice laced with quinine flavor, which produces a repulsive taste. The researchers asked the children to taste both drinks and indicate which drink was nice and which was nasty. Then, while being videotaped, the children were asked to drink another sip of each drink and to try and convince the researcher’s assistant that both drinks tasted nice. The researchers later showed the silent footage of the children and to a group of adult judges.

The researchers briefed the judges that one drink was nice and that the other was actually nasty and asked them to rate whether the children were being honest or lying about the actual taste of the drink based upon their displayed behavior. The researchers then used these ratings to score how effective each child was at deception. In addition, in a closer analysis of the judges' ratings, the researchers asked the judges to indicate what it was about the children's behavior that the adults found to be convincing. The factor for successful deception that they isolated was the ability to smile, rather than contort, while saying that a nasty drink tasted nice. The judges indicated that it was the child's smile that made the behavior believable. Unlike previous studies, Keating and Heltman (1994) found that the ability to deceive is not dependent upon age. They concluded that there are individual differences concerning deceptive ability and that it is consequently a genuine ability.

Most recently, Peterson (2003) designed a storyboard task in order to assess deceptive ability in preschool children. In Peterson's task, the experimenter shows the participant two pictures. One picture has a drawing of a child with a happy expression, and the other has a drawing of the same child with an unhappy expression. The experimenter presents to the participant a particular scenario about the feelings and condition of the pictured child and another individual that is not pictured (*e.g.*, Casey has a tummy ache but he/she really wants to go outside to play with his/her friends. Casey's mom does not let Casey play outside when she/he is sick. How will Casey look when he/she goes to ask his/her mom if he/she can go outside to play?) Peterson (2003) found that four- and five-year-old children have little difficulty in identifying that while Casey

may feel unhappy, Casey will look happy when he/she approaches Mom to ask to play outside. Three-year-olds, conversely, have trouble understanding that people's thoughts may differ from their behaviors and that this difference is a means of manipulation that enables the individual to get what he or she wants.

While the findings that it is not until about four years that children understand false belief are fairly robust, a few studies suggest that awareness of others' mental states emerges much earlier than four years of age and that younger children do have some knowledge of belief-desire reasoning. For example, Dunn (1995) found that two-year-olds are capable of using a variety of mental state terms in their conversations with caregivers. In addition, around two years of age, children not only can respond to some perceptual object or event but they can also simultaneously "hold in mind" a representation of a nonpresent object or event (Olson, 1993). Furthermore, the mental representation can control behavior, so that activity can be conducted in relation to imaginary objects or states of affairs rather than real ones, as seen in pretend play. At about the same time, children also show evidence of self-conscious emotions, such as coyness and embarrassment (Lewis et al., 1989). The latter forms of behavior suggest that children at this age are affected by their beliefs of how they appear from the perspective of another. Flavell et al. (1990) have also shown that three-year-olds, presented with a favorite cookie and then shown another person express disgust after taking a bite of the cookie can understand that, even though they like the cookie, the other does not. Further, Wellman (1990) has provided evidence of three-year-old children's belief-desire reasoning by using brief story tasks in which a participant is told a story about a character

who wants something or thinks something. Through their tasks, Wellman and his colleagues (Wellman & Bartsch, 1988; Wellman & Woolley, 1990) claim that three-year-olds know that people will act on the basis of their desires and knowledge.

A theory as to why children younger than four years of age have difficulty with theory of mind tasks deals with response control. There is evidence to support the idea that three-year-old children know the right answer but have difficulty inhibiting incorrect responses. One method that has been used in order to assess whether three-year-olds possess the requisite knowledge but fail to act appropriately on false-belief tasks use eye-gaze devices that have been used in reading research to assess looking-time. Ruffman et al. (2001) found that three-year-olds look longer to the correct location even though they give the wrong answer. In addition, Carlson, Moses, & Hix (1998) found that children perform better on false-belief tasks when asked to give spoken rather than pointing responses.

The Role of Theory of Mind in Social Development

Two of the early founders of Machiavellian Intelligence research in humans are Christie and Geis. Christie and Geis (1970) created an adult personality test based upon statements taken from Machiavelli's *The Prince* in order to discern how individuals with high Machiavellian dispositions differ from other individuals. Participants rated how much they agreed with statements such as "Most people forget more easily the death of their parents than the loss of their property" and "The biggest difference between most criminals and other people is that the criminals are stupid enough to get caught." Christie and Geis labeled those who agreed with Machiavelli's opinions as high Machs and those

who rejected the statements as low Machs. They found that most people fall somewhere in the middle but that there is a significant minority at both extremes. High Machs, he determined, constitute a distinct personality type that is charming and confident but also arrogant, calculating, cynical, and prone to manipulate and exploit. While Christie and Geis' work focused on adults, research supports that there are some individuals who as preschoolers begin to use their mind-reading skills very competently in order to achieve various social objectives.

Asher, Singleton, Tinsley, and Hymel (1979) originally designed a way to assess peer relationships in preschool children by creating a sociometric measure. Denham, McKinley, Couchoud, and Holt (1990) later modified this early measure into what is now a very popular device for researchers to use when assessing popularity amongst preschoolers. With the sociometric rating procedure, the researcher shows the participants individual pictures of their classmates and asks the participants to rate their peers based on how much they like the child in each photo by placing the photographs into boxes marked with a happy face, a sad face, or a neutral face. Recent research that has included sociometric status as an index of children's social functioning has also found that an association exists between theory of mind ability and peer acceptance.

In a study preformed by Dockett and Degotardi (1995), preschool children who were consistently most liked by their peers also preformed higher on representational theory of mind tasks than the children who were consistently least liked by their peers. In addition, in a sample of four- to six-year-olds, Badenes, Estevan, & Bacete (2000) found that popular children preformed significantly better than average as compared to

neglected children on deception, figurative language, and intention tasks, although performances on the other theory of mind tasks did not vary with peer acceptance. Slaughter, Dennis, and Pritchard (2002) also examined the relationship between sociometric status and theory of mind in preschool children. In two separate samples, they observed a developmental trend in which theory of mind development was the best predictor of peer popularity in children over the age of five-years-old. In children under five-years-old, however, the amount of prosocial and aggressive behaviors were the best predictors of peer popularity. Peterson and Siegel (2002) have also reported that popular preschoolers obtained higher scores on theory of mind tasks than did their rejected peers. In addition, rejected children who had at least one mutual friendship scored higher on theory of mind tasks than did rejected children who were without such friendships. The same relationship was found to exist for popular children as well. In summary, popular children with at least one mutual friendship obtained the highest theory of mind scores, whereas rejected children without such friendships received the lowest scores. Peterson and Siegel (2002) thus proposed that social interactions within the context of mutual friendship are critical to the acquisition of theory of mind skills.

Research by McNab (2001) and Keenan and Quigly (2002) suggests that there are gender differences in social development and the use of various theory of mind skills. McNab (2001) administered five different measures of theory of mind understanding and two measures of peer acceptance to 80 four- and five-year-old children. Performance on the false-belief task was positively correlated with peer acceptance as rated by female participants but not male. One explanation for this finding is that there might be multiple

paths to peer acceptance that differ for boys and girls. Another explanation is that a developed theory of mind causes children to display different social behaviors that girls find attractive but that boys do not seem to consider.

Finally, Keating and Heltman (1994) researched the relationship between deception and dominance in children between three to six years of age. The researchers determined dominance in the children by observing the displays of routine behavior in the children's school setting and assigning a rated dominance score. For the deception task, the researchers used their quinine drink task. The researchers also asked the judges to indicate how socially confident the children appeared. The researchers then looked at the social confidence ratings that the judges gave to the children when they were telling the truth about an untainted drink, *i.e.*, were not being deceitful, in order to come up with an independent measure of social confidence. As Keating and Heltman (1994) had predicted, the children who were the most skillful at deception were also the children who were most dominant over others. The dominant children in particular were able to overcome the desire to contort one's face at the nasty drink and present convincing behavior of having an enjoyable experience. Keating and Heltman (1994), moreover, determined that the relationship between deception and dominance was maintained even when the age of the child was statistically controlled as a variable. That is, it was not simply that the older children were the ones who were best able to deceive and dominant but rather the children who possessed a genuine ability. In addition, Keating and Heltman (1994) statistically controlled for social confidence and were able to determine that the children who were socially confident were not the only ones who were skillfully

dominant and deceitful. That is, timid children do not simply fall victim to dominate children nor do they lack the self-confidence to carryout a successful deception.

Therefore, after controlling for both age and social confidence, Keating and Heltman (1994) concluded that the relationship between dominance and deception in children is a genuine rather than spurious phenomenon.

The previously discussed studies have all examined the effect of theory of mind on social development. However, a number of studies have also been conducted that examine the effect of social interactions on the development of theory of mind. Such studies have reported evidence that interactions with caregivers, siblings, and peers facilitate development of theory of mind. This is especially true for children with poor language skills (Jenkins & Astington, 1996). For example, Ruffman et al. (1998) found that younger children from larger families with older siblings do better on false-belief tasks. However, children who have younger siblings only did not show any benefit. An explanation for this effect could possibly due to older siblings stimulating pretend play scenarios that facilitate the development of counter-factual reasoning. Adults can also be effective tutors for theory of mind development in young children. Lewis administered theory of mind tests to a group of three- and four-year-olds and found that the best predictor of success on the tasks was the number of adults that the child interacted with every day. In addition, research conducted by Hughes and Dunn (1998) found that mental-state talk between family and friends is associated with later theory of mind ability.

Traditionally, the relationship between theory of mind and social functioning has been conceptualized as a positive one. That is, a well functioning theory of mind has been linked to superior social outcomes (*i.e.*, popularity). Recently, however, mounting evidence has been presented which suggests that superior mind reading skills are not necessarily linked to superior, positive social functioning. For example, Astington and Jenkins (1995) reported that three- to five-year-old children who had a better understanding of false beliefs failed to show greater empathic concern towards their peers. Dunn (1995) also found that the transition to school was more difficult for children who at 40 months of age had demonstrated an advanced understanding of false belief. Even more recently, Cuming and Repacholi (1999) reported that children with few or no mutual friends in preschool were more successful on false-belief tasks than preschoolers who have many mutual friendships. Such research, therefore, suggests that an advanced theory of mind in early childhood does not guarantee that individuals will be able to form and maintain large circles of mutual friends. That is, individuals may not always competently use the mind-reading skills that they have available to them (O'Connor & Hirsch, 1999). In addition, some preschool children have been observed using their theory of mind abilities to achieve antisocial goals such as teasing, deceiving, and manipulating others (Hala & Chandler, 1996).

Summary

Contemporary theory of mind research has placed more emphasis on the ability to discern the beliefs rather than the affects, emotions, and desires of another. Empathy and role-taking are two ways in which individuals can pick up on the needs of others.

Affective perspective taking involves the ability to recognize the experience of another without experiencing vicariously that person's emotional state. Empathy and role-taking abilities enable individuals to suppress their own perspectives so that they might entertain those of another person. As such, empathic concern involves the ability to experience specific emotional reactions of sympathy and compassion in response to another's misfortune (Davis & Kraus, 1991). Hence, individual differences in perspective taking and empathy are relevant to the intentional mapping of the beliefs and desires of another. Empathic concern and perspective taking, as a result, help shape what use is made of the information gained about the state of another, that is, whether the individual uses the information to help another person or to exploit them.

Individuals in social groups can choose from two methods in order to gain advantage. Either they can choose to use cooperative behavior or they can choose to use competitive behavior. Following this school of thought, David Wilson believes that Machiavellianism is just one trait that has evolved in humans and that not all of us choose to use it. According to Wilson (1998), "there is more than one way to succeed in social life. There are exploitative ways, and there are cooperative ways." As such, Wilson has proposed a "multiple-niche" theory. According to Wilson (1998), while some people choose to get ahead through deceit, others prosper using altruistic approaches. Wilson proposes that cooperative strategies can work as well as, and sometimes better than, exploitative ones. This is because Machiavellianism can backfire and result in the individuals being expelled by their community if caught.

The studies on the relationship between deception and dominance are extremely intriguing in that they provide interesting insight into the differences between acts of deception in humans versus in other living organisms. Humans are capable of using acts of deception not just for immediate survival needs, *i.e.*, avoiding predation, but for long-term personal ambitions, *i.e.*, social status, as well. That is, people are able to use deception in order to dominate mentally over others and assume positions of power or use empathy in order to cooperate with others and achieve social stability. It is not surprising, therefore, to find a relationship between theory of mind and social development in early childhood when the ramifications of social popularity begin to emerge.

However, given the conflicting literature and limitations of previous research on the relationship between mind-reading and social skills, it would be inappropriate to describe social experiences as formative for later theory of mind performance and vice versa without further research. Therefore, the purpose of the present study is to provide more insight into possible relationships between false-belief understanding, deceptive ability, deception detection ability, and peer acceptance in preschool children.

CHAPTER 3. METHODS

Participants

Participants were recruited from preschools located in the metropolitan area of Phoenix, Arizona. In order to encourage the recruitment of representatives from racial or ethnic minority groups, preschools in both lower and upper socioeconomic neighborhoods were recruited. Ultimately, two preschools were selected for participation because both provide high quality education to a large, diverse population of young children. In order to be eligible for participation, the children had to be between the ages of three and five and be able to understand English. In total, seventy-eight male and female children of mixed ethnicity participated in the study. A description of the sample in terms of age and gender is presented in Table 3.1.

Table 3.1: Sample Characteristics

	3-Years-Old	4-Years-Old	5-Years-Old	Total
Male	8	12	14	34
Female	18	14	12	44
Total	26	26	26	78

Procedure

Parental consent forms were sent home with all of the children who attended the preschool. Only children who returned parental consent forms were allowed to participate in the study. In addition, before beginning the data collection, the children were informed

that their parents had given their consent to participate and asked if they would like to play the games with the researcher. This was done in order to ensure the child's assent. In order to obtain scores for false-belief, deceptive ability, deception detection ability, and peer acceptance, all of the participating children individually completed four tasks.

False-Belief Task

The task that was used to assess false-belief understanding was the Wimmer and Perner (1983) "Maxi" task. The Wimmer and Perner (1983) task involves someone hiding an object and then leaving the room. Unbeknownst to the hider, the researcher moves the object to a new location before the original hider returns to the room. The participant then predicts where the hider will look for the object, *i.e.*, in the original or new location.

For the purpose of this study, instead of having a research assistant hide an object and then return to the room, the researcher instead placed a paper bag and a small box on the table. Inside the paper bag was an apple. The researcher showed the children that the bag contained an apple and told the children that their teacher put the apple in the bag. The researcher told the children that she was going to take the apple out of the bag and hide it in the box. The researcher then put the apple in the box so that the children could see it. In order to ensure that the children were able to remember the displacement of the object, the researcher first asked the participants control questions. The researcher asked the children where the teacher put the apple before leaving the room and where the experimenter moved the object. If the children did not correctly identify the original or new location of the apple, the researcher reminded them of the scenario. Finally, the

researcher asked the children where their teacher is going to look for her apple when she comes back into the room.

The children performed this task only once in order to establish whether they possess false-belief understanding. False-belief understanding is a dichotomous variable, where a score of one indicates presence of the ability. The participants' response to where the teacher will look for the apple indicates whether they predict from their own knowledge, *i.e.*, the hider will look where the object really is, or whether they appreciate the hider's false belief, *i.e.*, the hider will look where the object was originally placed. This provided information as to whether the children can recognize that someone else's knowledge and thoughts may be different from their own.

Deceptive Ability Task

The task that was chosen to assess deceptive ability was Peskin's (1992) "Mean Monkey" task. However, instead of a monkey puppet, the experimenter in this study used a turtle puppet and therefore named it "Mean Turtle." In order to obtain assent from the participants, the experimenter asked them if they like stickers and would like to play a game with puppets and stickers. Once assent was obtained, the experimenter spread out on a table in front of the participants a collection of ten stickers. Half of the stickers were various two-inch stickers of popular cartoon characters, the other half of the stickers were plain, half-inch colored labeling dots. Meanwhile, the experimenter was controlling Mean Turtle, which she introduced to the children. The experimenter then explained the rules of the game to the children. She told the children that they were going to choose a sticker and that Mean Turtle was going to choose a sticker. The experimenter also told the

children that Mean Turtle always goes first and always chooses the sticker that they really want, adding that Mean Turtle does not care if it makes the children sad because he is mean. It is important to note that although Mean Turtle is not nice, he is always honest about his intentions to take the identified stickers and that he never uses deception against the child in order to get what he wants.

The experimenter then told the children that she was going to hide Mean Turtle so that Mean Turtle could not hear what the children were saying and did not know which sticker the child really wants. The experimenter asked the children to tell her which sticker was the yucky sticker that they did not really want. The experimenter then brought Mean Turtle back into view and reminded the children that Mean Turtle gets to choose first and that Mean Turtle always takes the sticker that he or she really wants because Mean Turtle does not care if it makes the children sad. Before Mean Turtle made his selection, the experimenter told the children to think of something that they can say or do so that Mean Turtle would not get the sticker that they really wanted. Using Mean Turtle, the experimenter asked the participants to identify which of the stickers they really wanted the most. Mean Turtle then took the sticker that the participants identified as being the one that they wanted the most.

This procedure was repeated five times with ten different stickers. The researcher recorded whether the children chose a less desirable sticker as their favorite and an attractive one as their least favorite during any of the trials. Each trial of the deceptive ability task was recorded as a dichotomous variable, where a score of one indicates presence of the ability on that particular trial. In addition to the trial scores, a cumulative

rating scale for deceptive ability was also calculated by totaling the number of successful trials. The total score for deceptive ability can range from zero to five, where zero indicates absence of ability and five indicates the highest level of ability.

In order to gain more insight into the children's thought processes during the task, upon completion of the task, the experimenter asked the children what Mean Turtle was doing when he was asking which sticker was their favorite. The experimenter then asked the children if they could think of something that they could say or do so that Mean Turtle would not be able to take their stickers in the future. At the end, Mean Turtle told the participants that he really liked playing with them and that he does not want to be mean anymore. Mean Turtle then apologized for taking the children's favorite stickers and asked them if they would like to keep all of the stickers. The children that participated received all ten stickers to place in their take-home cubby, which they were allowed to retrieve at the end of the school day.

Deception Detection Task

The task that assessed whether the children were able to detect when someone is using deception against them was designed as a modification of the Mean Turtle task. However, unlike the deceptive ability task where the researcher told the children the puppet's intention from the beginning, the deception detection task required that the children discover this on their own. In addition, while the deceptive ability task puppet never deceived the child, the puppet in this task used deception in order to get what it wanted.

In order to obtain the participants' assent, the researcher asked the children if they would like to play another game with a puppet and toys. The researcher then placed five small, party favor toys and three cups in a row on a table in front of the participants. The researcher introduced a puppet named "Tricky Giraffe" to the children. The researcher told the children that Tricky Giraffe was going to hide one of the toys under a cup and that they would have to guess under which cup the toy was hiding. In addition, the researcher told the children that if they guessed the correct cup, then they could keep the toy but that if they guessed the wrong cup, then Tricky Giraffe would get to keep the toy. The researcher also told the children that Tricky Giraffe would give them a clue about where the toy was hiding.

The researcher then asked the children to turn around and close their eyes so that Tricky Giraffe could hide a toy. After hiding the toy, the researcher asked the children to turn back around. The researcher asked Tricky Giraffe if he could give the children a clue about where the toy was hiding. Tricky Giraffe would agree and point to the cup that was actually concealing the toy and say that the toy was not under this cup. The researcher then asked the children to pick the cup that they thought was hiding the toy. The researcher lifted the selected cup to reveal its contents. If the selected cup was different from the one that actually contained the toy, then the researcher also revealed the toy's location. When lifting the correct cup, the researcher told the children that it was the cup that Tricky Giraffe said did not contain the toy.

This process was repeated five times with five different toys. The researcher recorded whether the children chose the correct cup for any of the trials. Each trial of the

deception detection ability task was scored as a dichotomous variable, where a score of one indicates presence of the ability on that particular trial. In addition to the trial scores, a cumulative rating scale for deception detection ability was also calculated by totaling the number of successful trials. The total score for deception detection ability can range from zero to five, where zero indicates absence of ability and five indicates the highest level of ability.

In order to gain further insight into the thought processes that the children underwent during the task, the experimenter asked the children a series of questions following the completion of the Tricky Giraffe task. First, the researcher asked the children if Tricky Giraffe gave them good clues about where the toys were hiding and why they were good. Second, the experimenter asked if Tricky Giraffe ever gave any tricky or bad clues and, if so, how they were tricky or bad. At the end, Tricky Giraffe told the children that he really liked them and that he had a lot of fun playing. Tricky Giraffe then apologized for being tricky with his clues and taking the toys and asked the children if they would like to keep all of the toys. The children that participated received all five toys to place in their take-home cubby, which they were allowed to retrieve at the end of the school day.

Peer Acceptance Task

The task chosen for the peer acceptance rating is a variation on Denham, McKinley, Couchoud, and Holt's (1990) sociometric measure. The task involves asking the participants to rate their peers based on how much they like the child in each photo. In a private location, the participants viewed their group photograph of the class that was

taken previously in the year by a professional photographer who is not associated with this study. The researcher told the participants that she was going to show them a picture of all of the children in their class and that she wants them to think about how much they like to play with each of the children. She asked them to think about whether they like to play with each child a lot, a little bit, or not very much. The researcher then began the process of having the children rate their peers by pointing to a child in the picture, saying the child's name, and asking the participants if they like to play with the child a lot, a little bit, or not very much. This was repeated until the participants rated every child pictured.

The children received two points for each time they said that they liked a peer a lot, one point for each time they said that they liked a peer a little bit, and zero points each time they said that they did not like a peer very much. The points were then totaled and averaged for each class. The new score was used to identify how much the children like their peers. In addition, each time the children were identified by one of their peers as being liked a lot, they received two points. Each time the children were identified by one of their peers as being liked a little bit, they received one point. Each time the children were identified by one of the peers as not being liked very much, they received zero points. The points were then totaled and averaged for each class. The new score was used as the score for how much the children are liked by their peers.

CHAPTER 4. RESULTS

Descriptive Statistics

The independent variables for this study are age, gender, and false-belief understanding. Age has three levels (three-, four-, and five-years-old), gender has two levels (male and female), and false-belief understanding has two levels (passed and failed). The dependent variables are peer acceptance and deception. Peer acceptance has two levels (peer acceptance of their peers and peer acceptance by their peers) and deception has two levels (deceptive ability and deception detection ability). The descriptive statistics for the overall performance, independent of age or gender, on the false-belief task, deceptive ability task, deception detection ability task, and peer acceptance task can be found in Table 4.1. The descriptive statistics for three-year-olds across the deception tasks can be found in Table 4.2. The descriptive statistics for four-year-olds across the deception tasks can be found in Table 4.3. The descriptive statistics for five-year-olds across the deception tasks can be found in Table 4.4. The overall descriptive statistics independent of age across the deception tasks can be found in Table 4.5.

Table 4.1: Descriptive Statistics for Overall Task Performance

Task	N	Minimum	Maximum	Mean	Std. Deviation
False-Belief	78	0	1	0.38	0.490
Deceptive Ability	78	0	5	1.13	1.557
Deception Detection Ability	78	0	5	2.67	1.938
Peer Acceptance of Peers	78	0.22	2.00	1.30	0.379
Peer Acceptance by Peers	78	0	2	1.31	0.355

Table 4.2: Descriptive Statistics for Three-Year-Olds Across the Deception Tasks

Gender	False-Belief	Mean	Std. Deviation	N
Female	Failed	.69	1.494	13
	Passed	.80	1.095	5
	Total	.72	1.364	18
Male	Failed	2.67	2.251	6
	Passed	1.00	0.000	2
	Total	2.25	2.053	8
Total	Failed	1.32	1.945	19
	Passed	.86	0.900	7
	Total	1.19	1.721	26

Table 4.3: Descriptive Statistics for Four-Year-Olds Across the Deception Tasks

Gender	False-Belief	Mean	Std. Deviation	N
Female	Failed	1.86	2.340	7
	Passed	3.43	1.134	7
	Total	2.64	1.946	14
Male	Failed	2.71	2.138	7
	Passed	4.40	.548	5
	Total	3.42	1.832	12
Total	Failed	2.29	2.199	14
	Passed	3.83	1.030	12
	Total	3.00	1.897	26

Table 4.4: Descriptive Statistics for Five-Year-Olds Across the Deception Tasks

Gender	False-Belief	Mean	Std. Deviation	N
Female	Failed	3.71	1.254	7
	Passed	3.60	0.894	5
	Total	3.67	1.073	12
Male	Failed	3.63	1.408	8
	Passed	4.33	0.816	6
	Total	3.93	1.207	14
Total	Failed	3.67	1.291	15
	Passed	4.00	0.894	11
	Total	3.81	1.132	26

Table 4.5: Overall Descriptive Statistics for Deception Across the Deception Tasks

Gender	False-Belief	Mean	Std. Deviation	N
Female	Failed	1.78	2.063	27
	Passed	2.71	1.611	17
	Total	2.14	1.936	44
Male	Failed	3.05	1.884	21
	Passed	3.85	1.405	13
	Total	3.35	1.739	34
Total	Failed	2.33	2.066	48
	Passed	3.20	1.606	30
	Total	2.67	1.938	78

Analysis of Variance

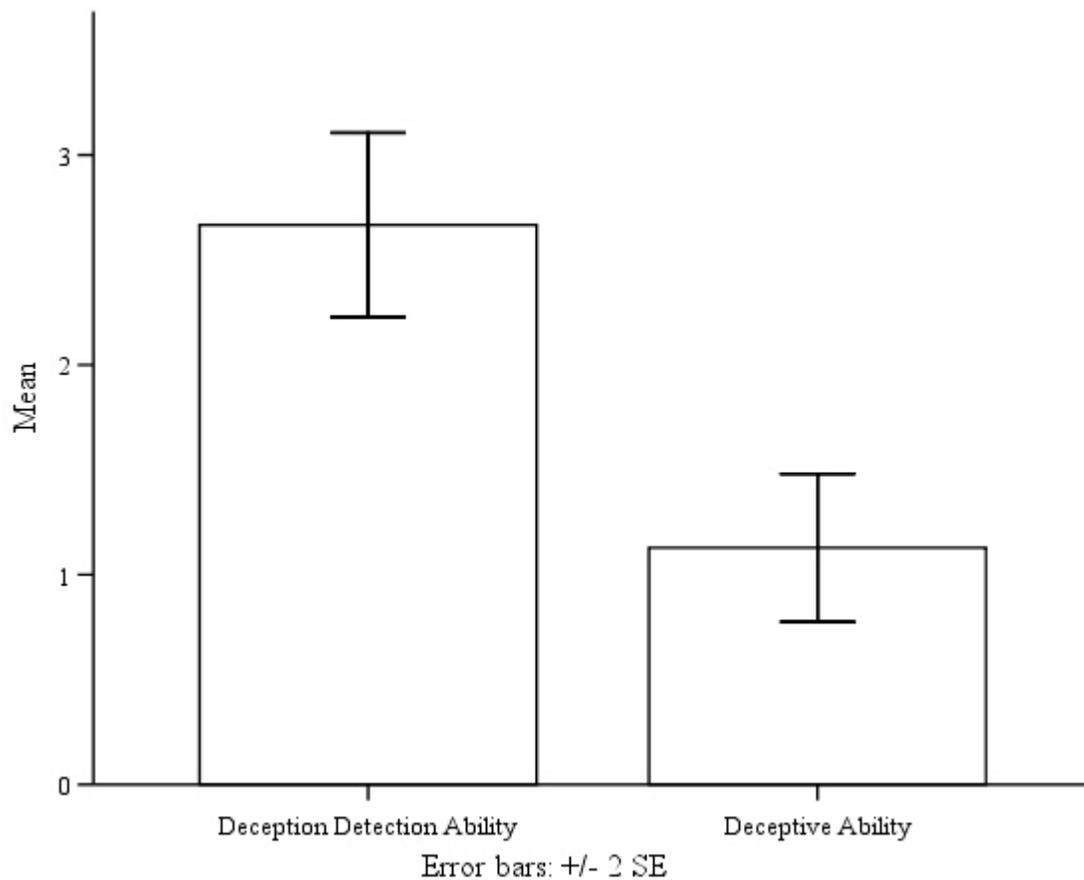
Deception was analyzed in a four-way repeated measures mixed-model analysis of variance (2 Gender x 3 Age x 2 False-Belief Understanding x 2 Deception) where gender, age, and false-belief understanding were the between subjects factors and deception was the within subjects factor. Effect sizes were computed as partial Eta squared values. Significant differences were found for both within and between factors. The results of the analysis of variance can be found in Table 4.6.

Table 4.6: Analysis of Variance Summary Statistics

Source	SS	df	MS	F	Sig.	Partial η^2
Between						
Age (A)	86.900	2	43.450	20.689	.000	.385
Gender (B)	19.757	1	19.757	9.408	.003	.125
False-Belief (C)	11.437	1	11.437	5.446	.023	.076
A X B	.246	2	0.123	0.059	.943	.002
A X C	12.369	2	6.185	2.945	.060	.082
B X C	.130	1	0.130	0.062	.804	.001
A X B X C	3.130	2	1.565	0.745	.479	.022
Error	138.609	66	2.100			
Within						
Deception (D)	76.127	1	76.127	37.033	.000	.359
D X A	5.186	2	2.593	1.261	.290	.037
D X B	0.000	1	0.000	0.000	.988	.000
D X C	1.439	1	1.439	0.700	.406	.010
D X A X B	2.415	2	1.208	0.588	.559	.017
D X A X C	4.062	2	2.031	0.988	.378	.029
D X B X C	1.340	1	1.340	0.652	.422	.010
D X A X B X C	4.129	2	2.064	1.004	.372	.030
Error	135.672	66	2.056			

Only one significant within group effect was found. There is a main task effect for deception ($F(2, 66) = 37.033, p < .000, \eta^2 = 0.359$). Scores on the deception detection task ($M = 2.67, SD = 1.938$) were significantly higher than scores on the deceptive ability task ($M = 1.13, SD = 1.557$). A graph of the means and standard error for the deception tasks can be found in Table 4.7.

Table 4.7: Graph of Task Effect



In addition to the one within group main effect, there are three between group main effects across deception. First, there is a main effect for age ($F(2,66) = 20.689$, $p < .000$, $\eta^2 = 0.385$). Post hoc comparisons were performed on age using Tukey's HSD at a .05 level. The results of the pairwise comparisons can be found in Table 4.8. Two comparisons reached significance. Four-year-olds ($M = 3.00$, $SD = 1.897$) performed significantly better than three-year-olds ($M = 1.19$, $SD = 1.721$) on the deception tasks (Mean Difference = 1.60, $p < .000$). In addition, five-year-olds ($M = 3.81$, $SD = 1.132$) also performed significantly better than three-year-olds on the deception tasks (Mean Difference = -2.13, $p < .000$). The pairwise comparison between four-year-olds and five-year-olds is not significant (Mean Difference = -0.54, $p < .148$). A graph of the means and standard errors for age effect on the deceptive ability task can be found in Table 4.9. A graph of the means and standard errors for the age effect on the deception detection task can be found in Table 4.10.

Table 4.8: HSD Pairwise Comparisons on Age

Age	Age	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
3	4	-1.60	.284	.000	-2.28	-.91
	5	-2.13	.284	.000	-2.82	-1.45
4	5	-0.54	.284	.148	-1.22	.14

Table 4.9: Graph of Age Effect on the Deceptive Ability Task

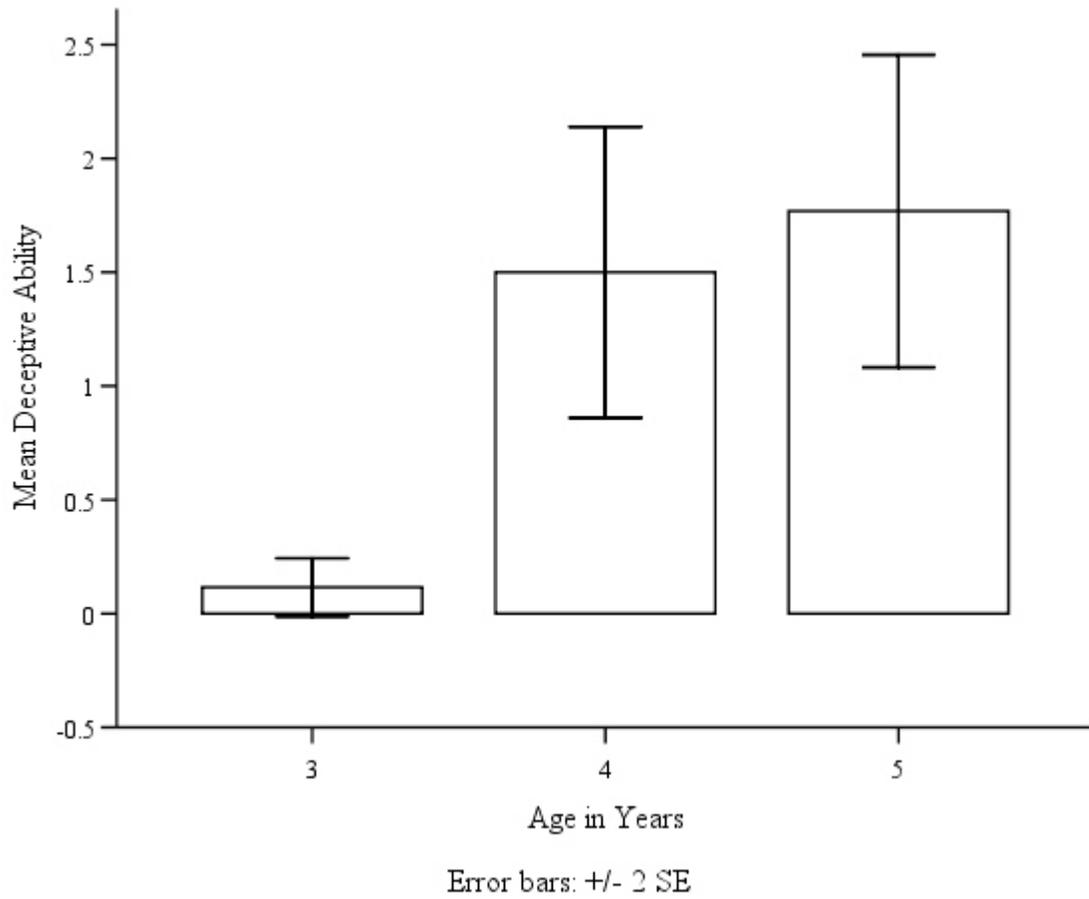
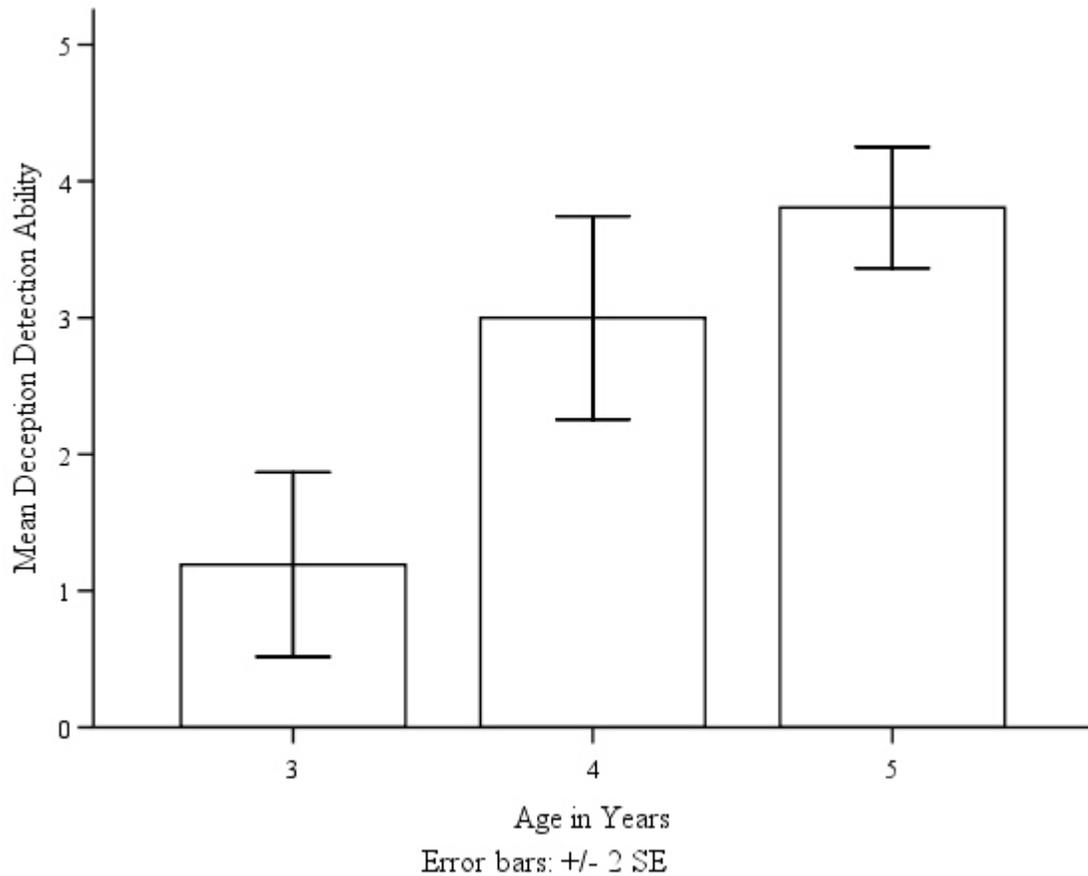


Table 4.10: Graph of Age Effect on the Deception Detection Task



Second, there is a main gender effect ($F(1,66) = 9.408, p >.003, \eta^2 = 0.125$).

Males ($M = 3.35, SD = 1.739$) performed significantly better than females ($M = 2.14, SD = 1.936$) on the deception tasks. A graph of the means and standard errors for the gender effect on the deceptive ability task can be found in Table 4.11. A graph of the means and standard errors for the gender effect on the deception detection task can be found in Table 4.12. Third, there is a main effect for false-belief understanding ($F(1,66) = 5.446, p <.023, \eta^2 = 0.076$). Children who passed the false-belief task ($M = 3.20, SD = 1.606$) performed significantly better on the deception tasks than those who failed the false-

belief task ($M = 2.33, SD = 2.066$). A graph of the means and standard errors for the false-belief understanding effect on the deceptive ability task can be found in Table 4.13. A graph of the means and standard errors for the false-belief understanding effect on the deception detection task can be found in Table 4.14. There were no significant interactions with neither the within nor between subjects factors.

Table 4.11: Graph of Gender Effect on Deceptive Ability Task

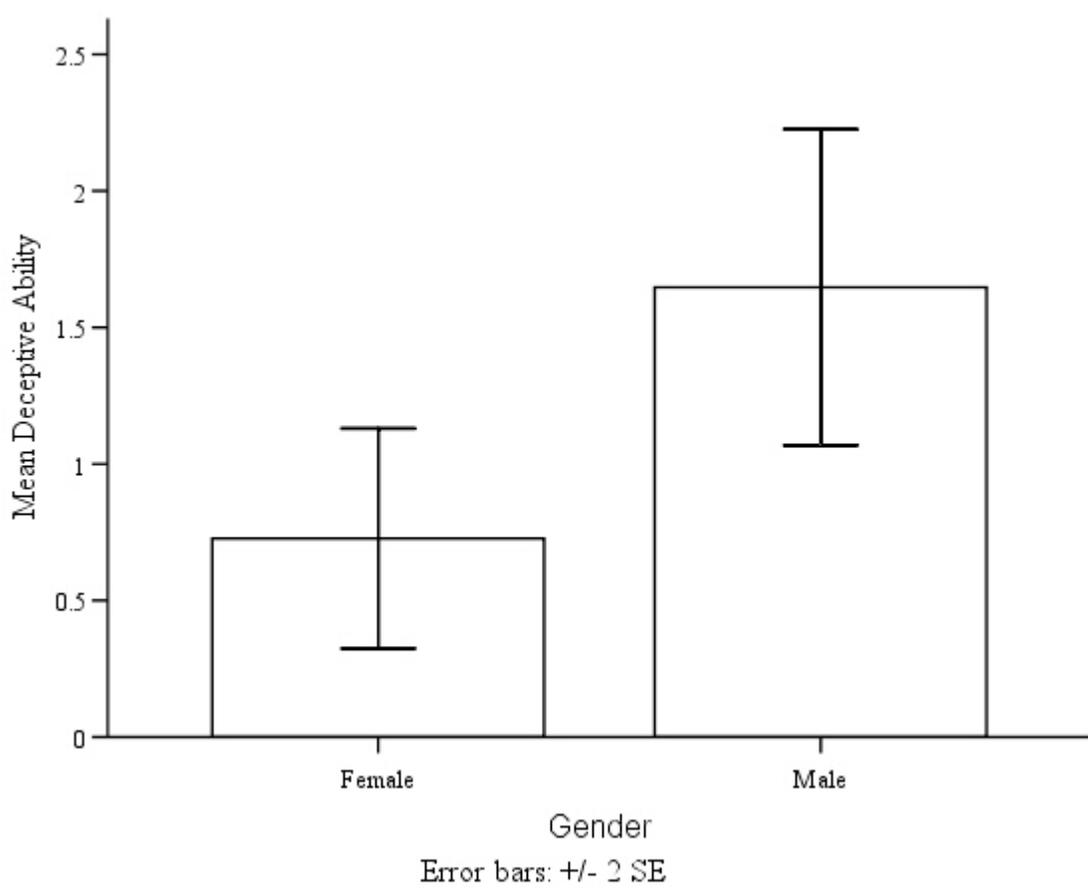


Table 4.12: Graph of Gender Effect on Deception Detection Task

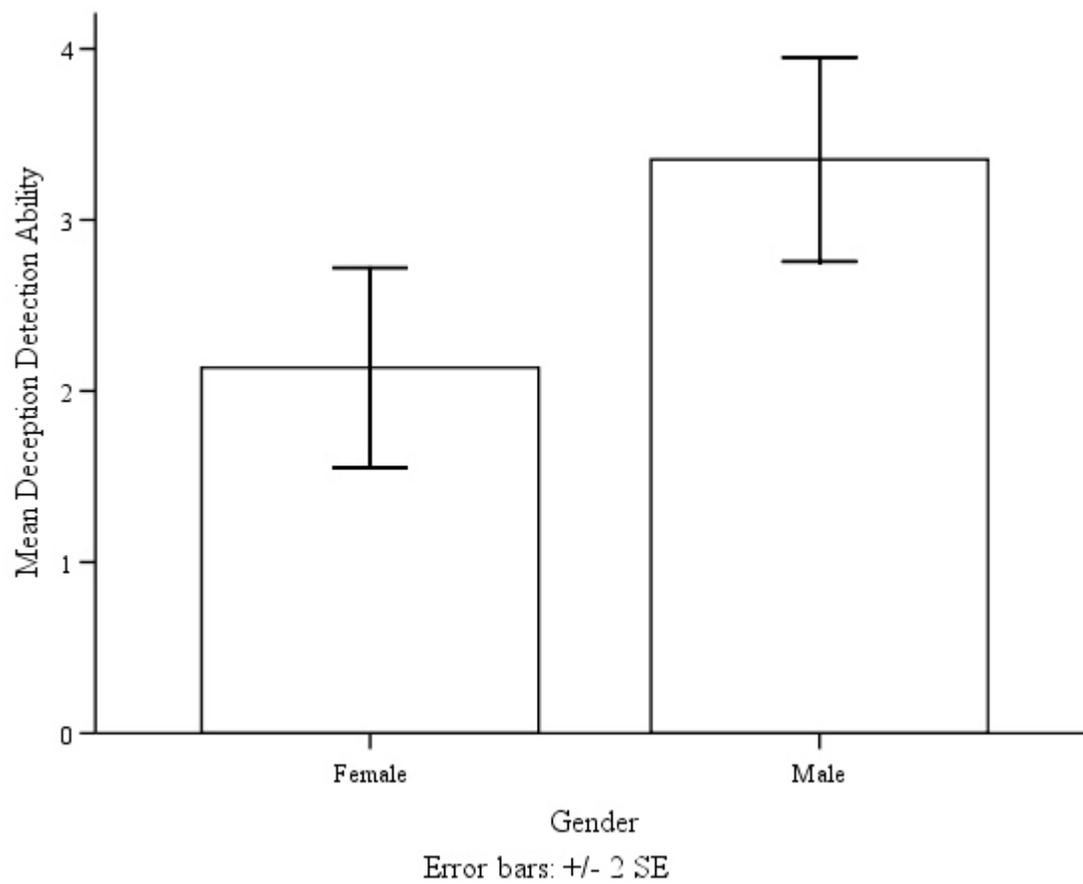


Table 4.13: Graph of False-Belief Understanding Effect on Deceptive Ability Task

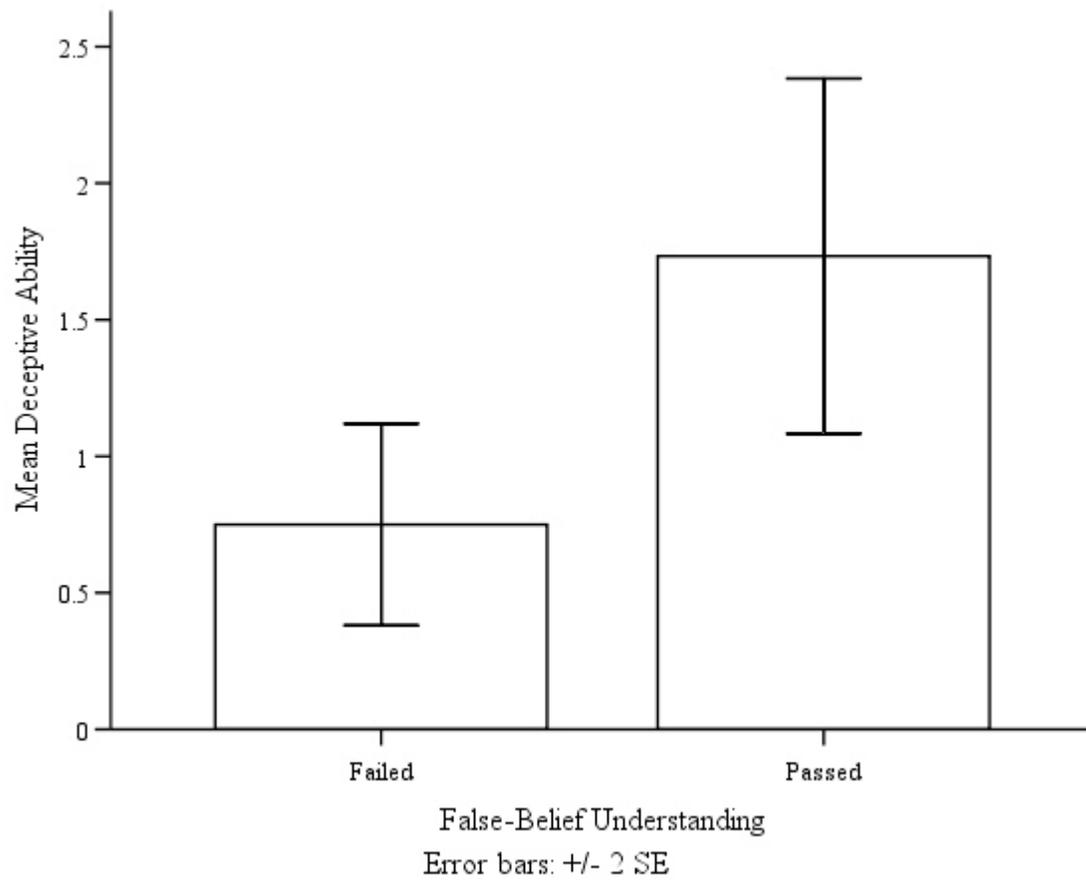
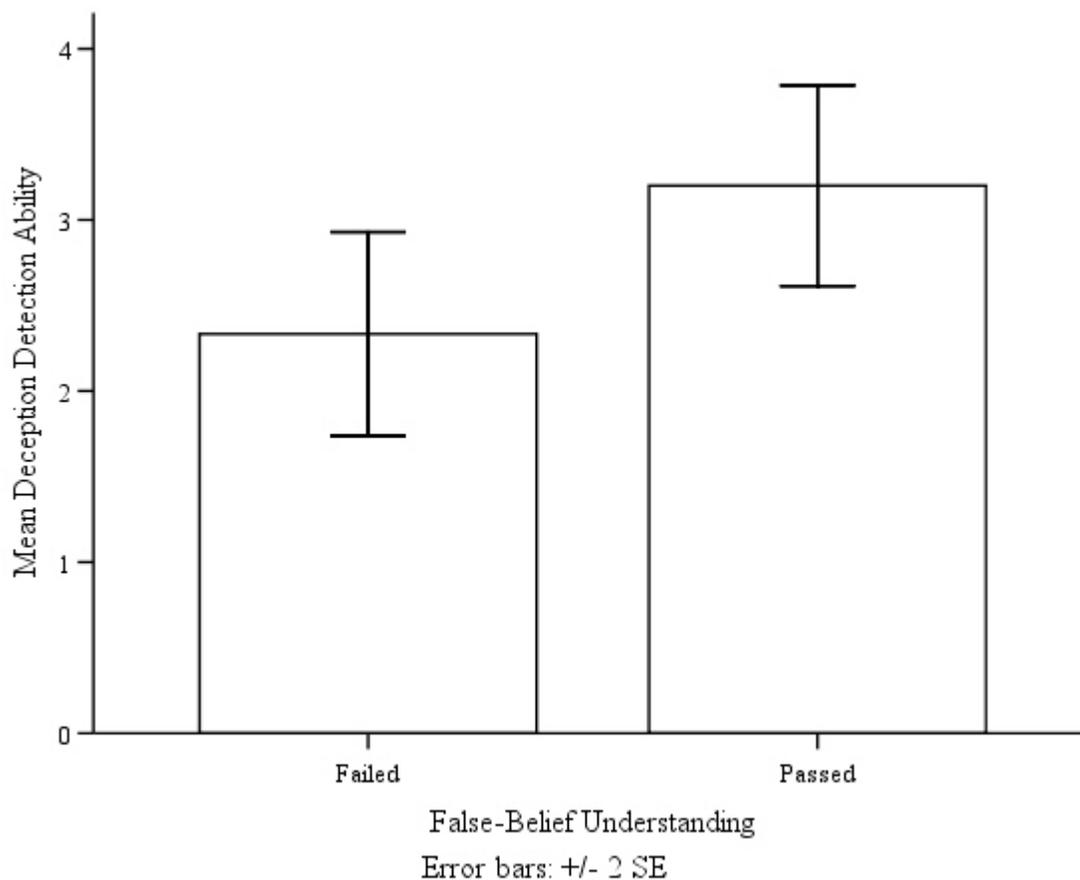


Table 4.14: Graph of False-Belief Understanding Effect on Deception Detection Task



Principal Components Analysis

A principal components analysis with varimax rotation was performed on the deception tasks in order to establish construct validity. Rotation converged after three iterations and two components were extracted. All of the deceptive ability task trials loaded onto one component, and all of the deception detection task trials loaded onto the other component. The total explained variance is presented in Table 4.15. In addition, the rotated component matrix can be found in Table 4.16.

Table 4.15: Total Variance Explained by the Principal Components Analysis

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.534	45.338	45.338	3.578	35.780	35.780
2	2.223	22.228	67.567	3.179	31.787	67.567
3	0.944	9.440	77.007			
4	0.801	8.015	85.021			
5	0.556	5.559	90.580			
6	0.387	3.873	94.453			
7	0.312	3.119	97.572			
8	0.106	1.059	98.631			
9	0.075	0.753	99.384			
10	0.062	0.616	100.000			

Table 4.16: Rotated Component Matrix

Item	Component 1	Component 2
Deceptive Ability Trial 1	-.106	.516
Deceptive Ability Trial 2	.087	.794
Deceptive Ability Trial 3	.190	.893
Deceptive Ability Trial 4	.279	.866
Deceptive Ability Trial 5	.220	.756
Deception Detection Trial 1	.576	.016
Deception Detection Trial 2	.906	-.021
Deception Detection Trial 3	.921	.101
Deception Detection Trial 4	.862	.269
Deception Detection Trial 5	.808	.286

Correlation Analysis

The results of the correlation analysis for the seven variables are shown in Table 4.17. Nine significant correlations were found between the variables. Three of the correlations involve age. First, there is a significant positive correlation between age and deceptive ability ($r = 0.436$, $p < .000$). This indicates that as age increases, deceptive ability increases with an r^2 of 0.190. Second, there is a significant positive correlation between age and deception detection ability ($r = 0.554$, $p < .000$). This indicates that as age increases, deception detection ability increases with an r^2 of 0.307. Third, there is a significant positive correlation between age and acceptance by peers ($r = 0.325$, $p < .004$).

This indicates that as age increases, acceptance by peers increases with an r^2 of 0.106. Two of the correlations involve gender. First, a significant positive correlation exists between gender and deceptive ability ($r = 0.295$, $p < .009$) with an r^2 of 0.087. Second, there is a significant positive correlation between gender and deception detection ability ($r = 0.313$, $p < .005$) with an r^2 of 0.098. Two of the correlations involve deception detection ability. First, there is a significant positive correlation between deceptive ability and deception detection ability ($r = 0.354$, $p < .001$). This indicates that as deceptive ability increases, deception detection ability increases with an r^2 of 0.125. Second, there is a significant positive correlation between deception detection ability and acceptance by peers ($r = 0.242$, $p < .033$). This indicates that as deception detection ability increases, acceptance by peers increases with an r^2 of 0.059. There is only one significant correlation involving false-belief understanding, which is the positive correlation between false-belief understanding and deceptive ability ($r = 0.309$, $p < .006$) with an r^2 of 0.095. The final significant correlation is the negative correlation between acceptance by peers and acceptance of peers ($r = -0.225$, $p < .047$). This indicates that as acceptance by peers decreases, acceptance of peers increases with an r^2 of 0.051.

Table 4.17: Correlation Matrix

	Gender	False-Belief	Deceptive Ability	Deception Detection	Accept. by Peers	Accept. of Peers
Age	.190	.129	.436(**)	.554(**)	.325(**)	.007
Gender		-.004	.295(**)	.313(**)	.068	-.135
False-Belief			.309(**)	.219	.003	-.063
Deceptive Ability				.354(**)	.121	.103
Deception Detection					.242(*)	-.086
Accept. by Peers						-.225(*)

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

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

Qualitative Data

Following the administration of the four tasks, each child participated in an exit interview in order to obtain qualitative data on the thought processes that the children were undergoing during the two deception tasks. A summary of examples for the types of responses that the children gave when they lacked understanding, as well as when they understood, the task dynamics is presented in Table 4.18.

Table 4.18: Summary of Exit Interview Responses

Question	Responses that Indicated Lack of Understanding	Responses that Indicated Understanding
<p>“What was Mean Turtle doing? Why did he ask you which sticker you wanted the most?”</p>	<p>“No.”</p> <p>“Why?”</p> <p>“He didn’t let me pick these [pointing to the collection in front of the puppet]. Why doesn’t he share anymore?”</p> <p>“He wanted to make me sad.”</p> <p>“Because he’s mean.”</p>	<p>“He was trying to take them all.”</p> <p>“Tricking me.”</p> <p>“To make me pick the bad one.”</p> <p>“He wanted them.”</p> <p>“He doesn’t want these” [pointing to the less desirable stickers].</p> <p>“Because he likes them.”</p> <p>“He wanted to take them because I wanted them.”</p> <p>“Cause he wanted me to lose.”</p> <p>“He was giving me the one I didn’t like.”</p>
<p>“Can you think of a way to get Mean Turtle to choose the sticker that you don’t want? Is there something that you could say or do?”</p>	<p>“No”</p> <p>“I don’t know.”</p> <p>“Say, ‘No.’”</p> <p>“Say, ‘Stop.’”</p> <p>“Say, ‘Don’t take it.’”</p> <p>“Tell him, ‘I don’t like you doing that.’”</p>	<p>“Tell him I like the others.”</p> <p>“Tell him I don’t like them.”</p> <p>“Have him take the ones I don’t want.”</p> <p>“Don’t let him know which is my favorite.”</p>

Question	Responses that Indicated Lack of Understanding	Responses that Indicated Understanding
	<p>“Ask him to give them back.”</p> <p>“Be really nice to him.”</p> <p>“Hold them close.”</p> <p>“Shoot him.”</p> <p>“Push him.”</p> <p>“Take it away.”</p> <p>“Hide it.”</p> <p>“Give him something else.”</p> <p>“Scare him. I have a skeleton costume from Halloween. I could use that.”</p>	
<p>“Did Tricky Giraffe give you good clues about where he was hiding the toys?”</p>	<p>“Yes”</p> <p>“No, I just guess. It’s kinda hard.”</p>	<p>“No, but my dad does.”</p> <p>“No, he gave me bad clues.”</p> <p>“Yes, it was easy.”</p> <p>“Yes, ‘cause I found it.”</p> <p>“Yes, I got all the hard things!”</p> <p>“He made it easy for me.”</p>
<p>“Did Tricky Giraffe ever give you any bad clues about where he was hiding the toys? Why?”</p>	<p>“No”</p> <p>“I don’t know.”</p> <p>“No, always good.”</p>	<p>“Yes”</p> <p>“He’s a tricky guy! My dad plays this game. You’re not tricky anymore, Giraffe!”</p>

Question	Responses that Indicated Lack of Understanding	Responses that Indicated Understanding
	<p>“No, but Turtle did.”</p> <p>“Yes, he got toys away from me.”</p>	<p>“No, I’m smart.”</p> <p>“He was tricky. He didn’t want me to find them.”</p> <p>“Yes, he was trying to take the stuff.”</p> <p>“Yes, he said it wasn’t under the cups when it was.”</p> <p>“He hid them in a tricky spot. It was a really tricky game for me.”</p> <p>“He tried to keep all the toys, but I’m trickier.”</p> <p>“You’re tricky, Giraffe. But not as tricky as me!”</p> <p>“He was being tricky. Really, really tricky.”</p>

In addition, while the children were completing the peer acceptance task, a number of them indicated why they liked a peer a lot or disliked a particular peer. A summary of the children’s comments are presented in Table 4.19.

Table 4.19: Summary of Peer Acceptance Commentary

Like a Peer A Lot	Do Not Like a Peer Very Much
<p>“He’s funny. He always says really funny things.”</p> <p>“She always plays with me.”</p> <p>“She’s fun to play with.”</p>	<p>“She doesn’t know how to talk.”</p> <p>“He never talks.”</p> <p>“She always cries.”</p> <p>“She pushes me and says, “Eww...go away!”</p> <p>“He spits on me.”</p> <p>“She always takes my stuff.”</p> <p>“He teams up against me with this boy” [pointing to another child in the class photo].</p> <p>“She never plays with me.”</p> <p>“I only play with boys.”</p> <p>“I only play with girls.”</p>

CHAPTER 5. DISCUSSION

The purpose of this study was to investigate the characteristics associated with deception and social development in early childhood that lead to individual differences in theory of mind development. Previous studies on deception in early childhood have only used deceptive ability tasks in order to assess children's competencies at deception. In other words, few, if any, previous studies have presented children with a situation in which they must predict the desire of another person while themselves holding a conflicting current desire. Because of this, previous research has been unable to determine whether a difference exists between deceptive ability and deception detection ability. Specifically, the question as to whether one ability develops before the other or whether they develop conjointly has not been addressed.

Consequently, an original deception detection task has been developed for this study that is capable of assessing desire understanding in preschool children. This data provides valuable insight into whether deception detection ability and deceptive ability are of the same entity. In addition, the data provides evidence as to whether deception detection ability, like deceptive ability, can be learned or whether the individual has to have a specialized cognitive module that handles deception already enabled. In addition to the deception detection task, participants in this study were presented with a false-belief task, deceptive ability task, and peer acceptance task. Finally, this dissertation contributes to existing literature on the relationship between deception and peer acceptance in early childhood. In sum, the information gleaned through this dissertation contributes to a relatively undeveloped field of theory of mind by examining individual

differences in the general population by providing detailed empirical evidence on the role that theory of mind and deception play in early childhood social functioning.

A four-way repeated measures mixed design analysis of variance was used in order to identify whether, among preschool children, there is 1) an age effect among three-, four-, and five-year-old preschool children for false-belief understanding, deceptive ability, and deception detection ability, 2) a gender effect for false-belief understanding, deceptive ability, and deception detection ability, and 3) a relationship between false-belief understanding, deceptive ability, and deception detection ability. In order to establish construct validity, a principal components analysis was performed on the deception tasks. In addition, a correlation analysis was performed in order to determine whether there is a relationship between peer acceptance, false-belief understanding, deceptive ability, and deception detection ability. Finally, qualitative data was collected through the use of an exit interview in order to gain understanding on the thought processes that children undergo during deceptive ability and deception detection ability tasks. The repeated measures analysis of variance, principal components analysis, and correlation analysis yielded a number of intriguing findings.

First, there is a significant task effect for deception intelligence. Children's performance on the deception detection task is better than their performance on the deceptive ability task. This indicates that the two tasks are measuring two separate abilities. This is further supported by the results of the principal components analysis in which two components were extracted. After three rotations, all five of the deceptive ability trials loaded onto the first factor, and all five of the deception detection trials

loaded onto the second factor. This further indicates that the overall deception intelligence scale is in fact measuring two different constructs. By identifying that the two abilities are separate, we are able to compare the performances on the two scales in order to determine which ability is easier for young children. For the deceptive ability task, the children succeeded on average of 1.13 trials. However, for the deception detection task, the children successfully completed an average of 2.67 trials. Because the mean score on the deception detection task was significantly higher than the deceptive ability task, we can infer that the deception detection ability is easier for young children than deceptive ability. This makes sense since deception detection involves only the ability to determine an individual's true intentions whereas deceptive ability involves the knowledge of how to counter another person's motives. In addition, once the children discovered the dynamics behind the two tasks, they did not revert. This supports the hypothesis that children are capable of learning deception detection and deceptive ability skills when given the opportunity. This could prove to be particularly valuable for use with educational "Stranger Danger" programs.

Second, there is a significant age effect for deception intelligence in preschool children. Three-year-olds perform significantly lower than four- and five-year olds across the deception tasks. However, there is not a significant difference between the performances of four- and five-year-olds. Three-year-olds on average discovered the nature of the deception tasks after approximately four trials. Four-year-olds, however, succeeded on the deception tasks after only two trials. Five-year-olds began succeeding on the deception tasks after a mere one to two trials. This is consistent with previous

theory of mind studies that found that four years of age appears to be the critical age for the emergence of deception skills (Peskin, 1992; Peterson, 2003). However, the lack of variance among the three-year-olds on the deception tasks indicates that there may be a possible floor effect. Therefore, it is possible that deception intelligence emerges before four years of age but that the tasks in this study were unable to measure three-year-olds' ability accurately. In addition, the lack of variance for the five-year-olds on the deception tasks suggests that there may be a ceiling effect. Such an effect can be due to the deception intelligence tasks not being difficult enough for five-year-olds. A ceiling effect, consequently, would limit five-year-olds from exhibiting their true deception intelligence ability. This in turn would make it erroneously appear as if four-year-olds and five-year-olds perform equally well on deception intelligence tasks. In conclusion, additional research using a wider range of deception tasks at varying degrees of difficulty is crucial for determining the true ability levels of three-year-olds and five-year-olds at deception intelligence.

Third, there is a significant gender effect for deception intelligence. Males perform significantly better than females across the deception tasks. Males discovered the nature of the antagonists in the deception tasks after one to two trials. Females, conversely, did not succeed on the deception tasks until after approximately three trials. One possible explanation for this effect is that girls are socialized to play in more passive and cooperative styles whereas boys are socialized to play in more aggressive and competitive styles. In addition, parents may be more likely to play teasing games with boys than with girls. However, further research is necessary before a more detailed

hypothesis can be made about the nature of the relationship between gender and deception in preschool children.

Fourth, there is a significant false-belief understanding effect for deception intelligence. Children who have an understanding of false-belief receive higher scores across the deception tasks than those who do not. Children who passed the false-belief task succeeded on an average of 3.20 trials. The children who failed the false-belief task, however, only succeeded on an average of 2.33 trials. This indicates that false-belief understanding is easier than deception detection and deceptive ability for young children. This finding is not surprising since false-belief understanding involves merely understanding that someone may have a different belief or desire while deception detection and deceptive ability require that the child not only understand that the other person's thoughts may be different but also apply this knowledge towards counteractive behavior so that the protagonist remains in control of the situation.

Fifth, there is a significant positive relationship between deception detection ability and peer acceptance. Children who receive higher scores on the deception detection task also receive higher acceptance scores by their peers. This is consistent with previous research that suggests that theory of mind is related to increased popularity (Slaughter, Dennis, & Pritchard, 2002; Peterson & Siegel, 2002). One possible explanation for this finding is that children who are more attuned to the wants of others are more liked by their peers. However, further research is needed in order to develop this theory further.

Sixth, there is a significant positive relationship between age and peer acceptance. Younger children receive significantly lower acceptance scores by their peers than older children. None of the children appeared to have difficulty with identifying exactly how they feel about their peers. As such, while the children were completing the peer acceptance task, they often provided a rationale for their decisions, especially in the case of the children whom they identified as not being liked very much. There are two main classifications of complaints that children have about their peers. The first deals with behavioral issues (“He spits on me” or “She always takes my stuff”). The second was in regards to the three-year-olds and involved their limited language ability (e.g., “He doesn’t talk” or “She doesn’t know how to talk”).

Finally, there is a significant negative relationship between acceptance scores that children give to their peers and acceptance scores that children receive from their peers. The more peers that children indicate that they like a lot, the less their peers say that they like them in return. This is attributable to three-year-olds being more likely to indicate that they like all of their peers a lot or to indicate that they like some children a lot and some a little but very few if any do they say that they dislike. In turn, as was mentioned above, three-year-olds tend to receive low peer acceptance scores by their peers due to language limitations and behavioral inappropriateness. It is interesting to note that while a few children were liked a lot by all of their peers, thus receiving perfect acceptance ratings by their peers, none of the children were identified as being disliked by all of their peers. In addition, while there were a handful of children who reported liking all of their peers a lot, which was primarily the three-year-olds, none of the children said that they

did not like any of their peers. In sum, this results in a relationship between the peer acceptance scores that children give to their peers and the peer acceptance scores that they receive from their peers.

Through the exit interviews, insight into the thought processes that the children underwent during the deception detection and deceptive ability tasks became available. Children who did not pass the deception detection and deceptive ability tasks were unable to identify the tasks' antagonists' intention and behavior (*e.g.*, "No"). However, children who succeeded on at least one trial of the deception detection task were able to identify that the task's antagonist was practicing tricky behavior in order to obtain a conflicting goal (*e.g.*, "He was tricky. He didn't want me to find them"). In addition, children who succeeded on at least one trial of deceptive ability were correctly able to identify the antagonist behavior patterns (*e.g.*, "He doesn't want these" [pointing to the less desirable stickers]). The majority of the children were also able to offer suggestions for how they might successfully counter the deceptive ability's antagonist, though few recommended using methods of deception (*e.g.*, "Tell him, 'I don't like you doing that'" versus "Tell him I like the others"). This suggests that the children who did not pass any of the trials were not simply experiencing difficulty with inhibiting their responses but legitimately failed to recognize the intentions and behaviors of the antagonists in the deception tasks.

This study adds support to the general consensus that at four years of age, children develop the ability to use highly sophisticated methods in order to determine that another individual is practicing acts of deception and the ability to use methods of trickery to deceive others successfully. By continuously watching for their peers' true

intentions, children are able to predict and control the behaviors of members of their social group by selecting the best social strategy for a given situation. Further, by being highly attuned to the thought processes of others, children are able to participate in deceptive behavior for personal gain.

Evolutionary psychologists would view the results of this study as providing further support for an evolutionary approach to Machiavellian Intelligence, arguing that a specific cognitive mechanism has evolved that involves false-belief understanding, deceptive ability, and deception detection skills. This module, they would contend, confers fitness advantages to individuals with theory of mind abilities beginning in early childhood by means of peer acceptance. Through increased peer acceptance, for example, individuals are more likely to secure resources that provide physical and emotional stability in times of need.

Empiricists, however, are equally likely to find the results of this study as supporting a non-evolutionary theory. From an empiricist perspective, child development can be explained through interactions with the environment. One might argue, then, that false-belief understanding, deceptive ability, and deception detection ability are learned abilities that are dependent upon cultural exposure. For example, as discussed above, the gender effect for deception intelligence may be the result of child rearing practices.

The findings from this study provide several additional questions to be addressed in future research. For example, further research that provides a more focused approach to investigating the relationship between gender and deception could prove fruitful in developing a more complete understanding of deception intelligence. Some specific

suggestions include assessing the differences between males and females on a wider variety of deception tasks. It would also be informative to discover whether this effect holds constant beyond early childhood. Additionally research that uses a wider variety of deception tasks is also necessary in order to establish a more detailed understanding of individual differences in false-belief understanding, deception detection ability, and deceptive ability. Such information may prove instrumental in developing a greater understanding of the developmental process that underlies deception intelligence. In addition, it is worth examining further the nature of the relationship between peer acceptance and deception detection ability. Finally, it would be interesting to research whether the effects found in this study remain across cultures.

REFERENCES

- Asher, S.R., Singleton, L.C., Tinsley, B.R., & Hymel, S. (1979). A reliable sociometric measure for preschool children. *Developmental Psychology, 15*, 443-444.
- Astington, J.W., & Jenkins, J.M. (1995). Theory of mind and social understanding. *Cognition and Emotion, 9*, 151-165.
- Badenes, L.V., Estevan, R.A.C., & Bacete, F.J.G. (2000). Theory of mind and peer rejection at school. *Social Development, 9*, 271-283.
- Baron-Cohen, S., Leslie, A.M., & Frith, U. (1985). Does the autistic child have a “theory of mind”? *Cognition, 21*, 37-46.
- Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: MIT Press.
- Bartsch, K., & Estes, D. (1996). Individual differences in children’s developing theory of mind and implications for metacognition. *Learning and Individual Differences, 8*, 281-304.
- Bennett, J. (1978). Some Remarks About Concepts. *Behavioral and Brain Sciences, 1*, 557-560.
- Bjorklund, D.F., & Pellegrini, A.D. (2002). *The origins of human nature: Evolutionary developmental psychology*. Washington, DC: American Psychological Association.
- Buss, D.M. (2004). *Evolutionary Psychology: The New Science of the Mind*. Boston: Pearson.

- Byrne, R., & Whiten, A. (Eds.) (1988). *Machiavellian intelligence: Social expertise and the evolution of intellect in monkeys, apes, and humans*. Oxford, England: Clarendon.
- Carlson, S.M., Moses, L.J., & Hix, H.R. (1998). The role of inhibitory processes in young children's difficulties with deception and false belief. *Child Development, 69*, 672-691.
- Christie, R., & Geis, F.L. (1970). *Studies in Machiavellianism*. New York: Academic Press.
- Cosmides, L. (1989). The logic of social exchange: Has natural selection shaped how humans reason? *Cognition, 31*, 169-193.
- Cuming, S., & Repacholi, B. (1999, July). *Is there a link between children's peer relationships and their theory of mind?* Poster presentation at the 11th Australasian Human Development Association Conference, Sydney, Australia.
- Davis, M.H., & Kraus, L.A. (1991). Dispositional empathy and social relationships. *Advances in Personal Relationships, 3*, 75-115.
- Denham, S.A., McKinley, M., Couchoud, E.A., & Holt, R. (1990). Emotional and behavioural predictors of preschool peer ratings. *Child Development, 61*, 1145-1152.
- Dennett, D.C. (1978). Beliefs About Beliefs. *Behavioral and Brain Sciences, 1*, 568-570.
- Dockett, S., & Degotardi, S. (1995). *Are popular children more likely than unpopular children to have developed a representational theory of mind at age 4?* Paper

presented at the Australian Association for Research in Education Conference, Hobart, Australia.

Dunn, J. (1995). Children as psychologists: The later correlates of individual differences in understanding of emotions and other minds. *Cognition and Emotion*, *9*, 187-201.

Dunn, J., Bretherton, I., & Munn, P. (1987). Conversations about feeling states between mothers and their young children. *Developmental Psychology*, *23*, 132-139.

Flavell, J.H., Flavell, E.R., Green, F.L., & Moses, L.J. (1990). Young children's understanding of fact belief versus value beliefs. *Child Development*, *61*, 915-928.

Flavell, J.H., Green, F.L., & Flavell, E.R. (1986). Development of knowledge about the appearance-reality distinction. *Monographs of the Society for Research in Child Development*, *51*(1, Serial No. 212).

Frye, D., & Moore, C. (Eds.). (1991). *Children's theories of mind: Mental states and social understanding*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic.

Garner, H. (1999). Are there additional intelligences? The case for naturalist, spiritual, and existential intelligences. In J. Kane (Ed.), *Education, information and transformation* (pp. 111-131). Englewood Cliffs, NJ: Prentice-Hall.

Hala, S., & Chandler, M. (1996). The role of strategic planning in accessing false-belief understanding. *Child Development*, *67*, 2948-2966.

- Jenkins, J., & Astington, J.W. (1996). Cognitive factors and family structure associated with theory of mind development in young children. *Developmental Psychology*, 32, 70-78.
- Keating, C.F., & Heltman, K.R. (1994). Dominance and deception in children and adults: Are leaders the best misleaders? *Personality and Social Psychology Bulletin*, 20, 312–321.
- Katz, L. (1988). What should young children be learning? *Wingspread Journal*, (special edition), 200-206.
- Keenan, T. (2003). Individual differences in theory of mind: The preschool years and beyond. In B. Repacholi & V. Slaughter (Eds.), *Individual differences in theory of mind: Implications for typical and atypical development* (pp. 121-142). New York, NY: Psychology Press.
- Kemple, K.M. (1991). Preschool children's peer acceptance and social interaction. *Young Children*, 46(5), 47-54.
- Lalonde, C.E., & Chandler, M.J. (1995). False belief understanding goes to school: On the social-emotional consequences of coming early or late to a first theory of mind. *Cognition and Emotion*, 9, 167-185.
- Leslie, A.M. (1987). Pretense and representation: The origins of "theory of mind." *Psychological Review*, 94(4), 412-426.
- Leslie, A.M. (1994). ToMM, ToBY, and agency: Core architecture and domain specificity. In L. Hirschfeld & S. Gelman (Eds.), *Mapping the mind: Domain*

specificity in cognition and culture (pp. 119-148). Cambridge, England: Cambridge University Press.

Lewis, M., Sullivan, M.W., Stanger, C. & Weiss, M. (1989). Self-development and self-conscious emotions. *Child Development*, 60, 146–156.

Machiavelli, N. (1513). *The Prince*. Harmondsworth, UK: Penguin Classics.

McNab, C. (2001). *Peer acceptance and theory of mind*. Unpublished MA thesis, University of Canterbury.

Mitchell, R.W. (1984). A framework for discussing deception. In R. Mitchell, & N. Thompson (Eds.), *Deception* (pp. 3-40). Albany: Suny Press.

O'Connor, T.G., & Hirsch, N. (1999). Intraindividual differences and relationship specificity of mentalising in early adolescence. *Social Development*, 8, 256-274.

Olson, D.R. (1993). The development of representations: The origins of mental life. *Canadian Psychology*, 34, 293-306.

Orbell, J., Morikawa, T., & Allen, N. (2002). The evolution of political intelligence: Simulation results. *British Journal of Political Science*, 32, 613-639.

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

Peskin, J. (1992). Ruse and representations: On children's ability to conceal information. *Developmental Psychology*, 28, 84-89.

Peterson, C.C. (2003). The social face of theory of mind: The development of concepts of emotion, desire, visual perspective, and false belief in deaf and hearing children.

- In B. Repacholi & V. Slaughter (Eds.), *Individual differences in theory of mind: Implications for typical and atypical development* (pp. 171-196). New York, NY: Psychology Press.
- Peterson, C.C., & Siegel, M. (2002). Mind-reading and moral awareness in popular and rejected preschoolers. *British Journal of Developmental Psychology*, *20*, 205-224.
- Piaget, J., & Inhelder, B. (1969). *The psychology of the child*. New York, NY: Basic Books.
- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, *1*, 515-526.
- Repacholi, B., Slaughter, V., Pritchard, M., & Gibbs, V. (2003). Theory of mind, Machiavellianism, and social functioning in childhood. In B. Repacholi & V. Slaughter (Eds.), *Individual differences in theory of mind: Implications for typical and atypical development* (pp. 67-97). New York, NY: Psychology Press.
- Ruffman, T., Garnham, W., Import, A., & Connolly, D. (2001). Does eye gaze indicate implicit knowledge of false belief? Charting transitions in knowledge. *Journal of Experimental Child Psychology*, *80*(3), 201-24.
- Ruffman, T., Perner, J., Naito, M., Parkin, L., & Clements, W.A. (1998). Older (but not younger) siblings facilitate false belief understanding. *Developmental Psychology*, *34*, 161-174.
- Slaughter, V., Dennis, M.J., & Pritchard, M. (2002). Theory of mind and peer acceptance in preschool children. *British Journal of Developmental Psychology*, *20*, 545-564.

- Tager-Flusberg, H. (2003). Exploring the relationship between theory of mind and social-communicative functioning in children with autism. In B. Repacholi & V. Slaughter (Eds.), *Individual differences in theory of mind: Implications for typical and atypical development* (pp. 197-212). New York, NY: Psychology Press.
- Watson, A.C., Nixon, C.L., Wilson, A., & Capage, L. (1999). Social interaction skills and theory of mind in young children. *Developmental Psychology, 35*, 386-391.
- Wellman, H.M. (1988). First steps in the child's theorizing about the mind. In J. Astington, P. Harris & D. Olson (Eds.), *Developing Theories of Mind*. Cambridge University Press.
- Wellman, H.M. (1990). *The child's theory of mind*. Cambridge, MA: MIT Press.
- Wellman, H.M., & Bartsch, K. (1988). Young children's reasoning about beliefs. *Cognition, 30*, 239-277.
- Wellman, H.M., & Wooley, J.D. (1990). From simple desires to ordinary beliefs: The early development of everyday psychology. *Cognition, 35*, 245-275.
- Whiten, A. (Ed.). (1991). *Natural theories of mind*. New York, NY: Blackwell.
- Wilson, D.S. (1998). *Unto Others: The Evolution and Psychology of Unselfish Behavior*. Harvard University Press.
- Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition, 13*, 103-128.